# Rook I Project

## Environmental Impact Statement

### Annex IV.2: Hydrometric Monitoring Characterization Report

GOLDER
MEMBER OF WSP

# HYDROMETRIC MONITORING CHARACTERIZATION REPORT
# FOR THE ROOK I PROJECT

Prepared for:

**NexGen Energy Ltd.**

Prepared by:

**Golder Associates Ltd.**

March 2022

# Executive Summary

The hydrometric monitoring baseline report is a component of a comprehensive baseline program that documents the natural and socio-economic environments in the anticipated area of the Rook I Project (Project). The hydrometric monitoring baseline program was undertaken to provide context from which effects on hydrological conditions from the Project can be assessed in the Rook I Environmental Impact Statement.

This report characterizes local hydrological conditions of lakes and streams in the area of the Project through detailed monitoring. No data were previously available for most of the lakes and streams included in this baseline study, and this field monitoring program therefore fills an important environmental knowledge gap in the area of the Project.

The monitoring program included the following surveys and types of monitoring:

- late winter snow surveys within Patterson Lake watershed in 2018 and 2019;
- water level monitoring at eight stations on lakes and ponds in the Clearwater River watershed;
- streamflow monitoring at 12 stations on streams and rivers in the Clearwater River watershed;
- water level and streamflow monitoring at Hodge Lake and its outflow in the Hodge Creek watershed;
- sediment sampling of channel bed substrate for particle size in the Clearwater River below Patterson, Beet and Naomi lakes; and
- suspended sediment (i.e., particles entrained within the water column) and bed load sediment (i.e., particles moving along the streambed) sampling at three streamflow monitoring stations downstream of Patterson Lake.

Snow accumulation available for snowmelt in Patterson Lake watershed was calculated from field snow surveys conducted in 11 terrain types; these types were based on slope and aspect (i.e., the direction the slope faces), and included lake and lake-edge terrain types. Snow water equivalent (SWE) results from the field surveys were compared with weekly SWE maps provided by Environment and Climate Change Canada (ECCC) throughout the winter and with data from the European Space Agency's Global Snow Monitoring for Climate Research (GlobSnow) Project. The comparison of the 2018 and 2019 snow surveys to the GlobSnow and ECCC weekly SWE maps provided confidence that the field survey SWE results in the anticipated area of the Project could be adequately approximated using the remote sensing data for 2020.

The hydrology monitoring program included nine stations along the Clearwater River mainstem (i.e., main channel) from its headwaters at Broach Lake to a location far downstream near Highway 955 above Warner Rapids, as well as numerous tributaries close to the proposed Project. Data collection was conducted year-round at several stations and seasonally during the open-water period at most other stations. A total of 11 field visits were completed between August 2018 and December 2020, and a wide range of water level and streamflow conditions were observed. Unit-area runoff values measured at the hydrometric monitoring stations were compared with long-term statistics at regional hydrometric stations to provide an indication of whether conditions in 2018 to 2020 were drier, wetter, or near average.

The main objective of this study has been met in that a wide range of hydrological conditions were observed at 22 waterbody and watercourse hydrometric stations, which provides sufficient and detailed information to support an Environmental Assessment for the Project.

**If referencing this report, please use for the following citation:**

Golder (Golder Associates Ltd.). 2021. Hydrometric Monitoring Characterization Report for the Rook I Project. Prepared for NexGen Energy Ltd.

# Table of Contents

**TABLES**

**FIGURES**

**APPENDICES**

# Abbreviations and Units of Measure

| Acronym | Definition |
|---|---|
| 1-D | one-dimensional |
| ADCP | acoustic Doppler current profiler |
| ADV | acoustic Doppler velocimeter |
| CCIN | Canadian Cryospheric Information Network |
| CR | Clearwater River |
| EA | Environmental Assessment |
| ECCC | Environment and Climate Change Canada |
| ERAI | European Re-analysis Interim |
| GGA | Generalized Gradient Approximation |
| GPS | global positioning system |
| HC | Hodge Creek |
| HEC-RAS | Hydrologic Engineering Center – River Analysis System |
| ID | identification |
| LSA | local study area |
| MS | main stem |
| NexGen | NexGen Energy Ltd. |
| NRCan | Natural Resources Canada |
| OWRC | open water rating curve |
| Project | Rook I Project |
| QA | quality assurance |
| QC | quality control |
| RSA | regional study area |
| RTK | real-time kinematic |
| SWE | snow water equivalent |
| TBRG | tipping bucket rain gauge |
| TI | tributary inflow |
| TLU | traditional land use |
| TSS | total suspended solids |
| UTM | Universal Transverse Mercator |
| WB | waterbody |
| WC | watercourse |
| WSC | Water Survey of Canada |
| WSE | water surface elevation |

| Units | Definition |
|---|---|
| % | percent |
| < | less than |
| ° | degree |
| °C | degrees Celsius |
| cm | centimetre |
| g | gram |
| $g/cm^3$ | grams per cubic centimetre |
| km | kilometre |
| $km^2$ | square kilometre |
| $L/s/km^2$ | litres per second per square kilometre |
| m | metre |
| $m^3/s$ | cubic metres per second |
| masl | metres above sea level |
| mg/L | milligrams per litre |
| mm | millimetre |
| $Mm^3$ | million cubic metres |

# 1.0 INTRODUCTION

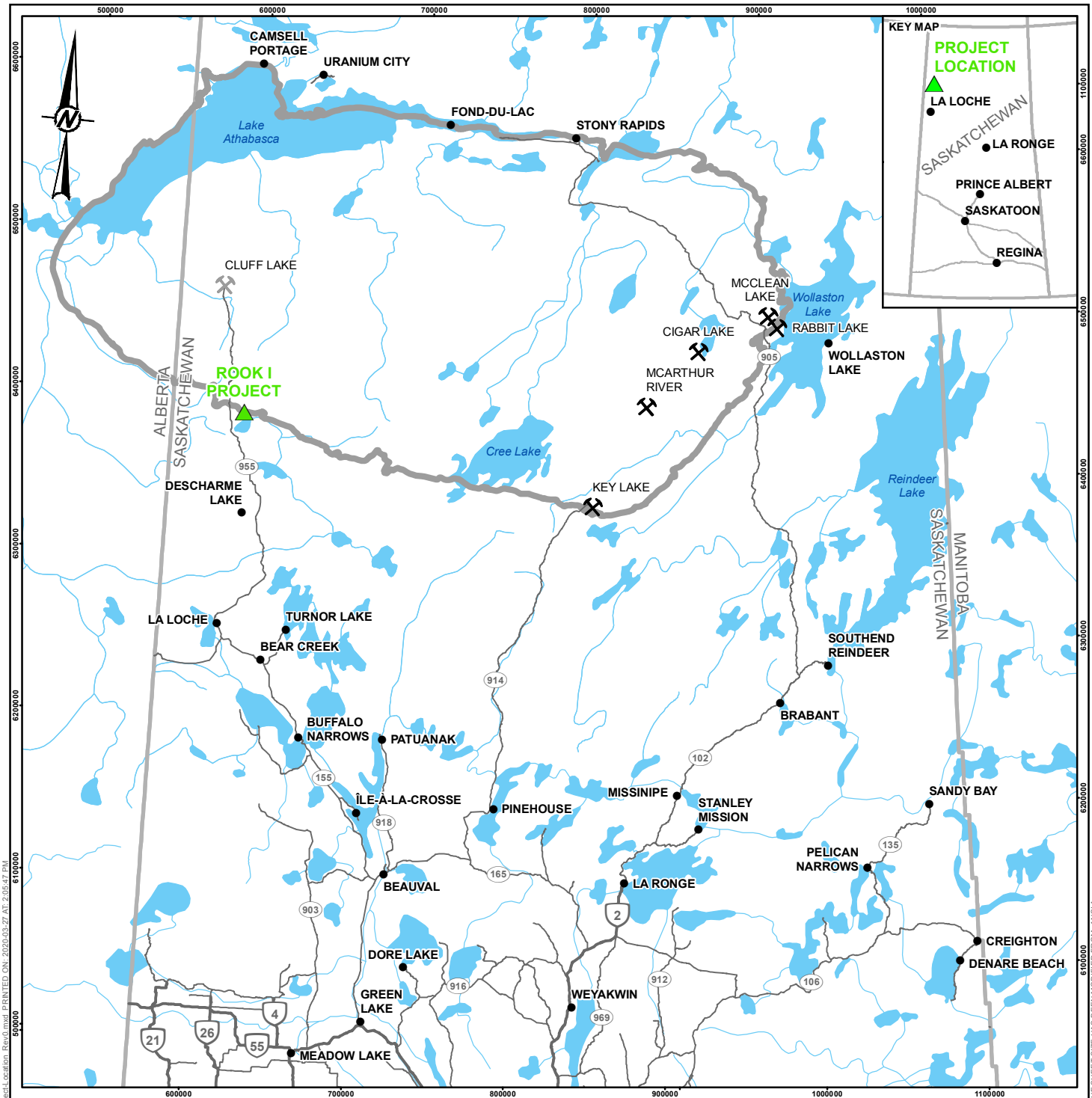
The Rook I Project (Project) is a proposed new uranium mining and milling operation that is 100% owned by NexGen Energy Ltd. (NexGen). The Project would be located in northwestern Saskatchewan, approximately 40 km east of the Saskatchewan-Alberta border, 130 km north of the town of La Loche, and 640 km northwest of the city of Saskatoon (Figure 1). The Project would reside within Treaty 8 territory and within the Métis Homeland. At a regional scale, the Project would be situated within the southern Athabasca Basin adjacent to Patterson Lake, and along the upper Clearwater River system (Figure 2). Access to the Project would be from an existing road off of Highway 955. The Project would include underground and surface facilities to support the extraction and processing of uranium ore from the Arrow deposit, a land-based, basement-hosted, high-grade uranium deposit.

The hydrometric monitoring baseline report represents a component of a comprehensive baseline program that documents the natural and socio-economic environments in the anticipated area of the Project. The hydrometric monitoring baseline program was undertaken to provide context from which Project environmental hydrometric monitoring effects could be assessed in the Environmental Impact Statement (EIS).

Since exploration at the Project commenced in 2013, NexGen has engaged regularly and established relationships with local First Nation and Métis Groups (collectively referred to as Indigenous Groups) and northern communities, specifically those closest and with greatest access to the proposed Project. NexGen respects the rights of Indigenous Peoples and the unique relationship Indigenous Peoples have with the environment and recognizes the importance of full and open discussion with interested or potentially affected Indigenous communities regarding the development, operation, and decommissioning of the proposed Project. Engagement activities to date, as well as future planned engagement activities, reflect the value NexGen places on meaningful engagement with Indigenous Peoples and northern communities who could be potentially affected by the proposed Project. Engagement mechanisms have included, but are not limited to: meetings with leadership, workshops and community information sessions, Project site tours, establishing Joint Working Groups to support the gathering and incorporation of Indigenous and Local Knowledge throughout the Environmental Assessment (EA) process, and providing funding for Traditional Land Use (TLU) Studies[1] to understand how the proposed Project may interact with the Indigenous communities traditional use of the anticipated area of the Project.

Feedback received during engagement activities was documented for contribution to the EIS for the Project; examples of feedback received include discussion of concerns, interests, potential adverse effects, mitigation, and design alternatives. Many baseline studies were initiated in advance of formal engagement on the EA for the Project; however, engagement during the execution of baseline studies has helped inform the understanding of baseline conditions and confirmed components of the natural and socio-economic environments that required study. A summary of feedback related to the hydrometric monitoring baseline program is presented in Appendix A of the Hydrology Road Map (Annex IV).

[1] Traditional Land Use Studies include all land use studies developed by the Project's affected Indigenous Groups, including Traditional Land Use and Occupancy studies, Traditional Knowledge and Use studies, and Indigenous Rights and Knowledge studies, henceforth referred collectively as TLU studies




**LEGEND**

- POPULATED PLACE
- URANIUM MINING FACILITY (ACTIVE)
- URANIUM MINING FACILITY (DECOMMISSIONED)
- PRIMARY HIGHWAY
- SECONDARY HIGHWAY
- WATERCOURSE
- WATERBODY
- ATHABASCA BASIN BOUNDARY
- PROJECT LOCATION

0 100 200

1:3,500,000 KILOMETRES

**REFERENCE(S)**

1. BASE DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
PROJECTION: UTM ZONE 12 DATUM: NAD 83

CLIENT

NexGen Energy Ltd.

PROJECT

ROOK I PROJECT

TITLE

**LOCATION OF THE ROOK I PROJECT, SASKATCHEWAN**

CONSULTANT

GOLDER

| | |
|---|---|
| YYYY-MM-DD | 2020-03-27 |
| DESIGNED | SS |
| PREPARED | NO/AK |
| REVIEWED | JMC |
| APPROVED | MM |

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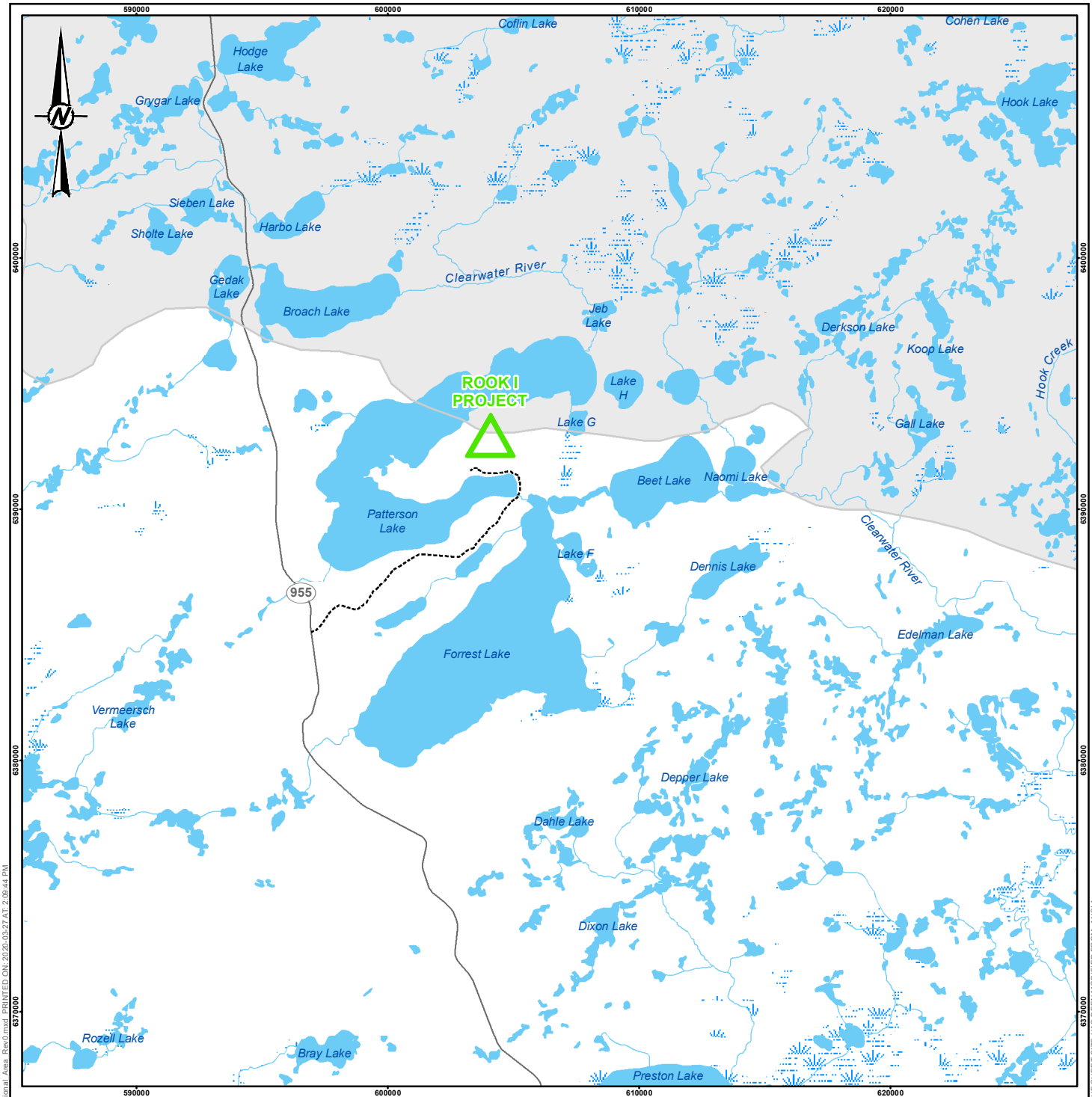


**LEGEND**

- SECONDARY HIGHWAY
- WATERCOURSE
- WATERBODY
- WETLAND
- ATHABASCA BASIN
- PROJECT LOCATION
- EXISTING ACCESS ROAD

0 5,000 10,000

1:225,000 METRES

**REFERENCE(S)**

1. BASE DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
PROJECTION: UTM ZONE 12 DATUM: NAD 83

CLIENT

NexGen Energy Ltd.

PROJECT

ROOK I PROJECT

TITLE

**REGIONAL AREA OF THE ROOK I PROJECT**

CONSULTANT

GOLDER

| | |
|---|---|
| YYYY-MM-DD | 2020-03-27 |
| DESIGNED | JMC |
| PREPARED | NO/AK |
| REVIEWED | JMC |
| APPROVED | MM |

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# 2.0 STUDY OBJECTIVE

The overall objective of the hydrometric baseline report was to describe the existing hydrological conditions in the baseline study area to support an EA for the Project. Specifically, the objectives of the hydrology baseline study were to characterize:

- snow accumulation available for melt at the basin scale;
- spatial and seasonal variation of water surface elevation (WSE) and discharge; and
- sediment transport characteristics.

The field studies completed in support of the hydrological baseline included:

- late winter snow surveys in April 2018 and March 2019;
- hydrometric monitoring of eight watercourses and eight waterbodies within the hydrology regional study area (RSA);
- hydrometric monitoring at three stations downstream of the RSA along the Clearwater River;
- hydrometric monitoring at one watercourse and one waterbody outside of the RSA along Hodge Creek;
- geodetic (an elevation of a given point on land above a published vertical datum reference system) GPS (global positioning system) RTK (real-time kinematic) surveys of key hydrometric station benchmarks; and
- suspended and bed load sediment sampling at three locations along the Clearwater River mainstem (i.e., main channel) downstream of Patterson Lake.

# 3.0 STUDY AREAS

The study areas for the hydrology baseline program include the following (Figure 3):

- local study area (LSA): the Clearwater River watershed to Naomi Lake outlet; and
- RSA: the Clearwater River watershed above the Mirror River confluence.

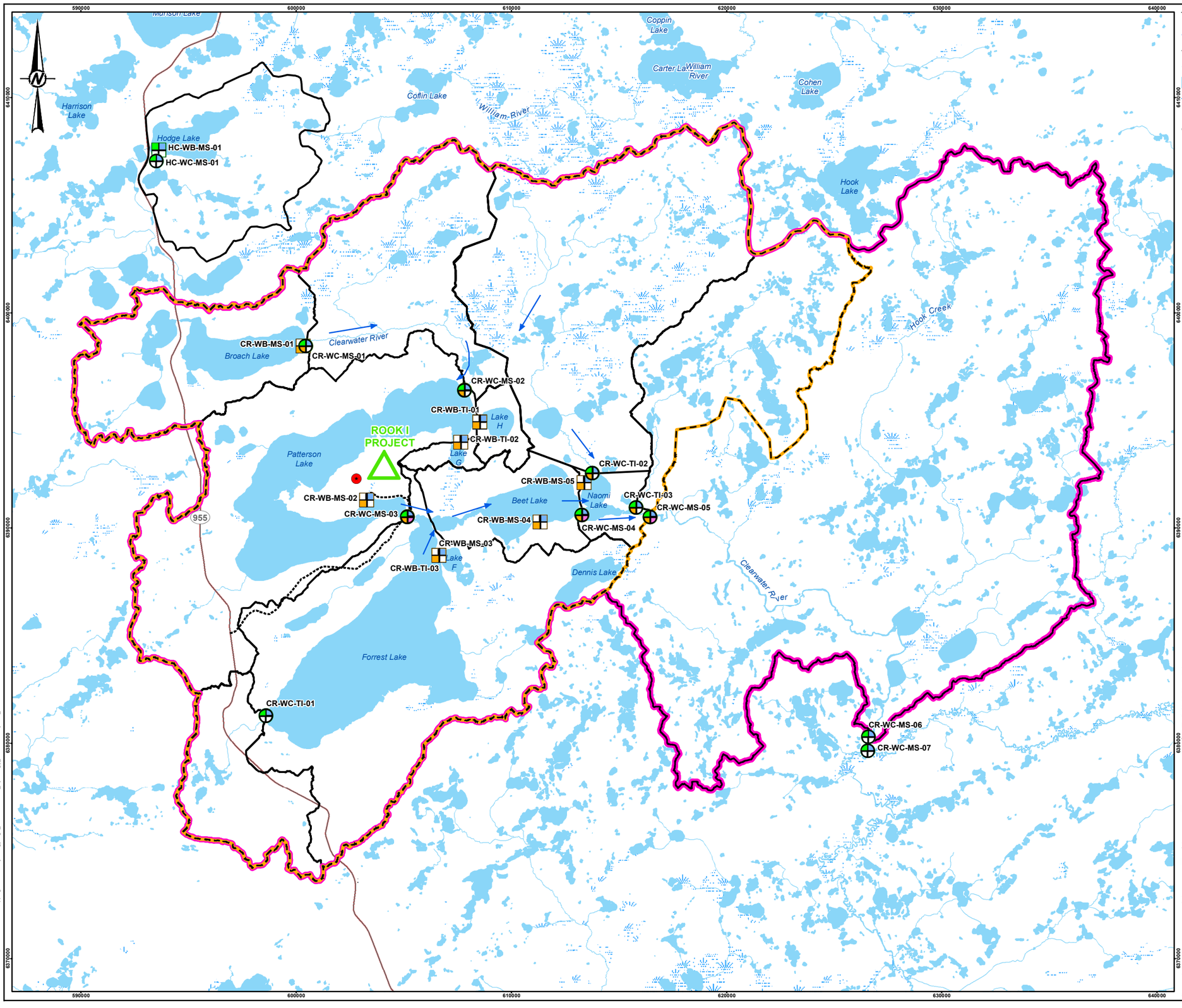
The Project would be located adjacent to Patterson Lake near the headwaters of the Clearwater River system at Broach Lake. The Clearwater River Upper Reach flows from the area near Broach Lake through a series of lakes including Patterson, Forrest, Beet, and Naomi lakes in order from upstream to downstream. The upper Clearwater River flows over a distance of 41.5 km from Broach to Naomi lakes; this area is dominated by glaciolacustrine terrain (Annex IV.3). From Naomi Lake, the Clearwater River flows another 20 km southeast before reaching the Mirror River confluence. Below the Mirror River confluence, the Clearwater River deepens with higher flow volumes from the Mirror River, and the channel form becomes meandering within a well-defined river valley. Farther downstream, the Clearwater River flows through Lloyd Lake, which is just upstream of the Clearwater River Provincial Park; the downstream end of the park is at the Saskatchewan–Alberta border.

Based on hydrological characteristics of the region and a screening-level assessment of the potential direct effects of the Project, the LSA is defined as the Clearwater River watershed up to the Naomi Lake outlet (Figure 3). The Clearwater River watershed above the Naomi Lake outlet drains an area of 685 $km^2$. Direct effects on hydrology may include changes to flows and water levels.

The RSA for hydrology includes waterbodies and watercourses within the Clearwater River watershed above the Mirror River confluence, which includes the LSA (Figure 3). The Clearwater River watershed above the Mirror River confluence drains an area of 1,070 $km^2$. The spatial extent of the Clearwater River watershed above the Mirror River confluence is expected to provide an ecologically relevant RSA for the EA. The RSA spans an area that provides habitat requirements for a discernible population unit of large-bodied fish species where cumulative effects may occur. The hydrometric stations in the RSA are shown in Figure 3.

The hydrological baseline studies collected sufficient data over approximately three years at numerous locations within the LSA and RSA and a wide range of hydrological conditions was observed. Hydrological baseline studies focused on the Clearwater River watershed to the Patterson Lake outlet and along the main lake chain downstream, including Forrest Lake, Beet Lake, Naomi Lake, and the reaches of the Clearwater River separating these lakes. Additional data were collected in small waterbodies adjacent to Patterson Lake (i.e., Lakes G and H), and upstream of Patterson Lake (i.e., Broach Lake, Broach Lake outflow, and the Clearwater River above Patterson Lake).

There are three hydrometric stations at locations of interest downstream of the RSA boundary, referred to as far-field stations. These locations contribute valuable information about hydrological variation in the upper Clearwater River and include the Clearwater River downstream of the Mirror River confluence, at the Lloyd Lake outlet, and above Warner Rapids. Hodge Lake and its outlet were added as reference monitoring locations in 2020; these stations are north of the Clearwater River watershed. Locations and watershed boundaries for the three far-field hydrometric stations and Hodge Lake reference stations relevant to the hydrology baseline are shown in Figure 4.




**LEGEND**

- FLOW DIRECTION
- SECONDARY HIGHWAY
- WATERCOURSE
- WATERBODY
- WETLAND

**PROJECT FEATURES**

- EXISTING ACCESS ROAD
- PROJECT LOCATION
- METEOROLOGICAL STATION

**WATERBODY HYDROMETRIC STATIONS**

- DISCHARGE
- SURVEYED BENCHMARK (GEODETIC DATUM)
- TOTAL SUSPENDED SOLIDS AND BEDLOAD
- WATER SURFACE ELEVATION

**WATERCOURSE HYDROMETRIC STATIONS**

- DISCHARGE
- SURVEYED BENCHMARK (GEODETIC DATUM)
- TOTAL SUSPENDED SOLIDS AND BEDLOAD
- WATER SURFACE ELEVATION
- HYDROLOGY LOCAL STUDY AREA
- HYDROLOGY REGIONAL STUDY AREA
- WATERSHED

0 3,500 7,000

1:175,000 METRES

**REFERENCE(S)**

1. BASE DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
2. WATERSHEDS DELINEATED BY GOLDER USING GREENKENUE SOFTWARE BASED ON CANADIAN DIGITAL ELEVATION DATA AND NATIONAL HYDROGRAPHIC NETWORK WATERCOURSES.

PROJECTION: UTM ZONE 12 DATUM: NAD 83

CLIENT

NexGen Energy Ltd.

PROJECT

ROOK I PROJECT

TITLE

**HYDROLOGY BASELINE STUDY AREAS**

CONSULTANT

GOLDER

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|---|---|
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| PREPARED | NO |
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| APPROVED | RP |

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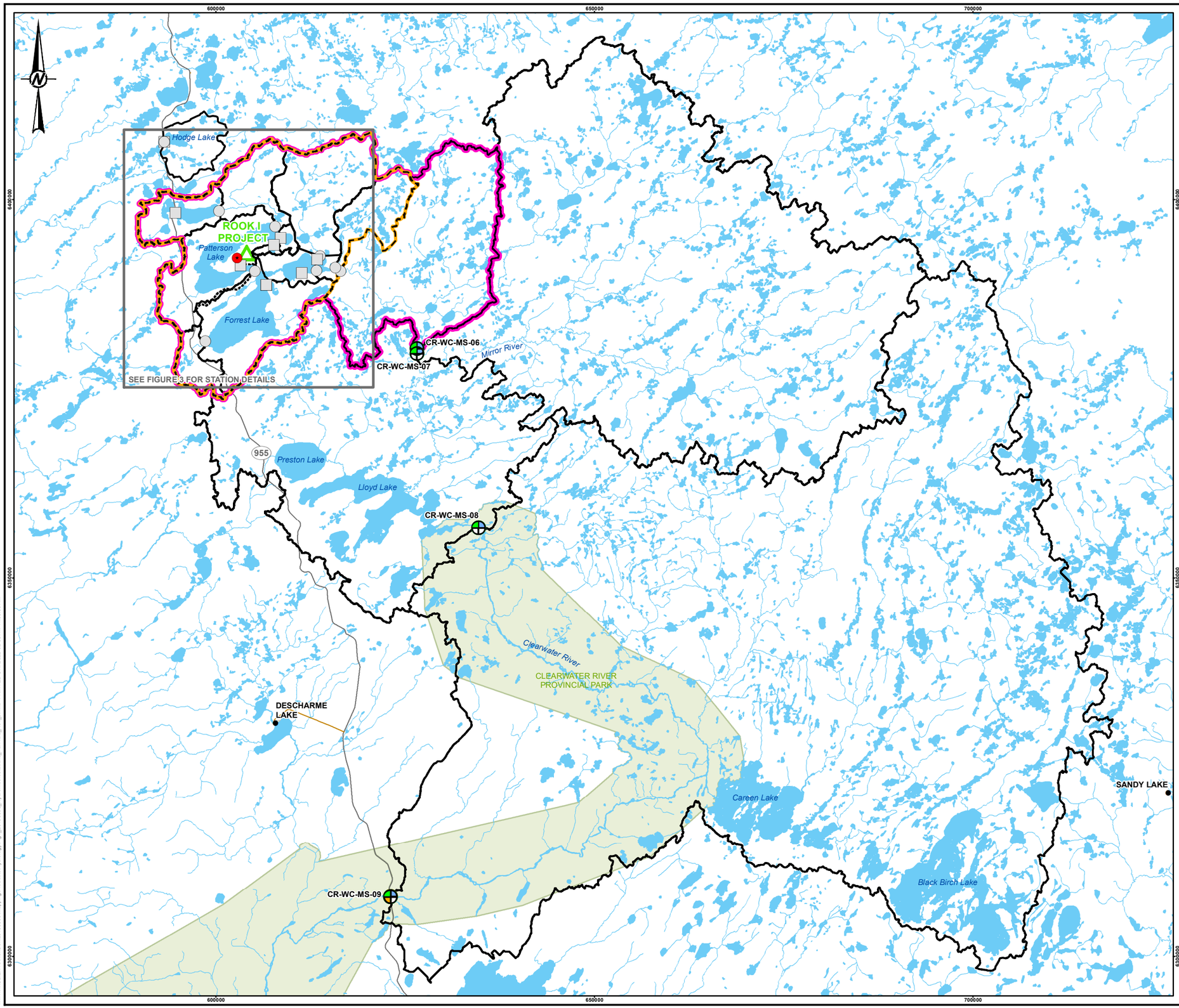


**LEGEND**

- POPULATED PLACE
- SECONDARY HIGHWAY
- LOCAL ROAD
- WATERCOURSE
- PARK
- WATERBODY

**PROJECT FEATURES**

- EXISTING ACCESS ROAD
- PROJECT LOCATION
- METEOROLOGICAL STATION

**WATERBODY HYDROMETRIC STATIONS**

- DISCHARGE
- SURVEYED BENCHMARK (GEODETIC DATUM)
- TOTAL SUSPENDED SOLIDS AND BEDLOAD
- WATER SURFACE ELEVATION

**WATERCOURSE HYDROMETRIC STATIONS**

- DISCHARGE
- SURVEYED BENCHMARK (GEODETIC DATUM)
- TOTAL SUSPENDED SOLIDS AND BEDLOAD
- WATER SURFACE ELEVATION
- HYDROLOGY LOCAL STUDY AREA
- HYDROLOGY REGIONAL STUDY AREA
- WATERSHED

0 10 20

**REFERENCE(S)**

1. PROJECT FEATURES OBTAINED FROM NEXGEN, OCTOBER 28, 2019.
2. BASE DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
3. WATERSHEDS DELINEATED BY GOLDER USING GREENKENUE SOFTWARE BASED ON CANADIAN DIGITAL ELEVATION DATA AND NATIONAL HYDROGRAPHIC NETWORK WATERCOURSES.

PROJECTION: UTM ZONE 12 DATUM: NAD 83

CLIENT
NexGen Energy Ltd.

PROJECT
ROOK I PROJECT

TITLE
**FAR-FIELD HYDROMETRIC STATIONS**

CONSULTANT
GOLDER

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| PREPARED | NO |
| REVIEWED | JH |
| APPROVED | RP |

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# 4.0 METHODS

## 4.1 Review of Existing Information

No publicly available hydrometric data collected within the RSA were available for use in the baseline study. The Rook I Meteorological Station (Figure 3) was in place before the commencement of the hydrometric baseline program; its data were used in the current study, and details are provided in Section 4.3.

## 4.2 Approach

The hydrological baseline data collection from 2018 to 2020 included the following main components:

- Local meteorological conditions were monitored from 2018 to 2020.
- Snow surveys were completed in the Patterson Lake watershed in April 2018 and March 2019.
- Hydrometric monitoring was conducted from 2018 to 2020:
  - Hydrometric stations were established in August 2018 at eight waterbodies (i.e., lakes or ponds) and 12 watercourses (i.e., flowing channels such as rivers, creeks, streams, brooks), and monitored until September 2020. Additional hydrometric stations were established at Hodge Lake and its outflow in June 2020 and monitored until September 2020.
  - Three local benchmarks were installed at each hydrometric station and surveyed during each field visit using an optical level.
  - Geodetic elevations for benchmarks at the 15 hydrometric stations were obtained in October 2018 using both real-time kinematic (RTK) and station occupation (static) global positioning service (GPS) survey methods. Four Global Navigation Satellite System (GNSS) receivers were used: two receivers were used as an RTK base and rover system, while the other two receivers were used to perform static surveys at various survey control points. . Static surveys allowed for post-processing of the GNSS data using the Canadian Spatial Reference System Precise Point Positioning (CSRS-PPP). Horizontal positions were established in Universal Transverse Mercator North American Datum of 1983 (UTM NAD83 Zone 12).
  - Discharge and WSE were measured during the field visits completed between August 2018 and September 2020. Continuous records of WSE were developed for the waterbodies and watercourses with installed Solinst Levelogger pressure transducers, which compensated for barometric pressure and corrected to geodetic or local benchmark elevations using the field WSE surveys. Discharge records were derived for watercourses using stage-discharge rating curves for the same period that Levelogger pressure transducers were installed.
- Sediment sampling was conducted from 2018 to 2020:
  - Total suspended solids (TSS) was sampled on numerous dates at the same time that discharge was measured
  - Sediment discharge was measured
  - Bed material samples were collected at three hydrometric stations along the Clearwater River mainstem.

The following sections describe the field data collection and data analysis methods used for each of the main study components, followed by quality assurance / quality control (QA/QC) used to confirm the integrity of the data.

## 4.3 Local Meteorological Data

Local meteorological data, in particular precipitation and air temperature, provided valuable baseline information about seasonal and annual variations in hydrological conditions near the proposed Project. Precipitation data were used to interpret the rainfall-response and recession of waterbody and watercourse hydrographs. Air temperature data were used to interpret mid-winter cold snaps that can influence water level hydrographs, as well as help to define the spring thaw and fall freeze-up hydrographs.

### 4.3.1 Data Collection

Local meteorological conditions were monitored at the Rook I Meteorological Station, located near the exploration camp (UTM NAD83 12V 602795 E 6392291 N, 550 m). The Rook I Meteorological Station has operated since installation on 13 September 2018 (Figure 3).

The meteorological variables measured included air temperature, total precipitation, humidity, solar radiation, rainfall, and wind speed. Total precipitation, which is of principal interest for providing context for the hydrometric monitoring, was measured using a Geonor T-200B total precipitation gauge, which reported cumulative precipitation in millimetres on an hourly interval. The Geonor gauge was equipped with an Alter-style wind shield to improve rainfall and snowfall catch efficiency. A Campbell-scientific CR1000 data logger was installed in an enclosure and the power supply consisted of a 20-watt solar panel and 26 Amp-hour battery. The station has a 10 m anemometer tower (used to measure wind speed and direction), where the air temperature sensor was installed at a height of 2 m, and the Geonor and Alter shield were installed at a height of 2.5 m.

Prior to 15 September 2018, local precipitation was measured using a TE525M tipping bucket rain gauge (TBRG) (UTM NAD83 12V 604501 E 6393442 N) installed at a height of 1.5 m above ground. The TBRG measured rainfall rates, but not total precipitation as it is measured by the Geonor gauge. As a result, total precipitation during months where snowfall would have occurred was under-estimated before 15 September 2018. As such, only the Geonor gauge data were relied upon for this report.

More detail on the Rook I meteorological station is provided in the atmospheric studies characterization report (Annex I Atmospheric Baseline Report). The calculation methods and the data completeness requirements followed the guidance provided by ECCC (ECCC 2020a) and the World Meteorology Organization (WMO 2017).

### 4.3.2 Data Analysis

Raw hourly cumulative precipitation values observed at the Geonor gauge were rounded to the nearest 0.01 mm and corrected for gauge catch efficiency hourly. At certain times during the period of record, the Geonor gauge would have caught more than 100% (i.e., over-catch) or less than 100% of the actual total precipitation that fell, depending mainly on the wind speed. Catch efficiency correction was necessary to properly account for the influence of wind on precipitation measurements. Therefore, catch efficiency correction at the meteorological station was based on wind speed measured at 10 m height, corrected to the wind speed at the height of the Geonor gauge, and assumed a roughness value for the surrounding area. Rainfall corrections used a method outlined in Devine and Mekis 2008, and snowfall corrections used a method outlined in MacDonald and Pomeroy 2007.

The precipitation data presented in this report are daily total precipitation values. The TBRG rainfall rates for each day were added together to obtain total daily rainfall values. The Geonor gauge accumulated precipitation over time, and raw hourly data were converted to total precipitation measured each day.

Local data collected by the Rook I Meteorological Station were compared to regional historical meteorological data and climate normal obtained from Environment and Climate Change Canada (ECCC 2019a).

## 4.4 Snow Surveys

The annual end of winter snowpack surveys provided valuable baseline information about seasonal and inter-annual variation of hydrological conditions near the proposed Project. The snowpack surveys provided information needed to validate measured snowfall, calibrate estimated atmospheric losses of snow to sublimation, and establish the end of winter water volume available to melt during the spring freshet, which occurs for approximately two to three weeks every mid- to late April. The snowpack survey data was also important to validate remote sensing data with ground-based measurements to characterize uncertainties or bias in the remote sensing data. In a similar approach to the overall hydrological modelling, the few years with field-based snow surveys were used to check the validity of a much longer remote sensing data record that spans a 40-year period.

Spring snowmelt often provides the largest volume of runoff into a watershed each year, and the highest water levels and peak flows often occur during spring freshet. A snow survey program was completed late in the winters of 2017-2018 and 2018-2019, with the objective of establishing the pre-freshet snowpack conditions in the Patterson Lake watershed. A stratified snow survey design was used, which involved selecting numerous snow survey plots in a wide range of terrain types (e.g., terrestrial, lake, or lake edge) and landscape features (e.g., slope and aspect) that were representative of the watershed. The snow survey results were weighted according to the proportional areal coverage of each terrain type in the watershed. Results are expressed as a snow water equivalent (SWE), which can be visualized as the depth of water on the ground surface if the entire snowpack were to melt at once. The SWE is reported in units of millimetres depth of melted SWE.

Two years of end-of-year SWE data collection provides a sufficient baseline for the Patterson Lake watershed; however additional data collection was planned. In 2020, a snow survey was planned for late March to early April but was not completed. A stop-work order was implemented 26 March 2020 (at the early stage of the COVID-19 outbreak in Canada), and the window to complete the snow survey had passed once discussions about the program had restarted (Golder 2020a). Instead, local SWE was estimated with remote sensing and regional SWE data. The two years of comparison of field and remote sensing data provide confidence that available remote sensing data provided adequate estimates of end-of-winter SWE for the proposed Project, while a third end-of-winter snow survey was completed March 2021 to provide further validation (Golder 2020a).

### 4.4.1 Data Collection

Stratified snow surveys were completed at the end of winter in 2018 and 2019. The 2018 survey was completed from 15 April 2018 to 16 April 2018, and the 2019 survey was completed from 21 March 2019 to 23 March 2019. The 2018 field survey was conducted during the onset of the spring freshet, and as a result, timing of the field survey presented challenges for access and sample collection. Temperatures were above the freezing point during this survey and some snowmelt was noted on south-facing slopes. In some cases, access to planned sampling points was restricted as a result of a low number of cut lines, a large number of regenerating burn areas populated by dense jack pine, or rapidly changing spring conditions in low-lying waterbodies and watercourses. In particular, the planned snow survey plots on lakes could not all be completed safely, and the single lake plot completed in 2018 was assumed to be representative of the snow conditions on lakes.

The 2019 survey was conducted from 21 March 2019 to 23 March 2019. Although the 2019 field survey was conducted earlier in the year than in 2018, air temperatures were well above normal, and snowmelt had started by

the beginning of the snow survey. Average daily temperatures were at or above 0°C on 11 March 2019, 17 March 2019 to 22 March 2019, 25 March 2019, and 26 March 2019. As a result, the maximum surface SWE may not have been captured by the 2019 survey; however, the timing and magnitude of the peak SWE was estimated through the use of remote sensing methods.

For all surveys, photos were taken at each plot, and the plot location was documented with a handheld GPS. Results were entered into standard snow survey data entry sheets. The type and density of terrestrial vegetation was noted, as were the slope and aspect. Slope was estimated with an inclinometer and classified as flat if less than 1° from the horizon, low slope if less than 10°, and high slope of between 10° and 33°. Aspect (i.e., the direction the slope faces) was noted to the nearest of cardinal directions (i.e., north, east, south, west) or flat for instances with no slope.

At each snow survey plot, snow depth was measured to the nearest centimetre at three locations using a snow probe or metal measuring stick. The average snow depth at each plot was obtained as the average of the three measurements. Plots were located a minimum of 50 m from any disturbed area such as a road or trail.

Snow density was measured once at each plot using a snow corer with a cutting blade at its base. A cradle hanging digital scale was used for snow sampling, which was tared (i.e., unladen weight set to zero) at the beginning of each day and periodically throughout the day (or before each measurement if there was a build-up of ice or snow inside). The snow corer sampling tube was pushed slowly through the snowpack until it reached the ground surface and a snow depth reading was made. The tube was then twisted into the soil to get a “plug” of soil and prevent granular snow at the bottom of the sample from falling out. If a plug could not be obtained, the field staff dug around the corer with a shovel, slid the blade of the shovel under the corer, and lifted out the corer with the blade against it to prevent the snow from falling out. The sampler tube was held horizontally, and its weight was measured using the digital scale. The “loaded” weight (i.e., sampler, cradle, and snow) were recorded on the data sheet.

### 4.4.2 Data Analysis

The average snow depth at each plot was obtained as the average of three measurements made with a metal ruler. Snow density was calculated as follows:

$$\rho_s = \frac{w_s}{d_s \pi R^2} \quad \text{Equation 1}$$

Where, $\rho_s$ is snow density in units of grams per cubic centimetre [g/cm$^3$], $w_s$ is weight of snow [g] calculated as loaded weight minus tare of the scale, $d_s$ is snow depth [cm], $\pi$ = 3.14159 [dimensionless], and $R$ is snow corer sampling tube radius [cm].

Using the snow density and average snow depth for each survey plot, the SWE [mm] was then calculated as follows:

$$SWE = \rho_s * d_s * 10 \quad \text{Equation 2}$$

The mean SWE in the Patterson Lake watershed was estimated by weighting the SWE results for the various terrain types by total area of that terrain type in the watershed. Snow depth and snow density were measured at 34 plots in 2018 and 50 plots in 2019, distributed over 11 terrain types in 2019 and nine in 2018. For the purposes of the snow survey, the Patterson Lake watershed was divided into Lake, Lake Edge, and Terrestrial categories. Terrestrial areas were further sub-divided into terrain types by slope and aspect, which accounts for primary drivers of snow accumulation, redistribution by wind, and losses to sublimation and evaporation (Table 1). The Lake area was taken to be the area classified as “Lake” in the Southern Digital Landcover set (Saskatchewan Research Council 2000). The Lake Edge area was established as a 30 m buffer around the perimeter of Patterson Lake. Based on observations during the field snow surveys, the terrestrial landscape consists primarily of open canopy jack pine stands and regenerating jack pine burns. As a result, the Terrestrial landcovers were grouped together as one aggregate landcover class, which was further subdivided by aspect (i.e., flat, facing north, east, south, or west) and slope (i.e., flat is classified as a slope of less than 1°, low slope less than 10°; and slope of 10° to 33°).

**Table 1: Patterson Lake Terrain Type Classification for 2018 and 2019 Sample Points**

| Terrain Classification | Area ($km^2$) | Percentage of Cover (%) | Number of Snow Survey Plots | |
|---|---|---|---|---|
| | | | 2018 | 2019 |
| Lake | 59.5 | 22.5 | 1 | 10 |
| Lake Edge | 6.5 | 2.5 | 3 | 1 |
| Terrestrial: flat, low slope | 39.5 | 15.0 | n/d | 7 |
| Terrestrial: north, low slope | 33.9 | 12.8 | 4 | 6 |
| Terrestrial: north, 10° to 33° | 1.21 | 0.5 | 5 | 1 |
| Terrestrial: west, low slope | 34.5 | 13.1 | 3 | 6 |
| Terrestrial: west, 10° to 33° | 0.59 | 0.2 | 5 | 1 |
| Terrestrial: south, low slope | 38.0 | 14.4 | 3 | 7 |
| Terrestrial: south, 10° to 33° | 1.4 | 0.5 | 8 | 1 |
| Terrestrial: east, low slope | 48.2 | 18.2 | n/d | 9 |
| Terrestrial: east, 10° to 33° | 0.88 | 0.3 | 2 | 1 |
| **Total** | **264.2** | **100.0** | **34** | **50** |

n/d = no data.

For regional context, local SWE data obtained from the snow surveys in Patterson Lake watershed were compared to publicly available regional SWE data, including a regional SWE snow pillow monitoring station and remotely sensed maps of SWE for the Canadian Prairie provinces (i.e., Alberta, Saskatchewan, and Manitoba). Alberta Environment provides hourly SWE data at Gordon Lake Lookout (Station 07CE801) (Government of Alberta 2020). This station is located 137 km southwest of the proposed Project and is within the Clearwater River watershed in Alberta. Gordon Lake Lookout is at an elevation of 500 masl, which is approximately 40 m lower than the elevation of Patterson Lake.

The SWE results obtained during the snow surveys were also compared with passive microwave remote sensing data published by ECCC (2020) and available on the Canadian Cryospheric Information Network (CCIN) website (CCIN 2020). These data cover the Canadian Prairie provinces and provide a snapshot of SWE for all locations, weekly throughout the winter. Data are provided on maps with increments of SWE over a 10 mm range (e.g., 80 mm to 90 mm SWE). These data provided a comparison for approximately the same location as the anticipated area of the Project.

## 4.5 Hydrometric Monitoring

Twenty-two hydrometric monitoring stations were included in the baseline hydrology program to provide field data for a wide range of sub-watershed sizes, waterbody sizes, and other physical factors. Monitoring covered both open-water and ice-covered conditions, and wide ranges of water levels and discharge conditions were captured between August 2018 and September 2020. Monitoring was also conducted through the winter of 2020-2021. Watercourse station locations were chosen along straight reaches with uniform flow characteristics (e.g., not highly turbulent flow, near-uniform depth, and near-uniform velocities across the channel at the measurement locations); however, the gradient is relatively low between some of the waterbodies included in the program, and backwater[2] from the downstream waterbodies was observed at several watercourse stations which was an expected occurrence, especially when water levels were high. Waterbody station locations were chosen to facilitate easy access by boat, and at relatively sheltered locations to reduce fluctuations in water levels influenced by wind and waves.

Hydrometric station numbers and names, the period of operation, and watershed areas contributing to each station are provided in Table 2 for watercourses and Table 3 for waterbodies. The locations of the stations are shown in Figure 3 and Figure 4. The naming convention adopted for the hydrometric stations used the following naming convention: the first pair of letters indicates the watershed, with CR indicating the Clearwater River and HC indicating Hodge Creek. The second pair of letters identifies whether the hydrometric station is a waterbody, WB (i.e., lake or pond), or watercourse, WC (i.e., flowing channels referred to colloquially as rivers, creeks, streams, and brooks). The third pair of letters indicates whether the waterbody or watercourse is on the mainstem (MS) of the drainage system or if it is a tributary (TI). The two-digit numbers at the end of the Station ID are sequential, starting upstream and increasing in the downstream direction.

**Table 2: Watercourse Hydrometric Station Details**

| Station ID | Station Name | Period of Operation | Watershed Area (km$^2$) |
|---|---|---|---|
| CR-WC-MS-01 | Clearwater River below Broach Lake | 7 August 2018 to 24 September 2020 | 56.4 |
| CR-WC-MS-02 | Clearwater River above Patterson Lake | 6 August 2018 to 23 September 2020 | 121 |
| CR-WC-MS-03 | Clearwater River below Patterson Lake | 4 August 2018 to 26 September 2020 | 264 |
| CR-WC-MS-04 | Clearwater River below Beet Lake | 5 August 2018 to 25 September 2020 | 473 |
| CR-WC-MS-05 | Clearwater River below Naomi Lake | 5 August 2018 to 25 September 2020 | 685 |
| CR-WC-MS-06 | Clearwater River above Mirror River confluence | 3 August 2018 to 24 September 2020 | 1,070 |

[2] Backwater is measured at a hydrometric station where stage was observed to be above the base stage-discharge rating curve when the stage is on the y-axis.

**Table 2: Watercourse Hydrometric Station Details**

| Station ID | Station Name | Period of Operation | Watershed Area (km$^2$) |
|---|---|---|---|
| CR-WC-MS-07 | Clearwater River below Mirror River confluence | 3 August 2018 to 24 September 2020[(a)] | 3,300 |
| CR-WC-MS-08 | Clearwater River at the Lloyd Lake outlet | 4 August 2018 to 24 September 2020 | 4,370 |
| CR-WC-MS-09 | Clearwater River at Warner Rapids | 8 August 2018 to 29 September 2020 | 9,590 |
| CR-WC-TI-01 | Tributary inflow above Forrest Lake | 6 August 2018 to 3 October 2019[(b)] | 34.8 |
| CR-WC-TI-02 | Tributary inflow to Naomi Lake | 5 August 2018 to 27 September 2020 | 134 |
| CR-WC-TI-03 | Tributary inflow Downstream of Naomi Lake | 5 August 2018 to 26 September 2020 | 67.5 |
| HC-WC-MS-01 | Hodge Creek below Hodge Lake | 8 June 2020 to 28 September 2020 | 52.6 |

a) Only instantaneous measurements of discharge (2018 and 2019) and water surface elevation (2019 only) were monitored at Station CR-WC-MS-07 to measure the inflows from the Mirror River for comparison with flows upstream of the Clearwater River-Mirror River confluence.
b) Station monitoring was discontinued after 2019 due to beaver dam activity at the station. .

**Table 3: Hydrometric Monitoring Program Waterbody Stations**

| Station ID | Description | Period of Operation | Cumulative Watershed Area (km$^2$) |
|---|---|---|---|
| CR-WB-MS-01 | Broach Lake | 7 August 2018 to 28 September 2020 | 56.4 |
| CR-WB-TI-01 | Lake H | 6 August 2018 to 23 September 2020 | 7.36 |
| CR-WB-TI-02 | Lake G | 6 August 2018 to 23 September 2020 | 3.75 |
| CR-WB-MS-02 | Patterson Lake | 4 August 2018 to 26 September 2020 | 264 |
| CR-WB-MS-03 | Forrest Lake | 2 August 2018 to 25 September 2020 | 445 |
| CR-WB-TI-03 | Lake F | 2 August 2018 to 25 September 2020 | 9.73 |
| CR-WB-MS-04 | Beet Lake | 5 August 2018 to 25 September 2020 | 473 |
| CR-WB-MS-05 | Naomi Lake | 5 August 2018 to 27 September 2020 | 685 |
| HC-WB-MS-01 | Hodge Lake | 8 June 2020 to 28 September 2020 | 52.6 |

## 4.5.1 Data Collection

### *4.5.1.1 Benchmark Installation and Geodetic Benchmark Survey*

Water surface elevations of waterbodies and watercourses were measured at hydrometric stations using periodic optical level surveys relative to local benchmarks. The benchmark coordinates and elevations for the watercourse stations are presented in Table 4. The benchmark coordinates and elevations for the waterbody stations are presented in Table 5. A detailed summary of the geodetic benchmark surveys is provided in Appendix A, Geodetic Survey Summary.

For the stations that were easily accessible, RTK GPS surveying equipment and static surveys were used to establish the geodetic elevation of local benchmarks between 29 September 2018 and 2 October 2018. Surveys were conducted at 15 watercourse and waterbody hydrometric stations considered important locations for the baseline program within the LSA, and also at CR-WC-MS-09 where a published NRCAN control point was

located. Unless otherwise stated, the WSE referenced is geodetic based on the 2018 survey throughout this report. The accuracy of the RTK survey benchmark elevations was expected to be approximately plus or minus 0.03 m in consideration of the density of trees around each benchmark. Where a geodetic survey was not possible, an assumed elevation of 100 m was assigned to the primary benchmark, and elevations for the other benchmarks were determined relative to that elevation based on an optical level survey. The use of repeated surveys of WSE relative to non-geodetic benchmarks is a standard method to maintain the vertical datum at hydrometric stations over time.

Three benchmarks were installed or adopted (if in place already) at each of the 22 hydrometric stations. The primary benchmark was named BM1 and was usually rebar driven into the ground, and the second and third benchmarks (BM2 and BM3) were usually 3/8-inch diameter lag bolts installed at the base of large tree trunks and marked with yellow survey tags (Figure 5). Other suitable benchmarks installed or adopted included large boulders or a galvanized steel pipe driven into the ground. The purpose of the second and third benchmarks was to check if the primary benchmark heaved or shifted vertically between field visits.

Two complete levelling surveys were conducted for each station during each field visit using an optical level. The accuracy of each survey was verified by opening and closing on the primary benchmark, and was deemed acceptable if the survey closed at equal to or less than 0.005 m. The results of the two surveys at each site were also compared and were deemed acceptable if they agreed within 0.01 m and if they did not the survey was repeated. Elevations of each benchmark were also compared with previous field visits. Movement of the primary benchmark relative to the secondary benchmark was checked.

**Table 4: Geodetic and Local Benchmark Survey Results at Watercourse Hydrometric Monitoring Stations**

| Station Name and Number | October 2018 Benchmark Coordinates and Elevation (m) | Benchmark Elevations (m) as of September 2020 and Details |
|---|---|---|
| Clearwater River below Broach Lake (CR-WC-MS-01) | BM1: 6398465.1 N 600437.4 E and 527.604<br>BM2: 6398466.1 N 600439.3 E and 527.766<br>BM3: 6398467 N 600433 E and 528[(a)] | BM1: No Change<br>BM2: 527.787<br>BM3: 527.801 |
| Clearwater River above Patterson Lake (CR-WC-MS-02) | BM1: 6396407.6 N 607825.0 E and 499.344<br>BM2: 6396409.9 N 607824.8 E and 499.186<br>BM3: 6396407.7 N 607826.4 E and 499.290 | BM1: 499.413<br>BM2: 499.200<br>BM3: 499.293 |
| Clearwater River below Patterson Lake (CR-WC-MS-03) | BM1: 6390535.7 N 605166.6 E and 499.699<br>BM2: 6390536.8 N 605168.0 E and 499.975<br>BM3: 6390535.8 N 605161.7 E and 499.569 | BM1: No Change<br>BM2: 499.991<br>BM3: No Change |
| Clearwater River below Beet Lake (CR-WC-MS-04) | BM1: 6390617.6 N 613269.7 E and 498.788<br>BM2: 6390616.0 N 613267.1 E and 498.750<br>BM3: 6390618.8 N 613268.1 E and 498.741 | BM1: No Change<br>BM2: 498.769<br>BM3: 498.719 |
| Clearwater River below Naomi Lake (CR-WC-MS-05) | BM1: 6390518.0 N 616451.7 E and 498.867<br>BM2: 6390515.7 N 616453.8 E and 498.711<br>BM3: 6390516.7 N 616452.0 E and 498.855 | BM1: 498.879<br>BM2:498.897<br>BM3: 498.733 |
| Clearwater River above Mirror River Confluence (CR-WC-MS-06) | BM1: 6380305.0 N 626600.0 E and 100.000<br>BM2: 6380300.0 N 626599.0 E and 100.098<br>BM3: 6380299.0 N 626595.0 E and 100.197<br>(Non-Geodetic) | BM1 to BM3: No Change |

**Table 4: Geodetic and Local Benchmark Survey Results at Watercourse Hydrometric Monitoring Stations**

| Station Name and Number | October 2018 Benchmark Coordinates and Elevation (m) | Benchmark Elevations (m) as of September 2020 and Details |
|---|---|---|
| Clearwater River below Mirror River Confluence (CR-WC-MS-07)[b] | BM1: 6379687.0 N 626541.0 E and 100.000<br>BM2: 6379688.0 N 626543.0 E and 100.074<br>BM3: 6379688.0 N 626537.0 E and 99.181<br>(Non-Geodetic) | BM1 to BM3: No Change |
| Clearwater River at the Lloyd Lake outlet (CR-WC-MS-08) | BM1: 6356667.0 N 634720.0 E and 100.000<br>BM2: 6356660.0 N 634730.0 E and 98.635<br>(Non-Geodetic) | Downstream of Rapids:<br>BM1: No Change<br>BM2: No Change<br>At WSC Station 07CD006:<br>S73-76: 100.000; (Golder) 5.493 m (WSC)<br>S73-75: 97.553 (Golder) 3.048 m (WSC) |
| Clearwater River at Warner Rapids (CR-WC-MS-09) | BM1: 6307938.7 N 623078.0 E and 400.339<br>BM2: 6307933.0 N 623076.0 E and 400.454<br>BM3: 6307937.0 N 623077.0 E and 400.975<br>BM4: 6307936.0 N 623087.0 E and 399.207 | BM1 to BM2: No Change<br>BM3: 400.990<br>BM4: Not surveyed in 2020 |
| Tributary inflow above Forrest Lake (CR-WC-TI-01) [c] | BM1: 6381301 N 598609 E and 499.969<br>BM2: 6381297 N 598613 E and 501.119<br>BM3: 6381299 N 598602 E and 500.369<br>BM4: 6381302 N 598609 E and 500.229 | BM1 to BM4: No Change |
| Tributary inflow to Naomi Lake (CR-WC-TI-02) | BM1: 6392567.9 N 613764.2 E and 499.139<br>BM2: 6392557.9 N 613770.5 E and 499.175<br>BM3: 6392573.7 N 613765.0 E and 498.982 | BM1 and BM3: No Change<br>BM2: 499.147 |
| Tributary inflow Downstream of Naomi Lake (CR-WC-TI-03) | BM1: 6390961.2 N 615808.2 E and 498.912<br>BM2: 6390967.7 N 615802.6 E and 499.505<br>BM3: 6,390951.3 N 615802.2 E and 499.062 | BM1: 498.897 [d]<br>BM2: 499.569<br>BM3: 499.046 |
| Hodge Creek below Hodge Lake (HC-WC-MS-01) | BM1: 6407639.2 N 593181.9 E and 100.000[e]<br>BM2: 6407639.6 N 593182.4 E and 100.353[e]<br>BM3: 6407639.0 N 593182.0 E and 99.785[e]<br>(Non-Geodetic) | BM1 to BM3: No Change |

Note: All coordinates referenced are in UTM Zone 12 and North American Datum 1983 (NAD83). “No Change” in benchmark elevation is defined as a surveyed difference of less than 0.010 m for optical level surveys but allows for additional error in the RTK survey vertical elevations. Benchmark coordinates and elevations measured in October 2018 by RTK GPS survey and elevations updated using optical levelling survey in October 2019.

a) BM3 at CR-WC-MS-01 was not surveyed by RTK GPS in fall 2018. The coordinates are based on handheld GPS coordinates reported here to the nearest metre and vertical elevation surveyed relative to BM1 using an optical level.

b) All benchmarks for the Station CR-WC-MS-07 were installed in May 2019.

c) Benchmarks for CR-WC-TI-01 are based on handheld GPS coordinates reported to the nearest metre and vertical elevation relative to lake level for Forrest Lake are reported to the nearest 0.001 m but may be accurate to the nearest 0.1 m.

d) This benchmark was not stable between August 2018 and October 2019 as BM2, BM3, and the top of the staff gauge all moved upward by approximately 0.015 m relative to BM1 therefore BM1 likely moved downward by 0.015 m.

e) Benchmarks established June 2020.

**Table 5: Geodetic Benchmark Survey Results at Waterbody Hydrometric Monitoring Stations**

| Station Name and Number | October 2018 Benchmark Coordinates and Elevations (m) | Benchmark Elevations (m) as of September 2020 and Details |
|---|---|---|
| Broach Lake (CR-WB-MS-01) | BM1: 6398271.6 N 594670.3 E and 528.068<br>BM2: 6398271.1 N 594672.3 E and 527.725<br>BM3: 6398269.3 N 594670.6 E and 528.250 | BM1 to BM3: No Change |
| Lake H (CR-WB-TI-01) | BM1: 6394930.9 N 608522.5 E and 500.675<br>BM2: 6394933.0 N 608527.5 E and 501.642<br>BM3: 6394925.4 N 608526.7 E and 501.358 | BM1: No Change<br>BM2: 6394917.0 N 608506.0 E and 501.098[a]<br>BM3: 6394917.0 N 608509.0 E and 501.009[b] |
| Lake G (CR-WB-TI-02) | BM1: 6393993.9 N 607640.9 E and 500.171<br>BM2: 6393996.2 N 607643.5 E and 499.860<br>BM3: 6393993.0 N 607648.5 E and 500.250 | BM1: 500.141<br>BM2: 499.979[c]<br>BM3: 500.223 |
| Patterson Lake (CR-WB-MS-02) | BM1: 6391309.7 N 603271.0 E and 500.139<br>BM2: 6391312.3 N 603278.8 E and 500.424<br>BM3: 6391308.1 N 603277.1 E and 500.624 | BM1: 500.080<br>BM2: 500.361<br>BM3: 500.560 |
| Forrest Lake (CR-WB-MS-03) | BM1: 6388736.0 N 606636.8 E and 500.175<br>BM2: 6388731.9 N 606644.8 E and 500.278<br>BM3: 6388745.3 N 606641.5 E and 499.638 | BM1 to BM3: No Change |
| Lake F (CR-WB-TI-03) | BM1: 6388736.0 N 606636.8 E and 500.175<br>BM2: 6388731.9 N 606644.8 E and 500.278<br>BM3: 6388745.3 N 606641.5 E and 499.638 | BM1 to BM3: No Change |
| Beet Lake (CR-WB-MS-04) | BM1: 6390290.8 N 611334.2 E and 500.067<br>BM2: 6390289.7 N 611334.3 E and 500.133<br>BM3: 6390294.5 N 611337.1 E and 499.238 | BM1 to BM3: No Change |
| Naomi Lake (CR-WB-MS-05) | BM1: 6392109.9 N 613375.5 E and 500.296<br>BM2: 6392109.4 N 613383.6 E and 498.847<br>BM3: 6392122.5 N 613379.0 E and 499.497 | BM1: No Change<br>BM2: 498.914<br>BM3: No Change |
| Hodge Lake (HC-WB-MS-01) | BM1: 6407639.2 N 593181.9 E and 100.000[d]<br>BM2: 6407639.6 N 593182.4 E and 100.353[d]<br>BM3: 6407639.0 N 593182.0 E and 99.785[d]<br>(Non-Geodetic) | BM1 to BM3: No Change |

Note: All coordinates referenced are in UTM Zone 12 and North American Datum 1983 (NAD83). “No Change” in benchmark elevation is defined as a surveyed difference of less than 0.010 m.

a) Benchmark replaced in August 2020. Benchmark supporting tree had fallen.

b) Benchmark replaced in June 2020. Benchmark supporting tree had fallen.

c) Benchmark replaced in June 2019.

d) Benchmark established June 2020.

**Figure 5: Typical Benchmarks Installed during the Hydrometric Program in 2018**

**a) Lag Bolt**

**b) Rebar**

#### 4.5.1.2 Water Surface Elevation Monitoring

Non-vented Solinst Levelogger pressure transducers (Leveloggers), which monitor combined air and water pressure, were installed at the hydrometric stations during the initial site visit. Pressure and water temperature were recorded every 30 or 60 minutes at each station during its period of operation, and field visits were required to retrieve the locally stored data. At most stations, the Levelogger was deployed inside a tubular aluminum housing threaded onto an aluminum plate that rested on the stream bottom. At Hodge Lake and Hodge Creek below Hodge Lake, the Leveloggers were secured to an aluminum clamp with a stake driven into the stream bottom by hand. For watercourses, Leveloggers were deployed as close to the discharge measurement cross-section as possible, on firm substrate, and at a depth of 0.3 m to 1.0 m. For waterbodies, Leveloggers were deployed near shore, in a sheltered location if possible, on firm substrate, and at a depth of 0.3 m to 0.5 m.

Since atmospheric pressure varies with time, pressure measured with the Leveloggers was converted to water depth by subtracting the barometric pressure measured with Solinst Barologgers (Barologgers). Barologgers were installed at three locations: Clearwater River below Broach Lake, within Patterson Lake, and Clearwater River above Warner Rapids. The recommended maximum distance between a Barologger and corresponding Levelogger is 30 km horizontal distance and 300 m elevation change (Solinst 2018). The closest Barologger was used to correct Levelogger data. Water depth records at each hydrometric station were then converted to WSE values using an offset correction based on the difference between the primary benchmark elevation and the WSE of the watercourse or waterbody surveyed during each field visit.

During each monitoring station visit, a levelling survey was conducted with an optical level to measure the WSE at each hydrometric station relative to local benchmarks. A description of the benchmarks for each station are provided in Section 4.3.1.1 and Appendix A. Section 4.3.3 provides further discussion on data QA and checking effort, and Section 5.5 discusses data confidence and uncertainties for these measurements.

Staff gauges were installed at all hydrometric stations within the LSA, as they provide a means of verifying the WSE survey results. Each staff gauge was attached to a length of 19 mm diameter rebar or T-post driven into the stream bed at the discharge measurement cross-section. The staff gauges were installed so that approximately 1 m of rebar extended above the stream bed. For stability purposes, the length of rebar used was approximately 2 m. If a staff gauge was installed at a hydrometric station, a staff gauge reading was made concurrent with the optical level survey, and the top of the staff gauge was surveyed relative to the primary benchmark. Staff gauge readings were estimated to the nearest millimetre if conditions allowed. The elevation of the top of the staff gauge was surveyed at its highest point during levelling surveys.

#### 4.5.1.3 Discharge Measurements

In watercourses that could not be waded, a Sontek M9 acoustic doppler current profiler (ADCP) was used to measure discharge. RiverSurveyor Live software was used to collect measurements and complete data review in the field, and the field results were reviewed a second time in the office. A compass calibration was completed daily prior to the first ADCP measurement. Magnetic declination from true north for the field location and date was entered in the software based on Natural Resources Canada (NRCan 2020) website values. Typically, more than three discharge measurements were collected at each site during a single field visit. An average discharge was estimated from a minimum of three discharge measurements having results within 5%. Although moving beds were not observed at most sites, the GPS-Generalized Gradient Approximation (GGA) track reference (i.e., boat velocity calculated from GPS data) was usually preferred over the bottom track reference method (i.e., boat

velocity calculated from river bottom data), as the channel widths were more realistic using the GPS-GGA track reference compared to measured widths.

A Sontek FlowTracker acoustic Doppler velocimeter (ADV) was used to measure discharge in watercourses that were wadable. Manual discharge measurements were conducted according to the Water Survey of Canada (WSC) standard described by Terzi et al. (1994). Velocity and depth measurements used for discharge calculation were collected using the ADV and a top-setting wading rod. The mid-section method (i.e., in which both depth and velocity are measured at numerous points across the channel transect and area is calculated based on the depth at each point multiplied by the interval between points) was used to measure discharge, and the sampling time for velocity was 40 seconds.

## 4.5.2 Data Analysis

### *4.5.2.1 Data Management and Correction*

The Aquarius Time Series Software (Aquarius) was used to store and make corrections to hydrology data, perform and document QA/QC, and develop rating curves for the watercourses. Discharge time series were derived from these rating curve relationships. Data uploaded to Aquarius included WSE, discharge as well as the continuous WSE records from the barometrically compensated Levelogger data. Total precipitation data and water temperature records were also uploaded and used to interpret hydrographs.

For the hydrometric stations that had Leveloggers in place over the winters of 2018-2019 and 2019-2020, water levels were corrected for the overwinter backwater as these data were used for calibration of the regional hydrology model (Appendix 9A). There is higher uncertainty in the corrected under-ice water level data, but it was reasonably assumed that water levels receded gradually over the winter under the ice until the beginning of the spring freshet, which was in mid-March 2019 and mid-April in 2020. WSE surveys were conducted in late March 2019 at selected hydrometric stations, which allowed for accurate backwater corrections at those stations. The winter discharge records were further corrected using discharge measurements (or unit-area discharge estimates for the stations not visited in late March 2019), if required.

The WSC (2012) reference was used as a guide for all hydrometric data corrections. The following are the most common basic data corrections made for waterbody and watercourse stations:

- Stage (for watercourses) or water level (for waterbody) offset corrections to the vertical gauge datum established relative to local benchmarks. Offset corrections were made to the field stage or water level survey results.
- Drift corrections to stage or water level logger readings were made between two field survey results if required (i.e., if the logger readings differed from the corresponding field survey result by more than 0.003 m).
- Data were deleted from the record for any time period that the logger was removed from the water.
- Stage-discharge rating curves were initially fit to the stage-discharge paired data using a power equation, and the base equation or curves were adjusted over time as more data became available.
- Temporary stage-shifts were applied to the base rating curves when stage-discharge points did not fit within about 0.01 m or 5% of the base rating curve. Shifts were usually above the base rating curve when backwater conditions occurred.

As described in WSC (2012): “many factors can affect the stage discharge relationship and require its adjustment. Examples are backwater due to beaver dams, weed growth or ice and scour or deposition in the channel. In those situations, shifts are then applied to the stage-discharge relationship. Shifts are temporary adjustments to base rating that apply until the cause for the change has receded or been confirmed as permanent and a new rating is developed.”.

#### *4.5.2.2 Rating Curve Development*

Water surface elevation values were converted to stage values by subtracting a consistent offset (i.e., stage datum) at each hydrometric station; the stage datum was generally a value slightly below the minimum bed elevation at the watercourse, so that stage values were always positive and representative of the maximum water depth across the watercourse. Stage was related to discharge using an empirical equation referred to as the open water rating curve (OWRC), developed based on sets of manual stage and discharge measurements at each station.

The rating curve relating Patterson Lake WSE and lake outflow was developed based on simulations from a 1-D Hydrologic Engineering Center – River Analysis System (HEC-RAS) hydraulic model developed for the reach of the Clearwater River that separates Patterson Lake and Forrest Lake (Appendix 9B). As more data were collected in 2019 and 2020, rating curves for watercourse stations were developed from the paired stage and discharge measurements.

Rating curves were developed in Aquarius and following guidance in WSC (2012). At several stations, stage-shifts were applied to correct the base rating curve to the value of stage-discharge points that were at least 0.003 m above (or less frequently, below) the curve. At CR-WC-MS-09 no stage-shifts were used, and at two stations only small shifts were required (i.e., CR-WC-MS-01, CR-WC-MS-08), while larger stage-shifts of over 0.1 m were required at all remaining stations for at least one field visit (Appendix B). Several stations experienced seasonal backwater due to aquatic vegetation growth in the channel in the summer months or due to ice in the channel or downstream, and a few stations were occasionally backwatered by downstream waterbodies, particularly when lake water levels increased. Negative shift values indicate backwater conditions when the stage is higher for a given discharge. Stage-shifts were applied for most field visits, although not for the stage-discharge points that defined the base rating curve which had no shift applied. Stage-shifts were also occasionally applied in between field visits at transitions such as before and after spring thaw, or when backwater conditions were increasing (e.g., prior to documentation of beaver dams downstream of a station or aquatic vegetation growth, or as water levels rose in downstream waterbodies). Stage-shift reports were exported from Aquarius for most hydrometric stations for QA/QC documentation purposes (Appendix B). Anomalous stage-discharge measurements that fell below the base rating curve occurred at CR-WC-MS-03 and CR-WC-MS-04 and were corrected using positive stage shifts; more extensive effort was made in these cases to identify and resolve potential errors in WSE levelling surveys and discharge manual measurements, and that station’s time series was compared to results from other stations.

The OWRCs are based on a relatively wide range of WSE and discharge conditions that occurred, with the lowest water levels and discharges measured in 2018 and the highest water levels and discharges measured in 2020. At most stations in the LSA, field visits were conducted monthly or every two months during the open water period, with one late-winter field visit conducted in March 2019. A higher number of field visits increases confidence in the WSE and derived discharge time series records. Hydrometric stations closest to Patterson Lake were considered the highest priority and were visited most frequently.

The OWRCs with six or fewer paired discharge-stage data points are currently classed as preliminary. These stations were not visited as often during the monitoring program, as they were considered lower priority due to their location being farther from Patterson Lake, being outside the LSA, or because they were not easy to access when ice cover was in place in early spring. Monitoring at hydrometric Station CR-WC-TI-01 was discontinued due to the station being continuously affected by beaver dams and/or Forrest Lake water levels, as well as having low flows.

## 4.6 Sediment

Watercourses transport solid material as suspended particles that are held in suspension by the turbulence of the flowing water, and as bed load where solid particles bounce, roll, or slide along the stream bed (Henderson 1966). Suspended and bed load sediment transport were measured periodically at key watercourse locations in the RSA downstream of Patterson Lake: hydrometric stations CR-WC-MS-03, CR-WC-MS-04, and CR-WC-MS-05. These locations had relatively uniform depths across the channel and were characterized by fine to medium sand substrate with relatively uniform ripple bed form.

### 4.6.1 Data Collection

Sediment data collection included repeated sampling for suspended sediment and monitoring bed load at three watercourse locations, and one-time sampling of bed material to obtain a particle size distribution for the stream beds.

Suspended sediment measurements involved collecting surface water samples from the watercourses using grab samples from the middle of the water column. The samples were submitted to the Saskatchewan Research Council in Saskatoon for laboratory analysis of TSS. Duplicate TSS samples were taken during the 2018 field visits and were within acceptable margin of error, and duplicate samples were not taken in 2019 or 2020 field visits.

Bed load sampling was initially attempted at each of the three hydrometric stations in August 2018 using a Helley-Smith handheld wading bed load sampler with a large nylon mesh sediment collection bag. Instantaneous bed load sampling was initially conducted in a uniform cross-section at several equally spaced points across each station cross-section for a period of 10 minutes at each point. However, this method did not collect a measurable amount of sediment at any of the three stations. The Helley-Smith sampler is known to be unsuitable for characterizing bed load of some streams and bed forms based on the median diameter of bed material measured < 1.0 mm at these locations (Section 5.4.1) (Pickering 1979; Boning 1990). Once these results were obtained in 2018, no further attempts were made to use the Helley-Smith sampler.

For subsequent field visits, a test sample was completed at a higher velocity location at each station to determine if there was enough bed load transport occurring over a period of 60 minutes to warrant further sampling at lower velocity locations. If a measurable amount of bed load was not collected over a 60-minute period, a measurement of “Not Detected” was assigned and no further sampling was completed at lower velocity locations. During the field visits in 2019 (all three stations) and June 2020 (CR-WC-MS-03 only), an alternative bed load transport monitoring method was used whereby a square aluminum plate, with 0.25 m sides and thickness of about 0.007 m, was installed flush with the stream bed with a sampling bag at the downstream end. This plate and sample bag were left in place for a longer period of time (i.e., 1 hour to 38 hours depending on the site visit), and the sediment that migrated onto the plate or into the bag during that time was collected and rinsed into a plastic sampling bag, labelled, and double bagged.

The width of the plate perpendicular to the flow direction was used to estimate the total load over the sampling period. The total bed load material sampled was then submitted to the Golder soils laboratory in Saskatoon as a single composite sample to determine the sample dry weight. Only sampling periods exceeding 24 hours yielded sufficient sediment mass to submit for laboratory analysis, a mass of 300 g is normally required to conduct a sieve test.

For all visits following June 2020, a similar method of extended duration was used with the Helley-Smith handheld wading bed load sampler instead of the square aluminum plate. The width of the Helley-Smith sampler perpendicular to the flow was used to estimate the total load over the sampling period. The sampler was left in place for similar durations (i.e., 1 hour to 38 hours depending on the site visit) with the exception of July 2020 at CR-WC-MS-04, when it was deployed for approximately 67 hours due to thunderstorms and monitoring prioritizing.

Representative bed substrate samples were also collected at hydrometric stations CR-MS-WC-03, CR-MS-WC-04, and CR-MS-WC-05 in 2018 to characterize bed material grain size distribution. Bed material samples were collected with a shovel and sediment bag, double bagged, labelled, and submitted to the Golder soils laboratory in Saskatoon for particle size analysis. A combination of sieve method and the hydrometer method was used to test a subset of each sample to determine the particle size distribution.

### 4.6.2 Data Analysis

When sufficient sample was collected during bed load sampling as described in Section 4.6.1, the sediment samples were submitted to the Golder soils laboratory in Saskatoon to obtain the particle size distribution results. Channel bed substrate particle size was determined using standard laboratory methods and was based on combined mechanical sieve and hydrometer methods.

The TSS concentrations were analyzed by an accredited laboratory using a standard gravimetric TSS analytical method for the examination of water and wastewater (APHA-AWWA-WEF 2018). The detection limit used in the analyses was 1 mg/L.

Bed load sediment data was collected, reviewed, and related to stream parameters including channel width, velocity, and discharge. Bed load sediment concentrations ($C_{SED}$) were calculated as follows:

$$C_{SED}=\frac{M_{Dry}}{Q\times t\times 1000}$$

Where, $C_{SED}$ = bed load sediment concentration (mg/L), $M_{Dry}$ = sample mass dry weight (mg), Q = discharge ($m^3/s$), and t = sample collection time (s). Daily total sediment loads were also calculated based on the dry mass of the samples collected relative to sampler width and multiplied by the total channel width.

$$SL=\left(\frac{M_{Dry}}{W\times t}\right)W_b$$

Where, SL = bed load (tonnes/day), $M_{Dry}$ = oven dried sample mass (tonnes), W = sampler width (m), t = sample collection time (days), $W_b$ = total channel width (m).

Suspended sediment, bed load, and channel substrate results obtained are provided in Section 5.4.

## 4.7 Quality Assurance and Quality Control

Quality assurance (QA) and quality control (QC) practices determine data integrity and are relevant to all aspects of the study, from sample collection to data analysis and reporting. The QA encompasses management and technical practices designed to confirm that the data generated are of consistent high quality. The QC is an aspect of QA and includes the procedures used to measure and evaluate data quality, and the corrective actions to be taken when data quality objectives are not met.

The QA / QC information for the main components of this study is outlined in this section.

### 4.7.1 Meteorological Data

The meteorological station instrumentation, including the Geonor gauge, was installed according to manual specifications by experienced technical staff. This instrumentation was installed at standard heights above ground and considering fetch distances (i.e., un-obstructed distance over which the wind blows) relative to forested areas and occupied buildings. Meteorological data were reviewed by qualified staff. Details on the meteorological instrumentation and data collection are provided in Section 4.3.

### 4.7.2 Snow Surveys

Standard techniques were used for the snow surveys completed in late winter of 2018 and 2019 (Section 4.4). Detailed work instructions including proposed snow survey locations, and maps were provided to the field crew prior to the surveys. Care was taken to avoid placement of snow survey plots within 50 m of a disturbed area such as a road.

Soil plugs were obtained at the base of the snow cores wherever possible to reduce underestimation of snow density through verification of reaching the soil layers below. If snow was observed to be lost from a core when it was removed from the snowpack, a second replacement snow core was taken. The scales used for measuring weight of the snow cores were calibrated with standard weights prior to the surveys, and the scale was zeroed regularly in the field.

### 4.7.3 Hydrometric Monitoring

Field equipment was calibrated throughout the field programs, following manufacturer specifications, and all samples were collected by experienced personnel. Specific work instructions outlining each field task in detail were provided to, and followed by, field personnel. Field notes were recorded in waterproof field books and on pre-printed waterproof field data sheets in either pencil or indelible ink. Data sheets were checked at the end of each field day for completeness and accuracy and were scanned into electronic copies at the completion of the field program.

To provide QA on levelling surveys of water surface elevations, two levelling surveys were completed at each station during each field visit so that WSE results could be compared; for most field visits, the surveys were started and finished on the primary benchmark to provide additional confidence in the WSE results. If the results of the two levelling surveys differed by 0.005 m or less, then that was considered a good result; differences of up to 0.010 m were considered adequate. If lake conditions were windy and wavy, the WSE levelling survey and staff gauge readings were not always within the 0.010 m accuracy, and these weather conditions and reading instances were documented when they occurred. Section 4.5.1 provides further discussion on data QA and checking effort, and Section 5.5 discusses data confidence and uncertainties for these measurements.

Discharge during the field visits was measured with a Sontek Flowtracker ADV, Flowtracker2 ADV, and RiverSurveyor M9 Acoustic Doppler current profiler (ADCP). These devices do not require recalibration; however, QA tests were completed prior to starting measurements and a compass calibration was completed for the ADCP before use. Quality control measures were applied to the ADCP and ADV results following the field programs to check the following:

- The correct offsets and magnetic declination were used for the ADCP.
- There was minimal missing data.
- Depth and velocity measuring spacing for the measurements were logical.
- The ADCP speed did not greatly exceed stream velocity.
- The ADCP Tilt, pitch, and roll were minimal.
- Each ADCP discharge measurement accepted was within 5% of the averaged discharge measurements.
- The ADV percent uncertainty, number of measurement verticals, and measurement flags were reviewed.

All field data were transcribed into an online database. Data entry, summary tables, and statistical analyses were reviewed by a second qualified scientist or engineer.

Hydrometric program data collection methods are provided in detail in Section 4.5.

### 4.7.4 Sediment Sampling and Measurements

Suspended sediment sampling and bed load measurements were obtained during the baseline program period along the Clearwater River downstream of Patterson Lake (Section 4.6).

As mentioned in Section 4.6, an external laboratory was used to obtain water sample results for TSS, and a detection limit of 1 mg/L was used for all the tests. Chain-of-custody forms were used to track shipment and receipt of samples submitted to laboratories. Standard test methods were used. Results from duplicate samples for TSS from fall 2018 were identical and usually not detectable or very low. Due to this, duplicate TSS samples were not taken in 2019 or 2020 field visits.

The particle size analysis and dry weight of bed load samples were submitted to a qualified soils laboratory and standard methods were used. Additional QA/QC methods included using specific work instructions for every field visit to provide detailed instructions to the field crew, and field data were reviewed following each field trip.

# 5.0 RESULTS

## 5.1 Meteorological Data

Monthly total precipitation in the anticipated area of the Project in 2018 to 2020 are presented in Figure 6 alongside long-term European Re-analysis Interim (ERAI) data to provide historical context. In Figure 6, the schematic plot describes the variability of monthly precipitation over a 42-year period from 1979 to 2020. In Figure 7, 2018 to 2020 monthly average air temperature is presented with historical variability in the anticipated area of the Project over a 42-year period from 1979 to 2020. The length of the box in the plots represents the inter-quartile range (i.e., 25th and 75th inter-quartiles), with the median denoted by the horizontal line within the box. The whiskers represent the minimum and maximum values of the central 50% of the dataset. Any outliers are represented by “+” sign.

In 2018, observed precipitation at Rook I was below normal in every month except June, November and December. In 2019, observed precipitation was also below normal in every month except May, August, November and December. In August 2019 total precipitation at Rook I was 206.4 mm, which exceeded the maximum August precipitation in the ERAI records in the anticipated area of the Project and was about three times higher than the mean August precipitation of 73.1 mm. The largest rainfall events at Rook I occurred over multiple days: 56 mm of rainfall between 1 August 2019 and 3 August 2019, and 92 mm between 17 August 2019 and 18 August 2019.

Total annual precipitation in the anticipated area of the Project was 361.6 mm in 2018, 495.3 mm in 2019 measured up to 26 October 2019, and 603.4 mm in 2020 measured from 29 April 2020 to 3 November 2020. Precipitation data from 26 October 2019 to 28 April 2020 appeared erroneous and were well above other regional meteorological station data; therefore, the data have been intentionally omitted. Mean annual precipitation was 531 mm for the years 1979 to 2019 based on ERAI data. Hence 2018, and possibly also 2019, was below the long-term average value, and 2020 was above the long-term average value.

Monthly average air temperatures in 2018 to 2020 are presented in Figure 7, alongside historical temperatures for the anticipated area of the Project from 1979 to 2019 based on ERAI data. In general, observed air temperatures in 2018 and 2019 followed long-term average conditions with occasional exceptions.

**Figure 6: Monthly Precipitation Records for 2018 to 2020 at Rook I Compared to Long-Term ERAI Records (1979 to 2019)**

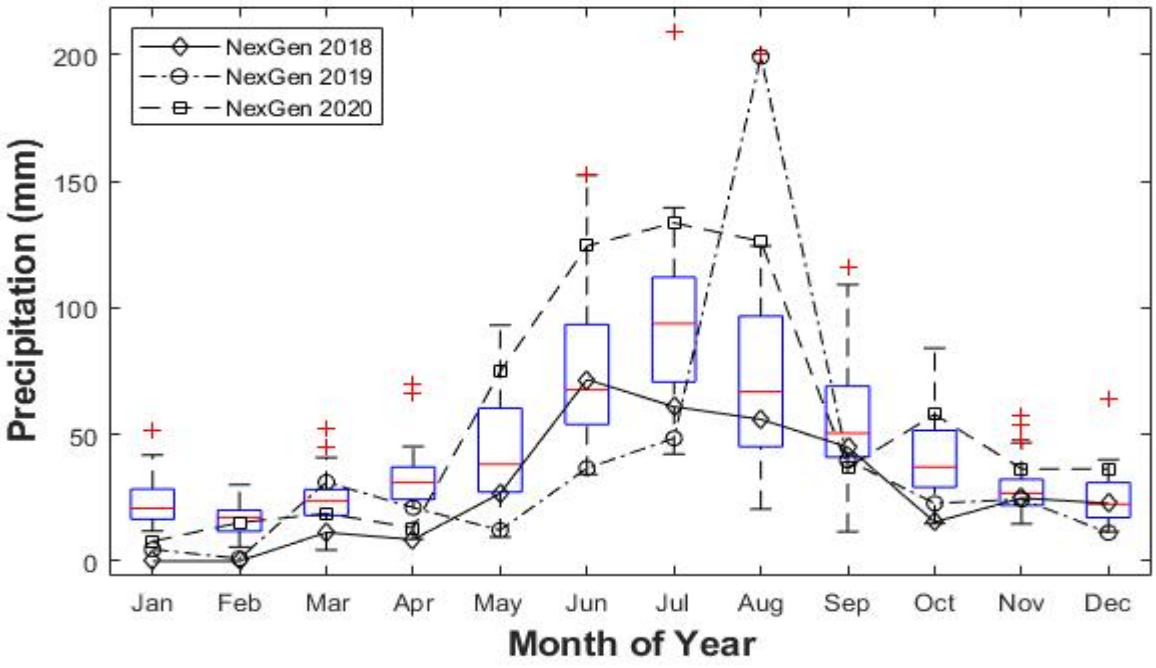
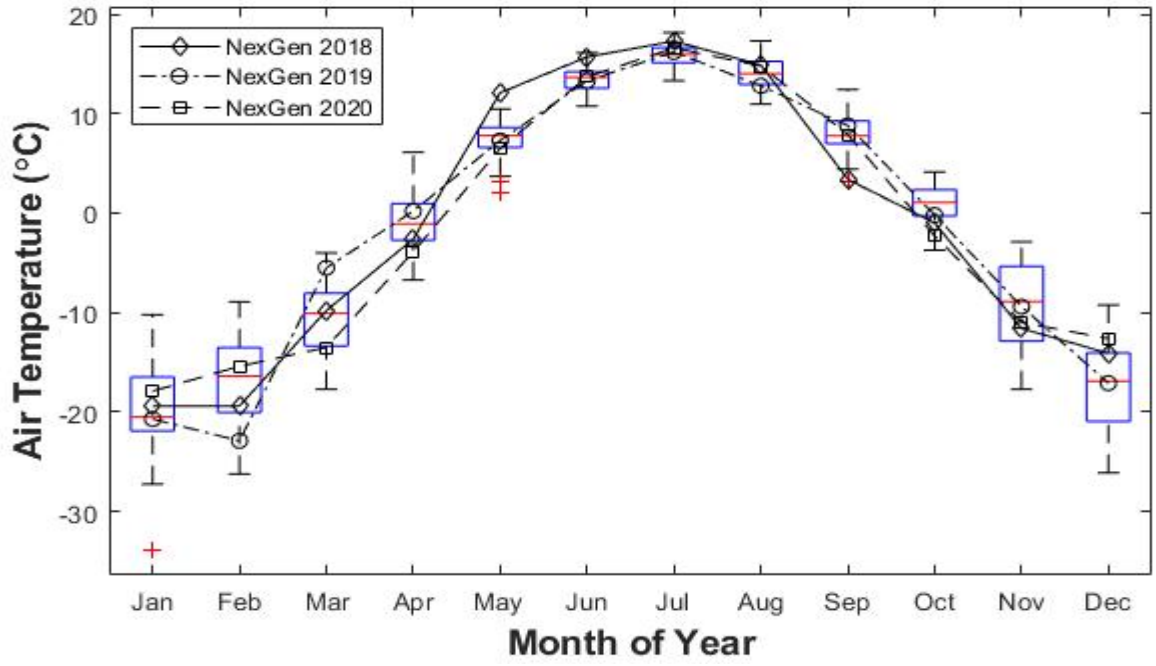



**Figure 7: Monthly Air Temperature Records for 2018 to 2020 Relative to Long-Term (1979 to 2019) Records**



## 5.2 Snow Surveys

Snow survey results for the Patterson Lake watershed, collected between 15 April 2018 and 17 April 2018 and between 21 March 2019 and 23 March 2019, are presented in Table 6. Detailed snow survey results are included in Appendix C Snow Survey Data.

The average SWE on the ground on 17 April 2018 (i.e., at the end of the 2018 snow survey) for all terrain types, not weighted by area, was 78.5 mm and ranged from 31.3 mm to 104.5 mm. The average SWE on the ground on 23 March 2019 (i.e., at the end of the 2019 snow survey) for all terrain types, not weighted by area, was 75.5 mm and ranged from 62.8 mm to 91.5 mm. The area-weighted SWE for the Patterson Lake watershed was estimated to be 74.0 mm in 2018 and 70.0 mm in 2019. This corresponds to an estimated snowpack available for melt of 19.6 million cubic metres ($Mm^3$) in 2018 and 18.4 $Mm^3$ in 2019 in the Patterson Lake watershed. The total volume of snow available for melt was expected to have peaked in advance of the field surveys in both 2018 and 2019.

Based on the weather and observations made during both years' snow surveys, some melt likely occurred prior to the surveys; therefore, these results likely underestimate the volume available for melt in Patterson Lake watershed. Additionally, no adjustment was made to account for sublimation losses between the time of the surveys and when the snowpack had fully melted, although blowing snow-sublimation losses would have been minimal as snowmelt had started and losses to wind-blown sublimation are typically minimal once melting of the snowpack begins. In spring 2018, snowmelt occurred relatively soon after the survey; therefore, this loss may have been small. In spring 2019, the spring freshet extended from the initial melt in March to early or mid-May; therefore, additional sublimation losses would be expected. No survey was conducted in 2020.

**Table 6: Snow Survey Summary Results, April 2018 and March 2019**

| Terrain Type | 2018 | | | 2019 | | |
|---|---|---|---|---|---|---|
| | Sample Mean Depth (cm) | Sample Mean Density ($g/cm^3$) | Sample SWE (mm) | Sample Mean Depth (cm) | Sample Mean Density ($g/cm^3$) | Sample SWE (mm) |
| Lake | 22.0 | 0.14 | 31.3 | 22.9 | 0.33 | 75.1 |
| Lake Edge | 47.9 | 0.16 | 78.8 | 26.3 | 0.29 | 75.7 |
| Terrestrial: flat, low slope[a] | 65.3 | 0.14 | 87.6 | 29.5 | 0.24 | 69.8 |
| Terrestrial: north, low slope | 61.3 | 0.14 | 88.4 | 32.9 | 0.19 | 64.1 |
| Terrestrial: north, 10° to 33° | 60.3 | 0.15 | 88.5 | 37.7 | 0.24 | 91.5 |
| Terrestrial: west, low slope | 84.0 | 0.14 | 104.5 | 31.6 | 0.26 | 78.0 |
| Terrestrial: west, 10° to 33° | 58.4 | 0.11 | 68.4 | 35.3 | 0.24 | 86.5 |
| Terrestrial: south, low slope | 51.6 | 0.13 | 70.0 | 31.0 | 0.22 | 65.2 |
| Terrestrial: south, 10° to 33° | 43.7 | 0.16 | 70.7 | 24.0 | 0.30 | 70.9 |
| Terrestrial: east, low slope[b] | 70.8 | 0.12 | 87.5 | 31.7 | 0.21 | 62.8 |
| Terrestrial: east, 10° to 33° | 70.8 | 0.12 | 87.5 | 43.0 | 0.21 | 91.1 |
| **All Types** | **57.8** | **0.14** | **78.5** | **31.4** | **0.25** | **75.5** |

a) No sample points were collected for Terrestrial: Flat, Low Slope terrain type and was assumed to be the average of low slope observations in all directions.
b) In 2018, Terrestrial: East, Low Slope was assumed to be the same as Terrestrial: East, High Slope as the results are similar to observations for north facing slopes in 2019.
SWE = snow water equivalent.

For late winter 2020, SWE values for the Patterson Lake watershed were estimated using data collected from regional remote sensing data and ground-based methods. Ground-based methods are important in validating the remote sensing data.

Comparison of local snow survey results to regional SWE conditions was possible based on publicly available regional measurements, as well as remotely sensed maps of SWE. Publicly available measurements of SWE are available at Gordon Lake Lookout snow pillow station. At the time of snow surveys from 15 April 2018 to 17 April 2018, SWE at Station 07CE801 was relatively stable at around 128 mm, and from 6 March 2018 to 19 April 2018, SWE at Station 07CE801 generally exceeded 120 mm. These values are much higher than the 74 mm of weighted SWE average measured at the anticipated area of the Project on the same dates. This is likely due to differences in snow pack at the two locations.

In 2019, peak SWE of 93 mm occurred at Station 07CE801 on 20 March. At the time of snow surveys from 21 March 2019 to 23 March 2019, SWE was slightly lower than the peak and steadily melting such that it decreased from 86 mm to 67 mm over the three-day period. These values are similar to the 70 mm of weighted SWE average measured at the anticipated area of the Project on the same dates.

In 2020, peak SWE of 127 mm occurred at Station 07CE801 on 12 April. From 1 April to 2020 to 17 April 2020, SWE of 120 mm or greater was sustained, followed by steady snowmelt beginning 21 April 2020 and ending 27 April 2020. No local snow surveys were completed in 2020 that could be compared with regional values.

Additional regional context was gained by reviewing weekly estimates of SWE for the Canadian Prairie provinces published by ECCC, accessed through CCIN (CCIN 2020; ECCC 2020b). Weekly snapshots from the expected peak annual condition between 22 March 2018 and 1 April 2018 up to the time of the snow survey show that snow ablation (i.e., reduction) and snow melt likely began before the snow survey (Figure 8a to Figure 8d). In Figure 8, the anticipated area of the Project is indicated in the weekly snapshots by a black star in northwest Saskatchewan. The estimated SWE in place on 15 April 2018 validates the SWE shown in Figure 8c for the anticipated area of the Project, which is approximately 70 mm. The peak SWE of between 100 mm and 110 mm occurred the week of 1 April 2018. This value is close to the peak SWE in 2018 of 124 mm estimated using Global Snow Monitoring for Climate Research (GlobSnow) data (ESA 2020) for the anticipated area of the Project and is close to the long-term average peak SWE of 115 mm using the GlobSnow data for 1980 to 2019 (ESA 2020).

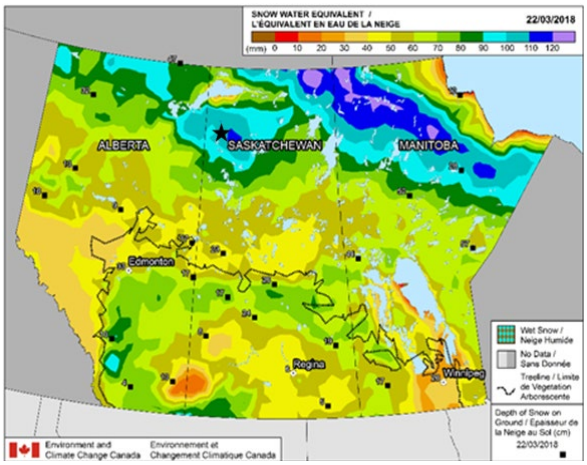
In winter 2019, weekly snapshots were obtained for dates between 22 February 2019 and 1 April 2019 that include the peak annual SWE and the timing of the snow survey (CCIN 2020; ECCC 2020b). Figure 9 includes six snapshots that show snow ablation and melt had likely started before the snow survey was completed. The estimated SWE on 21 March 2019 validates the SWE shown in Figure 9 for the anticipated area of the Project, which appears to be roughly between 80 mm and 90 mm. The peak SWE of between 100 mm and 110 mm appears to have occurred during the week of 1 March 2019. This is close to the peak SWE in 2018 of 119 mm estimated using GlobSnow data (ESA 2020) for the anticipated area of the Project, and is close to the long-term average peak SWE of 115 mm.

In winter 2020, weekly snapshots in late-winter 2020 were obtained for dates between 22 February 2020 and 22 April 2020 that include the peak annual SWE (CCIN 2020; ECCC 2020b). Figure 10 includes nine snapshots that show that snow ablation and melt likely began mid-April 2020, which is similar to GlobSnow and Station 07CE801. Peak snowpack between 100 mm and 110 mm is validated by GlobSnow data, which has a maximum value of 115 mm. GlobSnow and ECCC values are slightly lower than those for Station 07CE801.

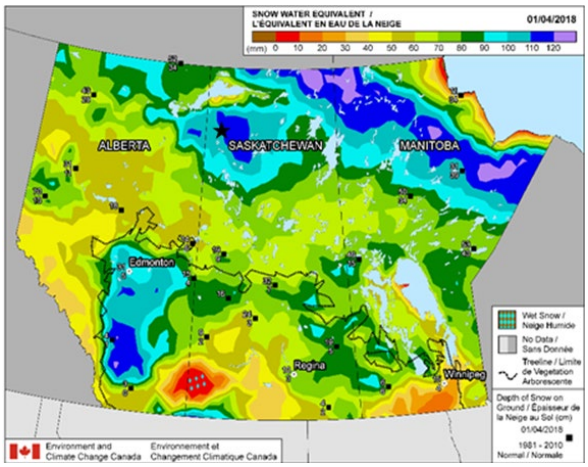
Based on the comparison of results in previous years, SWE at the anticipated area of the Project can be adequately approximated using the remote sensing data for 2020.

**Figure 8: Weekly Snow Water Equivalent Estimates, March and April 2018**

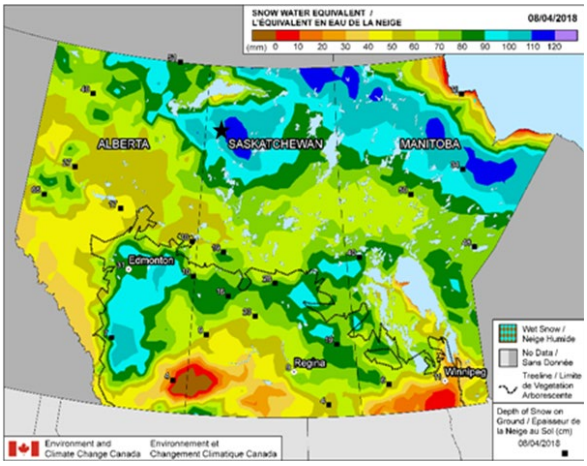
**a) 22 March 2018**



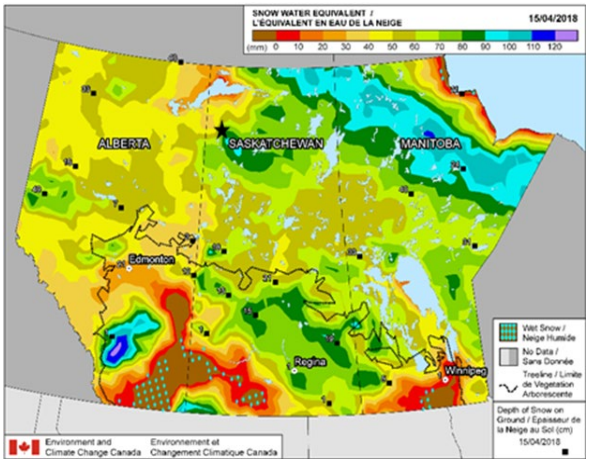

**b) 1 April 2018**




**c) 8 April 2018**



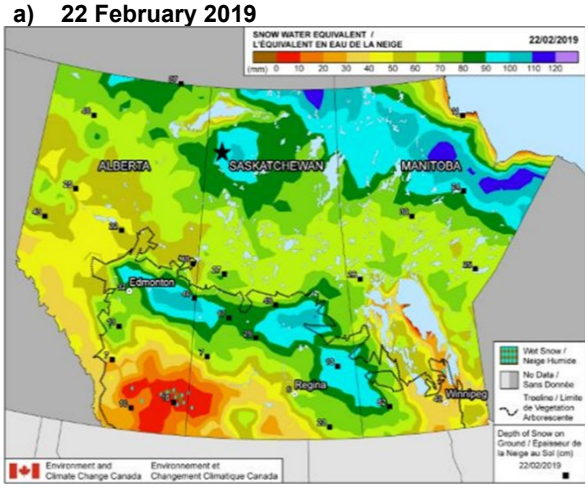

**d) 15 April 2018**



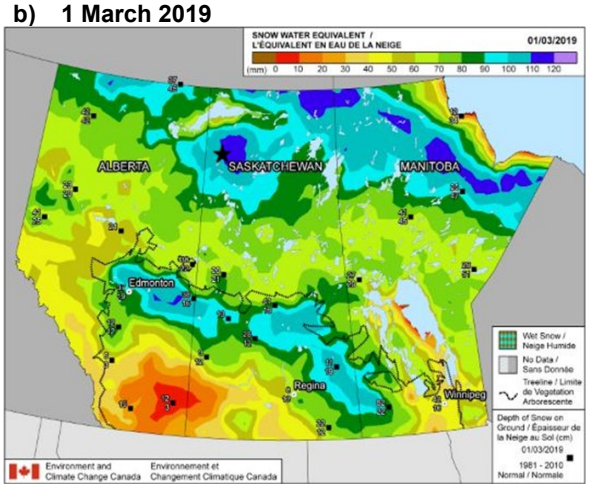

Source: ECCC 2020b
Note: Project location is indicated in the snapshots by a black star immediately northwest of the label for Saskatchewan.

**Figure 9: Weekly Snow Water Equivalent Estimates, February to April 2019**

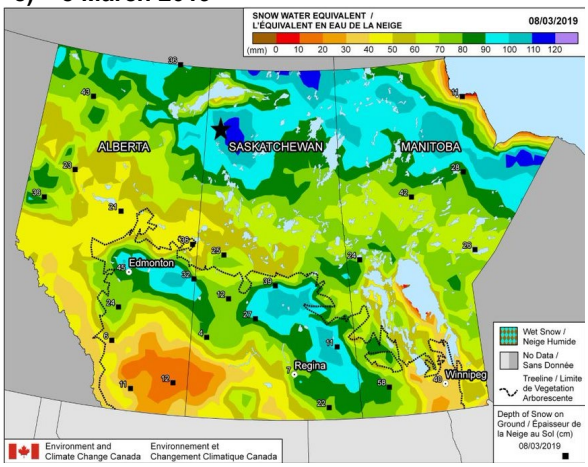
**a) 22 February 2019**



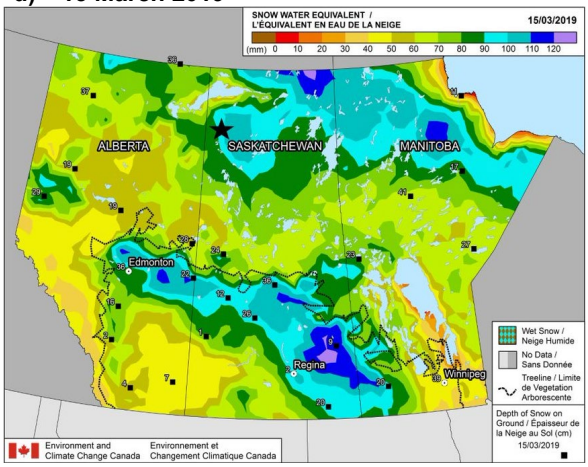

**b) 1 March 2019**



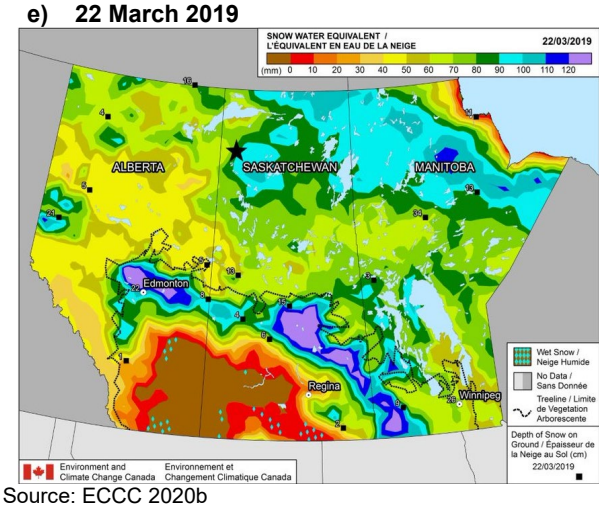

**c) 8 March 2019**



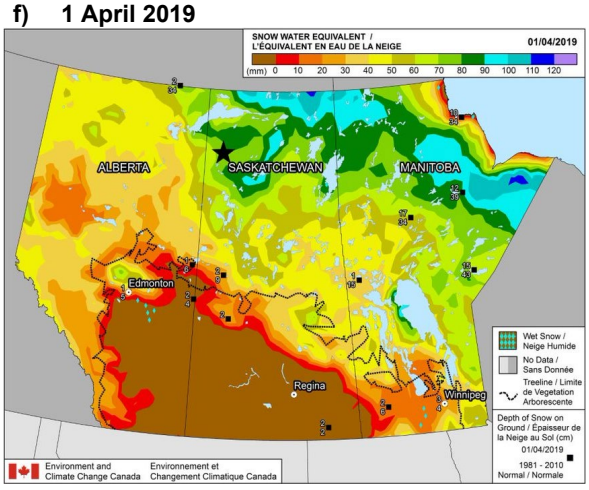

**d) 15 March 2019**




**e) 22 March 2019**




**f) 1 April 2019**

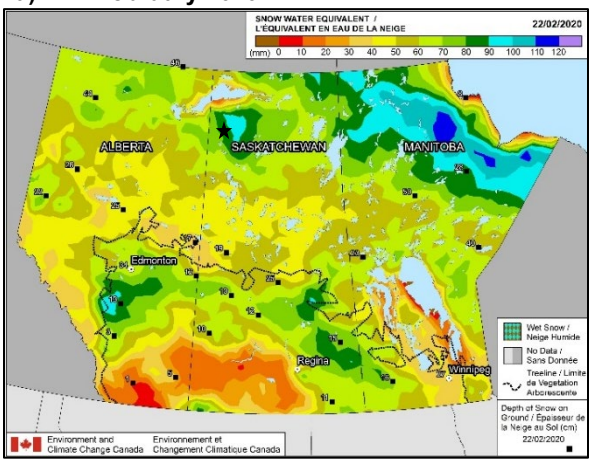



Source: ECCC 2020b

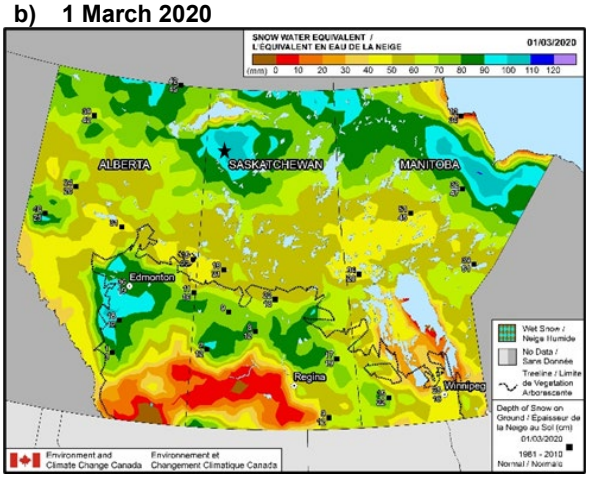
Note: Project location is indicated in the snapshots by a black star immediately northwest of the label for Saskatchewan.

**Figure 10: Weekly Snow Water Equivalent Estimates, February to April 2020**

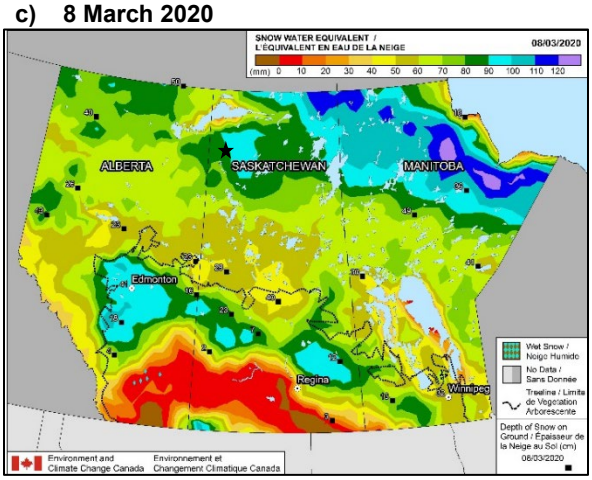
**a) 22 February 2020**



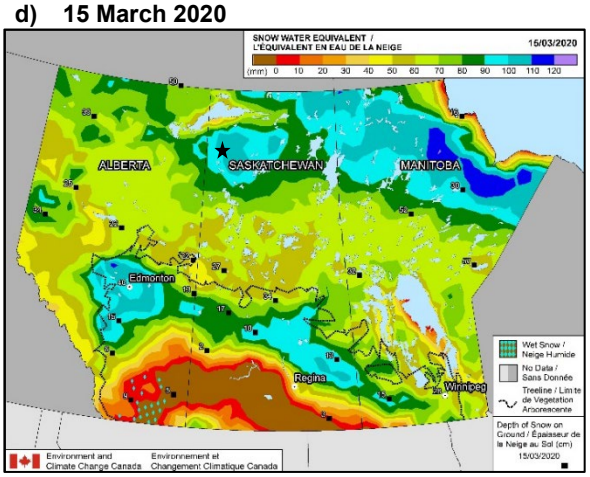

**b) 1 March 2020**



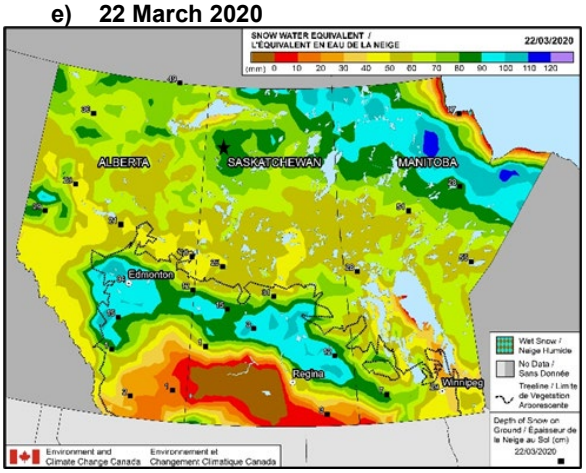

**c) 8 March 2020**



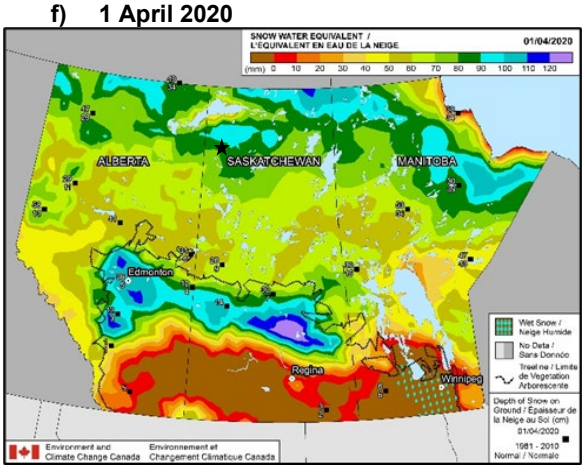

**d) 15 March 2020**



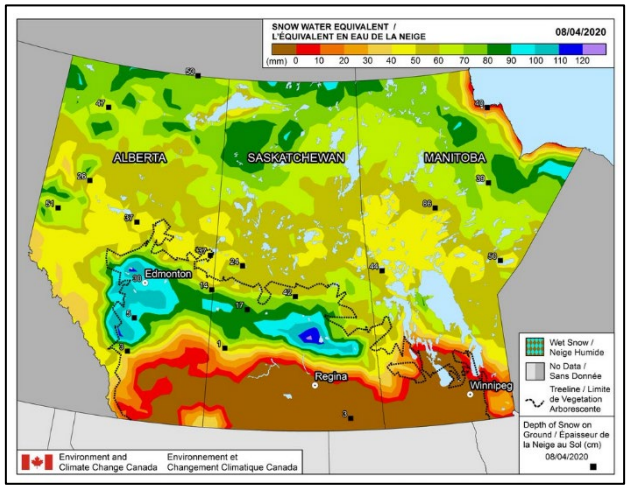

**e) 22 March 2020**



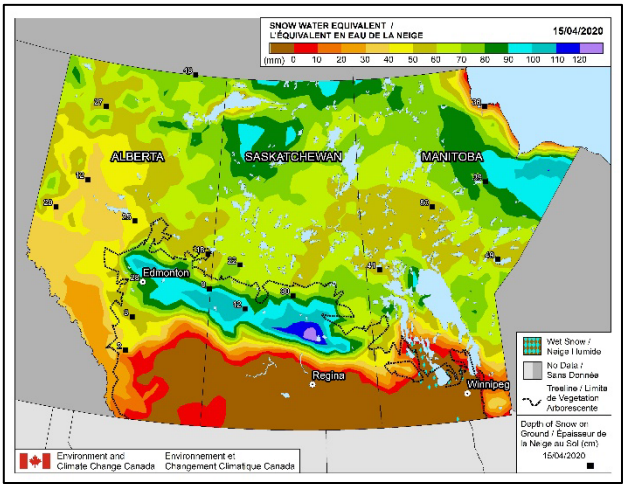

**f) 1 April 2020**



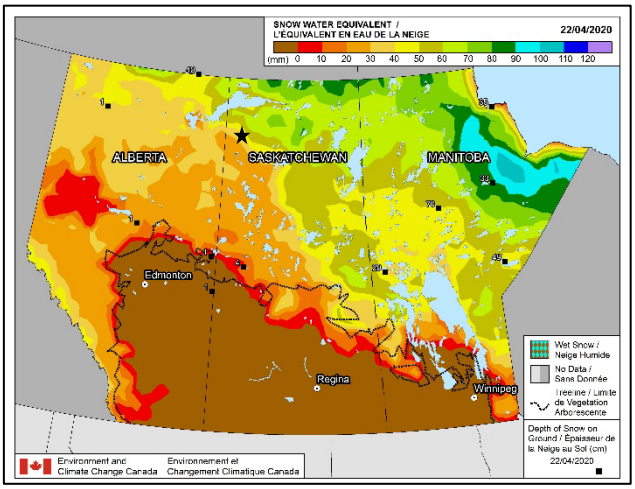
**g) 8 April 2020**




**h) 15 April 2020**




**i) 22 April 2020**




Source: ECCC 2020b

Note: Project location is indicated in the snapshots by a black star immediately northwest of the label for Saskatchewan.

# 5.3 Hydrometric Monitoring

## 5.3.1 Watercourse Hydrometric Monitoring

Discharge and WSE data collected for each hydrometric station during the 2018 to 2020 hydrology field programs are provided in the following subsections. Daily mean WSE and discharge data are included in Appendix D Hydrometric Monitoring Daily Data.

Only paired WSE and discharge measurements that were considered to be unaffected by backwater were used to develop the OWRC base curve equation. Stage-shifts were applied to the stage-discharge points that were affected by backwater. Small stage-shifts were applied to the OWRC to improve the derived discharge time series; the rating curve stage-shift report is included in Appendix B.

### *5.3.1.1 Station CR-WC-MS-01: Clearwater River below Broach Lake*

Hydrometric monitoring work at the Clearwater River below Broach Lake (i.e., CR-WC-MS-01) began in 2018 in support of the hydrological baseline. The station is located approximately 20 m downstream of the Broach Lake outlet (Figure 3) and is shown in Figure 11. The field results for CR-WC-MS-01 are summarized in Table 7.

The OWRC, calibrated using available field measurements, is shown in Figure 12. A wide range of WSE (i.e., 0.296 m) and discharge (i.e., 0.140 $m^3/s$ to 0.631 $m^3/s$) were measured during the monitoring period from August 2018 to September 2020 as shown in Table 7. This hydrometric station is located in the Clearwater River Upper Reach, which has a relatively higher slope than reaches farther downstream and may only experience minor backwater from terrestrial vegetation such as sweet gale (*Myrica gale*) hanging over the channel banks, as shown in Figure 11, or due to ice cover in winter. Based on the quality of discharge measurements and good fit of the stage-discharge rating curve over a wide range of conditions, the derived discharge records provide a good representation of baseline conditions at this location.

The daily mean WSE and discharge series derived from the Levelogger and OWRC, along with observed precipitation and air temperature, are presented in Figure 13.

**Table 7: Summary of Hydrometric Monitoring Results, CR-WC-MS-01**

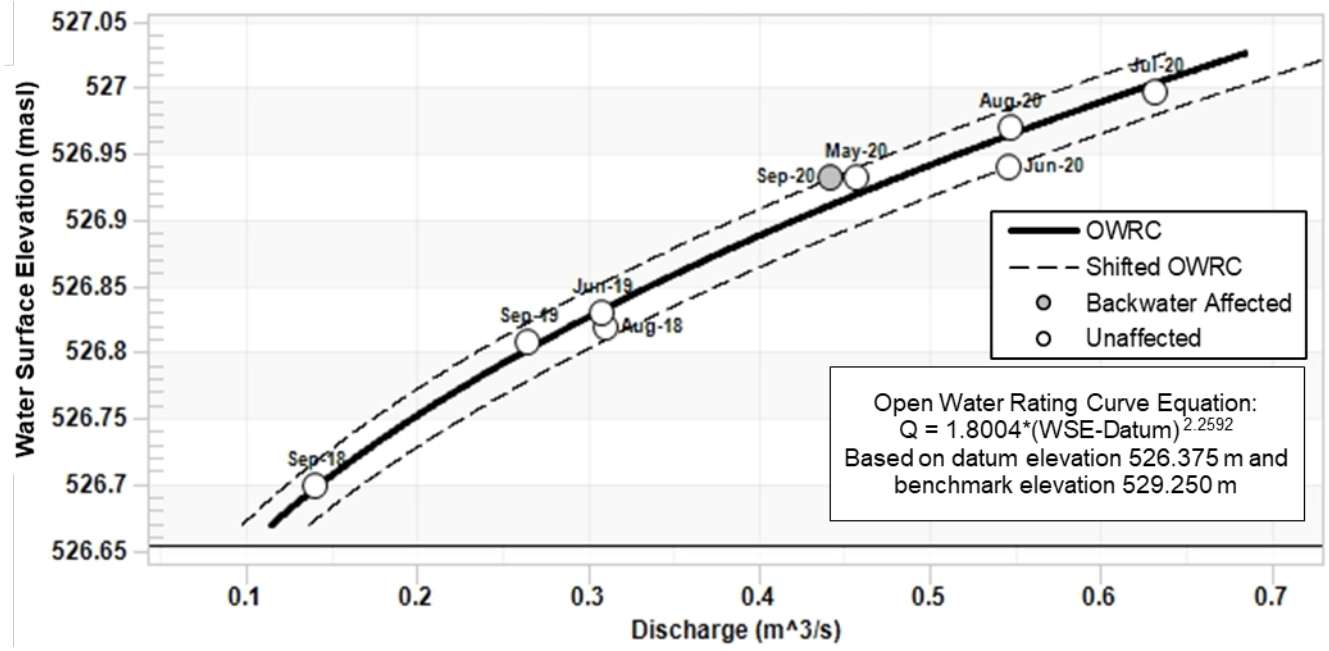
| Date and Time | WSE[(a)] (masl) | Staff Gauge Reading (m) | Discharge ($m^3/s$) |
|---|---|---|---|
| 7 August 2018 14:30 | 526.819 | 0.288 | 0.310 |
| 30 September 2018 17:50 | 526.701 | 0.170 | 0.140 |
| 4 June 2019 12:15 | 526.831 | 0.295 | 0.307 |
| 29 September 2019 14:00 | 526.808 | 0.265 | 0.264 |
| 3 May 2020 08:00 | 526.933 | 0.382 | 0.465 |
| 6 June 2020 14:27 | 526.940 | 0.394 | 0.546 |
| 11 July 2020 14:45 | 526.997 | 0.453 | 0.631 |
| 22 August 2020 10:16 | 526.970 | 0.423 | 0.547 |
| 24 September 2020 15:15 | 526.932 | 0.395 | 0.441 |

a) Water surface elevation (WSE) measured by levelling survey relative to rebar benchmark, CR-WC-MS-01_BM1.
masl = metres above sea level.

**Figure 11: Clearwater River at CR-WC-MS-01**

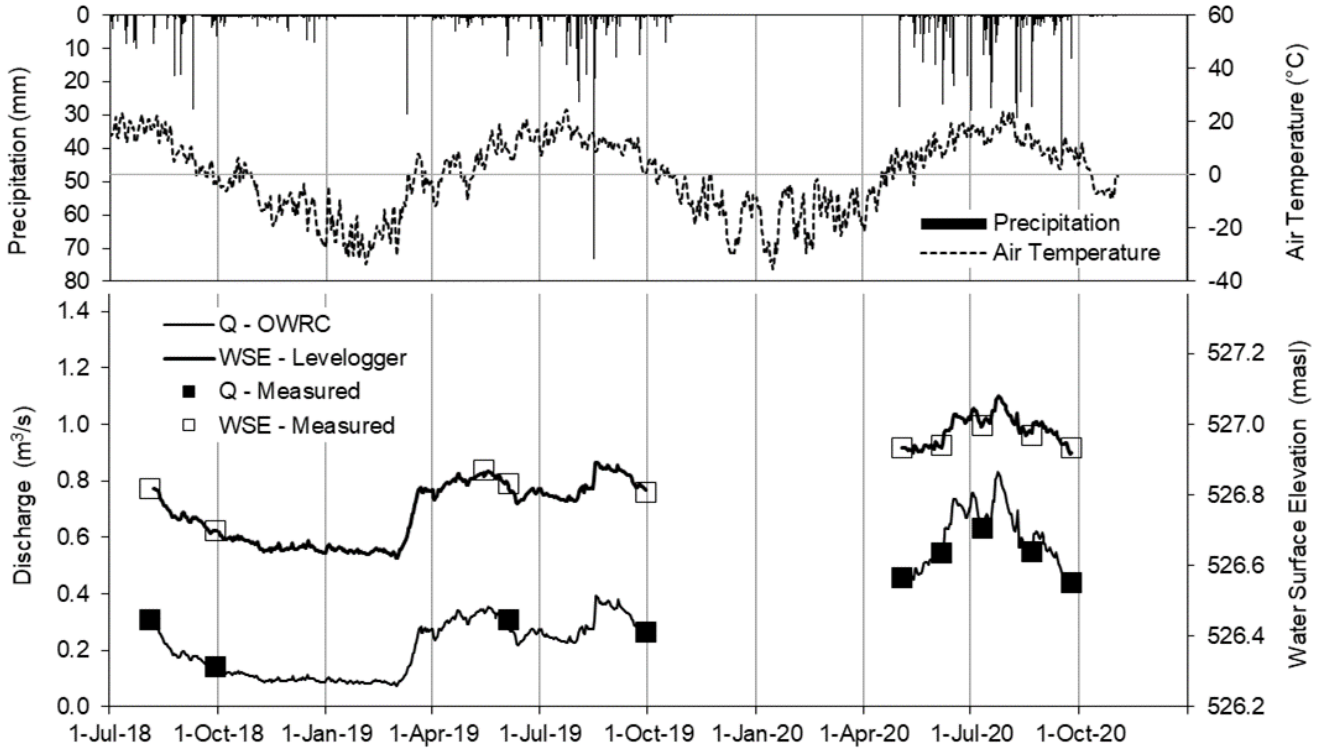
Note: View of CR-WC-MS-01 from the discharge transect on 24 September 2020; view is facing upstream (west).

**Figure 12: Open Water Rating Curve for CR-WC-MS-01**




OWRC = open water rating curve; Q = discharge ($m^3/s$); WSE = water surface elevation.

**Figure 13: CR-WC-MS-01 Water Surface Elevation and Discharge, 2018 to 2020**




OWRC = open water rating curve; Q = discharge ($m^3/s$) WSE = water surface elevation.

### *5.3.1.2 Station CR-WC-MS-02: Clearwater River above Patterson Lake*

Hydrometric monitoring at the Clearwater River above Patterson Lake (i.e., CR-WC-MS-02) began in August 2018. The station is located about 60 m upstream of Patterson Lake (Figure 3) and is shown in Figure 14. The field results for CR-WC-MS-02 are summarized in Table 8. The OWRC base curve equation was fit to the spring 2019 and spring 2020 field measurements that were unaffected by backwatering from Patterson Lake as shown in Figure 15. There was extensive backwater at this station once Patterson Lake levels increased following spring freshet, particularly in 2020 as the lake levels remained relatively high.

As this station has uniform water depth and velocities at its gauge location, the nine discharge measurements made with an ADV between August 2018 and September 2020 had good accuracy. A wide range of WSE (i.e., 0.315 m) and discharge (i.e., from 0.400 $m^3/s$ to 2.54 $m^3/s$) were measured during the monitoring period, which provides confidence in the derived discharge time series as shown in Table 8.

The daily mean WSE and derived discharge time series, along with observed precipitation and air temperature, are presented in Figure 16.

**Table 8: Summary of Hydrometric Monitoring Results, Station CR-WC-MS-02**

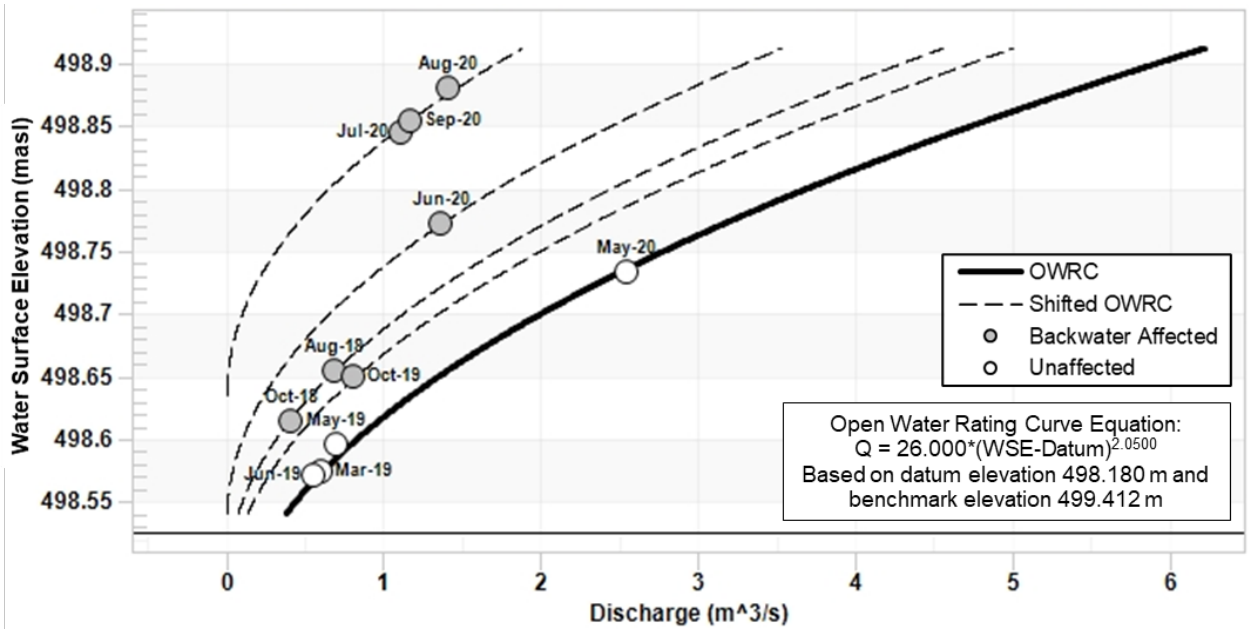
| Date and Time | WSE[(a)] (masl) | Staff Gauge Reading (m) | Discharge ($m^3/s$) |
|---|---|---|---|
| 6 August 2018 11:00 | 498.656 | n/d | 0.680 |
| 2 October 2018 11:42 | 498.615 | n/d | 0.400 |
| 25 March 2019 11:00 | 498.575 | 0.465 | 0.600 |
| 6 May 2019 17:15 | 498.597 | 0.487 | 0.693 |
| 3 June 2019 16:50 | 498.573 | 0.478 | 0.553 |
| 1 October 2019 13:00 | 498.651 | 0.555 | 0.806 |
| 4 May 2020 07:45 | 498.734 | 0.674 | 2.54 |
| 4 June 2020 17:10 | 498.773 | 0.723 | 1.36 |
| 9 July 2020 14:40 | 498.845 | 0.762 | 1.11 |
| 19 August 2020 15:09 | 498.882 | 0.808 | 1.40 |
| 24 August 2020 09:20 | 498.888 | 0.805 | n/d |
| 23 September 2020 13:59 | 498.856 | 0.785 | 1.16 |

a) Water surface elevation (WSE) measured by levelling survey using rebar benchmark, CR-WC-MS-02_BM1.
n/d = no measurement;

**Figure 14: Clearwater River at Station CR-WC-MS-02**

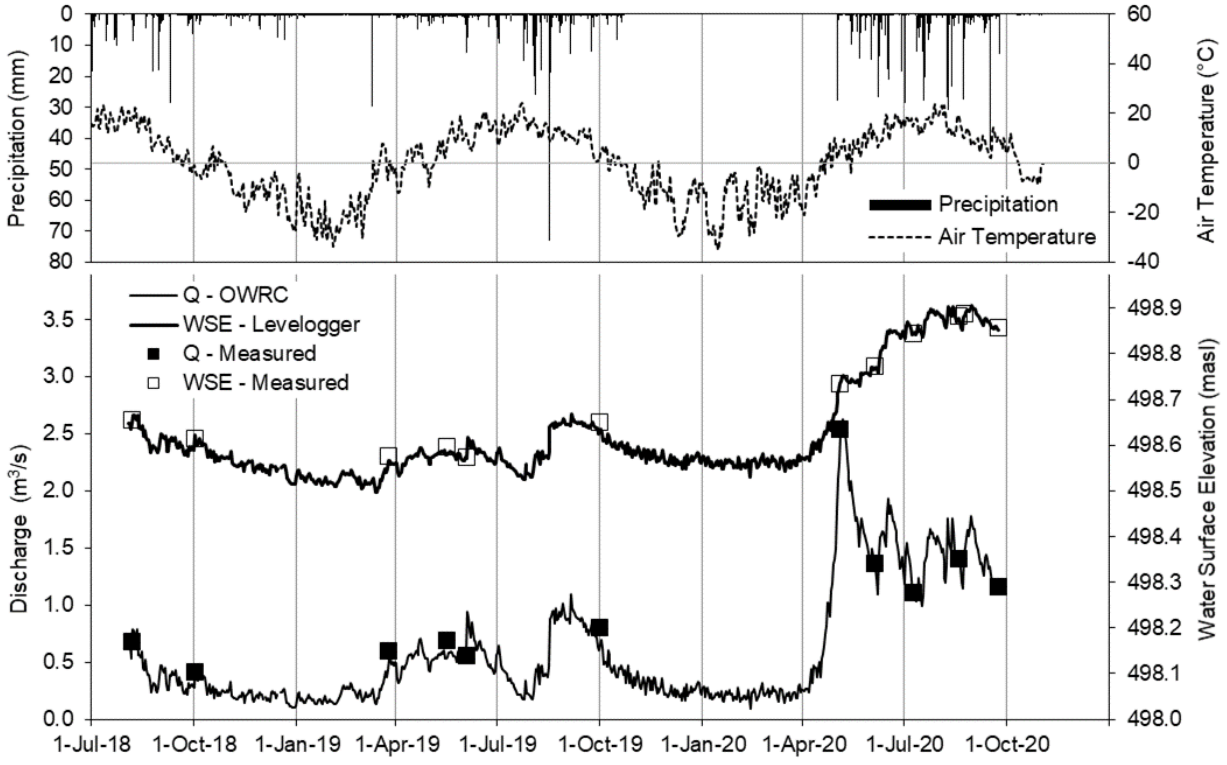
Note: View of CR-WC-MS-02 on 23 September 2020; view is facing upstream (northeast).

**Figure 15: Open Water Rating Curve for Station CR-WC-MS-02**




OWRC = open water rating curve; Q = discharge ($m^3/s$); WSE = water surface elevation.

**Figure 16: Station CR-WC-MS-02 Water Surface Elevation and Discharge, 2018 to 2020**




OWRC = open water rating curve; Q = discharge; WSE = water surface elevation.

### *5.3.1.3 Station CR-WC-MS-03: Clearwater River below Patterson Lake*

Hydrometric monitoring at the Clearwater River below Patterson Lake (i.e., CR-WC-MS-03) began in August 2018. The hydrometric monitoring station is located approximately 100 m downstream of the Patterson Lake outlet and 10 m upstream of the access road bridge (Figure 3), and is shown in Figure 17. The field results for CR-WC-MS-03 are summarized in Table 9.

**Table 9: Summary of Hydrometric Monitoring Results, Station CR-WC-MS-03**

| Date and Time | WSE[(a)] (masl) | Staff Gauge Reading (m) | Discharge ($m^3/s$) | TSS (mg/L) | Bed Load (mg/L) |
|---|---|---|---|---|---|
| 4 August 2018 14:30 | 498.584 | 0.320 | 1.16 | <1 | 0 |
| 29 September 2018 17:50 | 498.496 | 0.180 | 0.983 | <1 | 0 |
| 26 March 2019 14:27 | 498.536 | 0.288 | 0.984 | n/d | n/d |
| 15 May 2019 17:15 | 498.534 | 0.290 | 1.46 | n/d | n/d |
| 18 May 2019 16:45 | 498.531 | 0.290 | 1.42 | <1 | 0 |
| 4 June 2019 17:15 | 498.533 | 0.291 | 1.33 | <1 | 0 |
| 30 September 2019 16:00 | n/d | n/d | n/d | <1 | 0 |
| 30 September 2019 16:30 | 498.564 | 0.322 | 1.17 | n/d | n/d |
| 2 May 2020 20:03 | 498.661 | 0.430 | 1.59 | n/d | n/d |
| 3 May 2020 10:30 | 498.669 | 0.445 | 1.56 | n/d | n/d |
| 4 May 2020 15:00 | 498.688 | 0.465 | 1.62 | n/d | n/d |
| 6 June 2020 17:00 | 498.758 | 0.517 | 2.22 | n/d | n/d |
| 8 June 2020 08:32 | n/d | n/d | n/d | <1 | 0 |
| 10 July 2020 16:18 | 498.794 | 0.550 | 2.35 | n/d | n/d |
| 14 July 2020 07:33 | n/d | n/d | n/d | 1 | 0 |
| 23 August 2020 15:24 | 498.842 | 0.602 | 2.32 | n/d | n/d |
| 24 August 2020 11:15 | 498.845 | 0.600 | n/d | n/d | n/d |
| 25 August 2020 07:48 | n/d | n/d | n/d | <1 | 0 |
| 26 September 2020 14:57 | 498.831 | 0.590 | 2.16 | <1 | n/d |
| 28 September 2020 10:15 | n/d | n/d | n/d | <1 | 0 |

a) Water surface elevation (WSE) measured by levelling survey using rebar benchmark, CR-WC-MS-03_BM1.
TSS = total suspended solids; n/d = no data; masl = metres above sea level; < = less than.

**Figure 17: Clearwater River below Patterson Lake, Station CR-WC-MS-03**

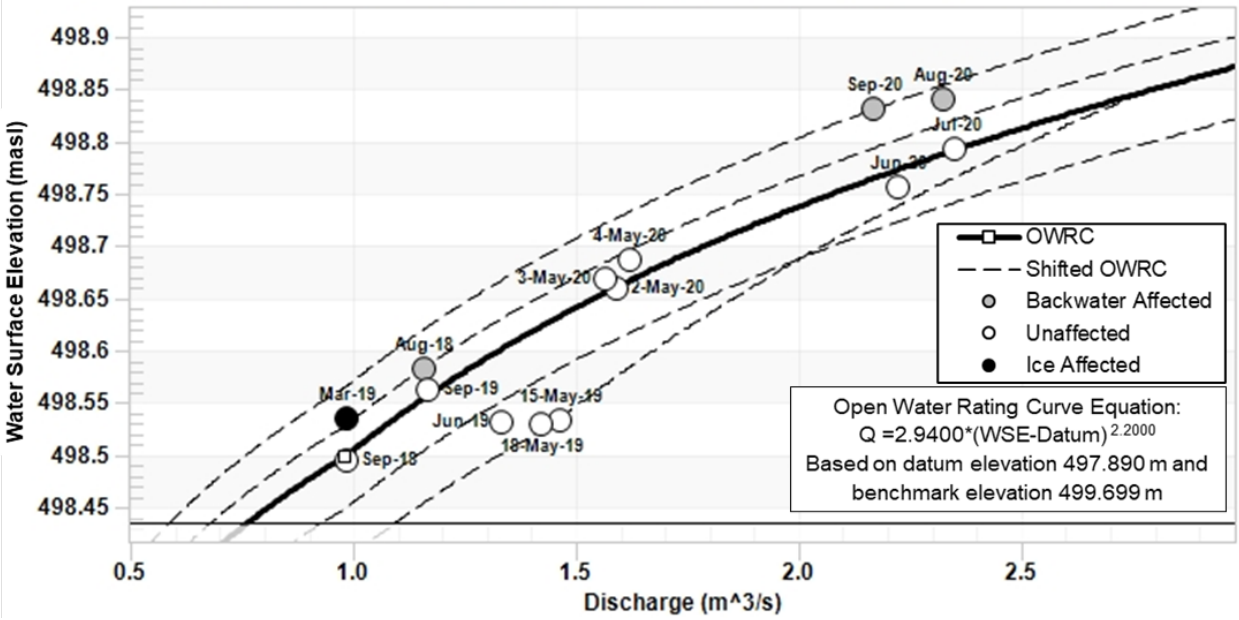
Note: View of CR-WC-MS-03 measurement cross-section and bed load sample location 26 September 2020 facing upstream (west).

The OWRC for CR-WC-MS-03 was developed using a calibrated 1-D HEC-RAS hydraulic model for the Clearwater River reach between Patterson and Forrest lakes. The rating curve relates the WSE of Patterson Lake to discharge at the outlet with the WSE elevations from the station location. The OWRC and field measurements are shown in Figure 18. The rating curve is supported by 14 coincident stage-discharge measurement points, as this was the most frequently visited station due to its importance as the outflow of Patterson Lake. There were 15 levelling surveys completed between August 2018 and September 2020. Three stage-discharge points measured in May 2020 and June 2020 were below the base rating curve and no levelling or discharge error or physical cause was identified therefore this issue was resolved for the derived discharge time series by using a stage-shift over this period that relies on the high accuracy of the discharge measurements made during these field visits (Appendix B).

As this station has uniform water depth and velocities at its gauge location, the numerous discharge measurements made with an ADV between August 2018 and September 2020 were sufficiently accurate. A wide range of WSE (i.e., 0.350 m) and discharge (i.e., from 0.980 $m^3/s$ to 2.30 $m^3/s$) were measured during this period as shown in Table 9. Based on these factors, there is high confidence in the derived discharge time series during the open water monitoring period.

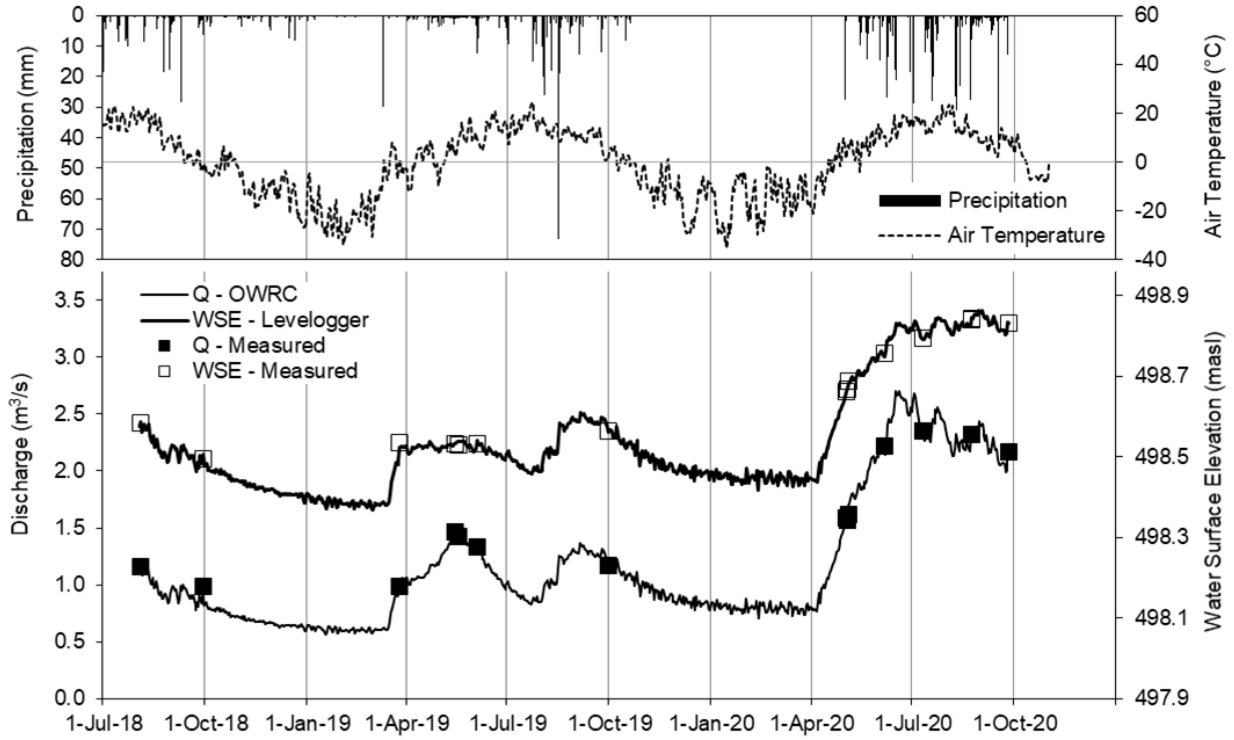
The rating curve shift report is included in Appendix B. The daily mean WSE and discharge series derived from the Levelogger and OWRC, along with observed precipitation and air temperature, are presented in Figure 19.

**Figure 18: Open Water Rating Curve for Station CR-WC-MS-03**




OWRC = open water rating curve; Q = discharge ($m^3/s$); WSE = water surface elevation.

**Figure 19: Station CR-WC-MS-03 Water Surface Elevation and Discharge, 2018 to 2020**




OWRC = open water rating curve; masl = metres above sea level; Q = discharge ($m^3/s$); WSE = water surface elevation.

### 5.3.1.4 Station CR-WC-MS-04: Clearwater River below Beet Lake

Hydrometric monitoring work at the Clearwater River below Beet Lake (i.e., CR-WC-MS-04) began in 2018 in support of the hydrological baseline. The station is located approximately 300 m downstream of the Beet Lake outlet (Figure 3) and is shown in Figure 20. The field results for CR-WC-MS-04 are summarized in Table 10.

The OWRC was developed based on nine coincident stage and discharge measurements (Figure 21). A WSE survey was not completed in June 2019 due to bear activity at the station. The daily mean WSE and discharge time series derived from the Levelogger and OWRC is presented in Figure 22 along with observed precipitation and air temperature. Due to a programming error, the Levelogger records for CR-MS-WC-04 stopped on 4 July 2019 for the remainder of 2019. To infill the gap in the discharge time series for the remainder of the y ear, the Levelogger records for Beet Lake (i.e., Station CR-WB-MS-04) were used along with the rating curve for CR-WC-MS-04.

**Table 10: Summary of Hydrometric Monitoring Results, CR-WC-MS-04**

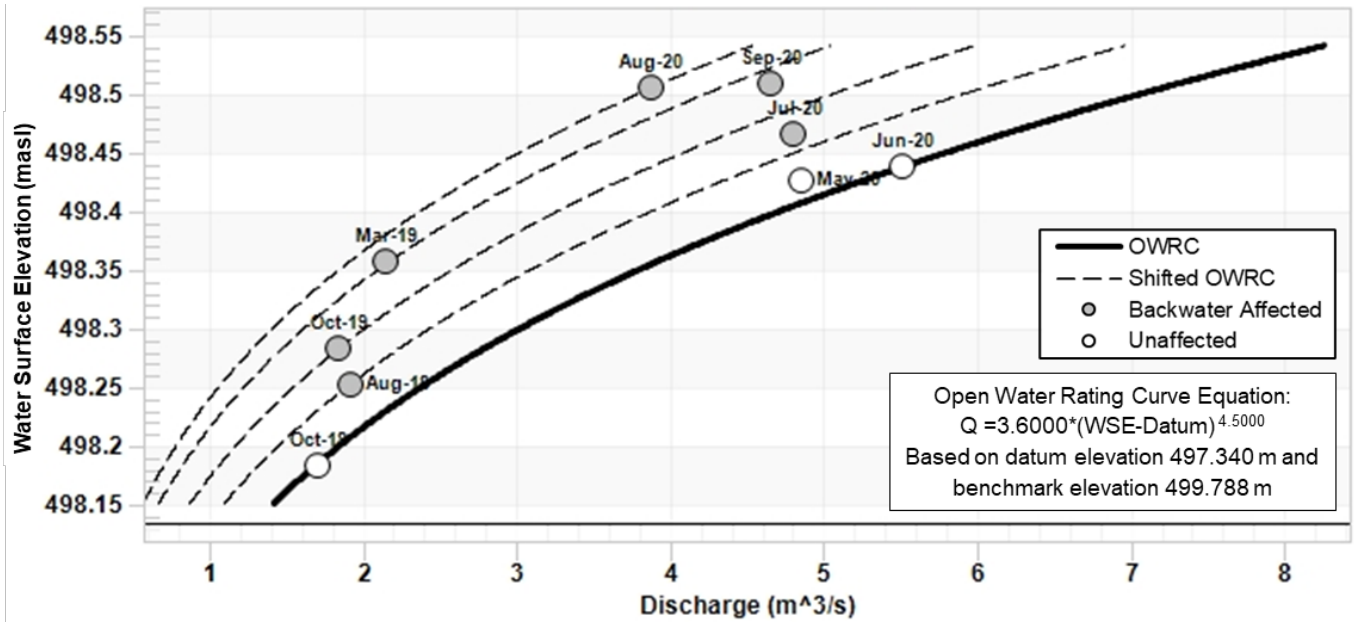
| Date and Time | WSE[(a)] (masl) | Staff Gauge Reading (m) | Discharge ($m^3/s$) | TSS (mg/L) | Bed Load (mg/L) |
|---|---|---|---|---|---|
| 5 August 2018 13:00 | 498.253 | 0.475 | 1.92 | 0 | 0 |
| 1 October 2018 15:42 | 498.185 | n/d | 1.70 | 0 | 0 |
| 28 March 2019 10:36 | 498.358 | 0.580 | 2.14 | n/d | n/d |
| 1 June 2019 16:45 | n/d | 0.380 | 2.54 | 2 | n/d |
| 2 October 2019 15:45 | 498.284 | 0.498 | 1.83 | <1 | n/d |
| 3 May 2020 15:30 | 498.427 | 0.715 | 4.85 | n/d | n/d |
| 5 June 2020 13:20 | 498.439 | 0.676 | 5.50 | n/d | n/d |
| 6 June 2020 10:00 | n/d | n/d | n/d | 3 | 0 |
| 10 July 2020 13:30 | 498.468 | 0.698 | 4.80 | n/d | n/d |
| 13 July 2020 10:57 | n/d | n/d | n/d | 2 | 0 |
| 20 August 2020 12:30 | 498.507 | 0.738 | 3.87 | n/d | n/d |
| 21 August 2020 10:36 | n/d | n/d | n/d | <1 | 0 |
| 25 September 2020 11:45 | 498.508 | 0.750 | 4.65 | <1 | n/d |
| 26 September 2020 8:41 | n/d | n/d | n/d | <1 | 0 |

a) Water surface elevation (WSE) measured by levelling survey using rebar benchmark, CR-WC-MS-04_BM1.
TSS = total suspended solids; n/d = no data; masl = metres above sea level; < = less than.

**Figure 20: Clearwater River below Beet Lake, Station CR-WC-MS-04**

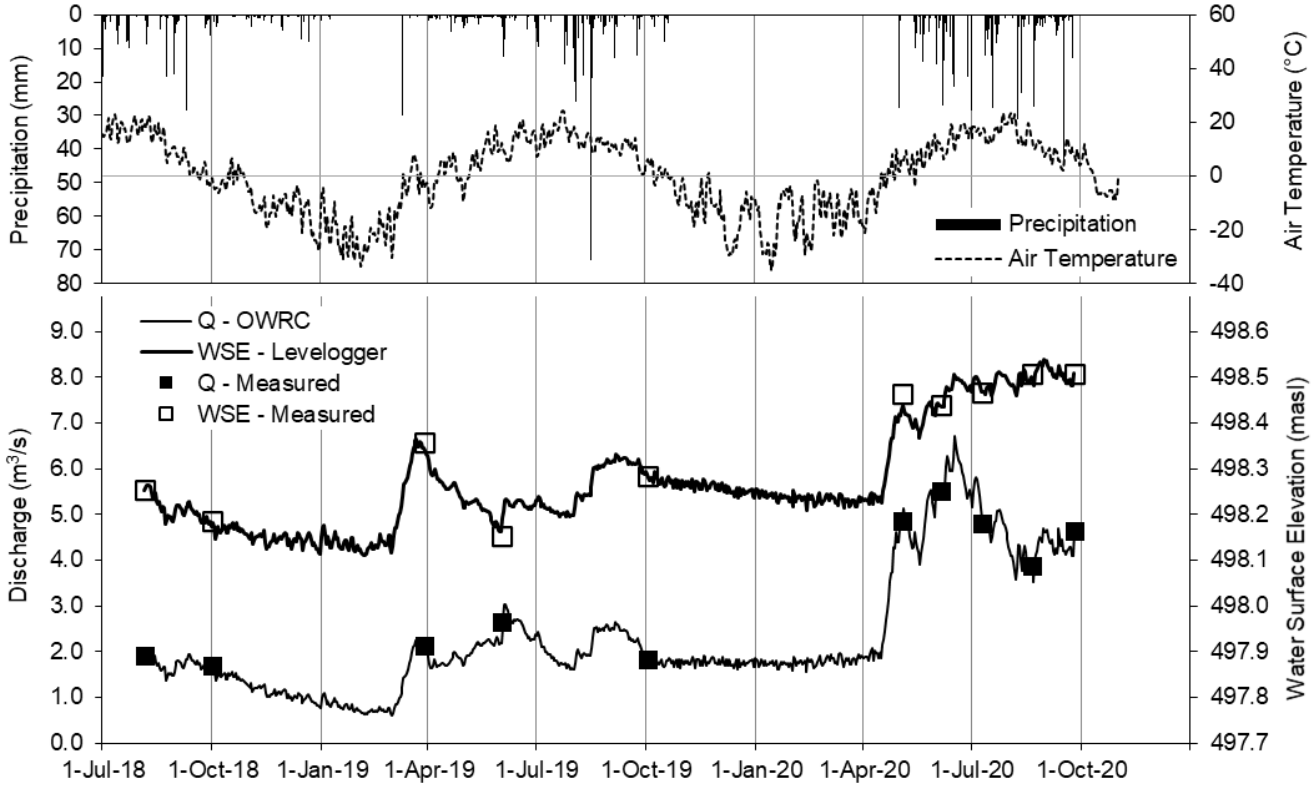
Note: View of CR-WC-MS-04 on 25 September 2020; view is from the right bank (when facing downstream) facing upstream (northeast).

**Figure 21: Open Water Rating Curve for Station CR-WC-MS-04**




OWRC = open water rating curve; Q = discharge ($m^3/s$); WSE = water surface elevation.

**Figure 22: Station CR-WC-MS-04 Water Surface Elevation and Discharge, 2018 to 2020**




OWRC = open water rating curve; Q = discharge ($m^3/s$); WSE = water surface elevation.

### 5.3.1.5 Station CR-WC-MS-05: Clearwater River below Naomi Lake

Hydrometric monitoring at the Clearwater River below Naomi Lake (i.e., CR-WC-MS-05) began in 2018. The station is located approximately 1 km downstream of the Naomi Lake outlet (Figure 3) and is shown in Figure 23. The field results for CR-WC-MS-05 are summarized in Table 11.

The OWRC equation was fit to the field measurements not apparently affected by backwater and was supported by eight coincident stage and discharge measurements (Figure 24). The OWRC was manually adjusted to the points unaffected by backwatering, and stage-shifts were applied to the affected points. The rating curve shift report is included in Appendix B. The daily mean WSE and discharge time series derived from the Levelogger and OWRC, along with observed precipitation and air temperature, are presented in Figure 25.

Due to operator error, the Levelogger records for CR-WC-MS-05 stopped on 4 July 2019, and for the remainder of the year (i.e., through 2 October 2019), the Levelogger records for Naomi Lake Station CR-WB-MS-05 were used to derive discharge. Discharge measurements for CR-WC-MS-05 were used along with WSE measurements from CR-WB-MS-05 to develop an additional preliminary OWRC equation for the period of 4 July 2019 to 2 October 2019. Station CR-WB-MS-05 Levelogger records are not as accurate a representation of CR-WC-MS-05 WSE, due to the distance between the two stations and the increased variation in WSE in the waterbody due to waves during windy periods. Based on the wide range of WSE (i.e., 0.406 m) Table 11, and accurate discharge measurements made for CR-WC-MS-05 (i.e., ranging from 2.90 $m^3/s$ to 8.23 $m^3/s$), derived discharge was considered adequate for the purposes of characterizing hydrology at this location for the open water period. Although there were no under-ice field measurements taken at this station, the derived discharge was checked against unit-discharge records for other stations, and time series data fall within the expected range.

**Table 11: Summary of Hydrometric Monitoring Results, CR-WC-MS-05**

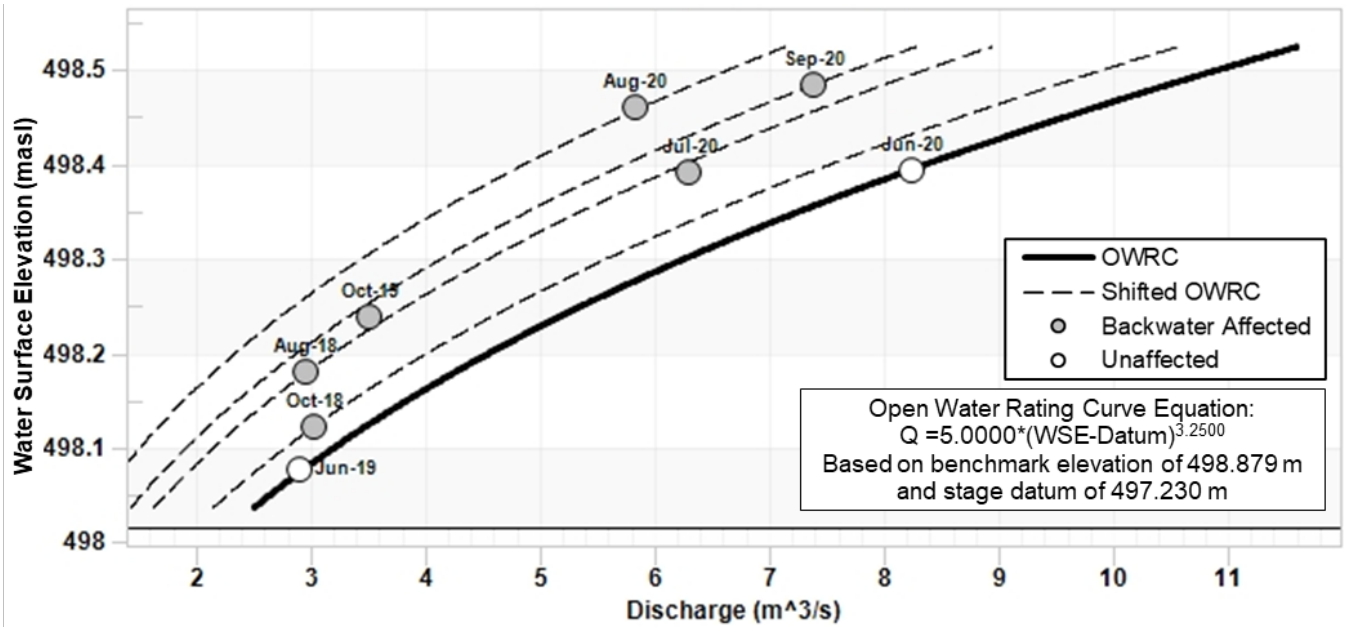
| Date and Time | WSE[a] (masl) | Staff Gauge Reading (m) | Discharge ($m^3/s$) | TSS (mg/L) | Bed Load (mg/L) |
|---|---|---|---|---|---|
| 5 August 2018 13:00 | 498.182 | 0.773 | 2.95 | 0 | 0 |
| 1 October 2018 14:38 | 498.123 | n/d | 3.01 | 0 | 0 |
| 1 June 2019 13:00 | 498.079 | 0.670 | 2.90 | <1 | n/d |
| 2 October 2019 11:00 | 498.240 | 0.837 | 3.51 | <1 | n/d |
| 5 June 2020 10:40 | 498.396 | n/d | 8.23 | n/d | n/d |
| 5 June 2020 17:18 | n/d | n/d | n/d | 3 | 0 |
| 10 July 2020 09:30 | 498.392 | 0.965 | 6.30 | n/d | n/d |
| 10 July 2020 15:00 | n/d | n/d | n/d | 2 | 0 |
| 20 August 2020 10:30 | 498.462 | n/d [b] | 5.83 | n/d | n/d |
| 20 August 2020 15:50 | n/d | n/d [b] | n/d | <1 | 0 |
| 25 September 2020 9:44 | 498.485 | n/d [b] | 7.38 | 2 | n/d |
| 27 September 2020 9:40 | n/d | n/d [b] | n/d | 2 | 0 |

a) Water surface elevation (WSE) measured by levelling survey using rebar benchmark, CR-WC-MS-05_BM1.
b) Staff gauge completely submerged.
TSS = total suspended solids; n/d = no data; < = less than.

**Figure 23: Clearwater River below Naomi Lake, CR-WC-MS-05**

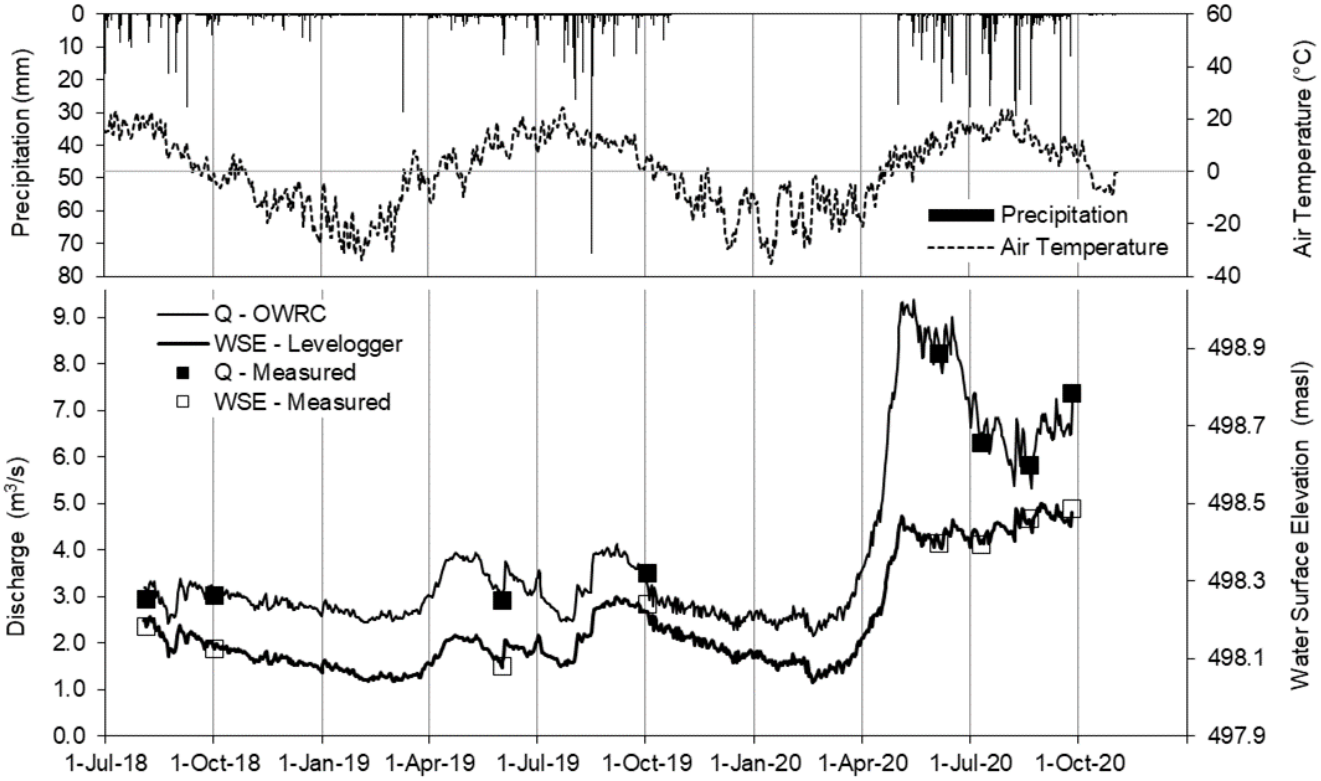
Note: View of CR-WC-MS-05 measurement cross-section on 20 August 2020; view is from the right bank (when facing downstream) facing upstream (northeast).

**Figure 24: Open Water Rating Curve for CR-WC-MS-05**




OWRC = open water rating curve; Q = discharge ($m^3/s$); WSE = water surface elevation.

**Figure 25: CR-WC-MS-05 Water Surface Elevation and Discharge, 2018 to 2020**




OWRC = open water rating curve; Q = discharge ($m^3/s$); WSE = water surface elevation.

### *5.3.1.6 Station CR-WC-MS-06: Clearwater River above Mirror River Confluence*

Hydrometric monitoring at the Clearwater River above Mirror River confluence station (i.e., CR-WC-MS-06) began in 2018. The station is located approximately 600 m upstream of the confluence (Figure 4). This station marks the farthest downstream point of the RSA. The field results for CR-WC-MS-06 are summarized in Table 12. The Clearwater River at CR-WC-MS-06 is shown in Figure 26.

The OWRC was based on eight coincident stage and discharge field measurements, as shown in Figure 27. The curve is fit through the May 2019, June 2020, and July 2020 points only, as backwater was observed during the late summer and fall visits in 2018 to 2020 and was attributed to observed dense vegetation in the channel at this location. The OWRC was manually adjusted to the points unaffected by backwater and stage-shifts were applied to the affected points. The rating curve shift report is included in Appendix B.

The daily mean WSE and discharge series derived from the Levelogger and OWRC, along with observed precipitation and air temperature, are presented in Figure 28. A data gap occurred from 1 July 2020 to 11 July 2020 when the Levelogger was found to be physically removed from the water. A wide range of WSE (i.e., 0.801 m) and discharge (i.e., 3.80 $m^3/s$ to 12.7 $m^3/s$) were measured at this hydrometric station (Table 12).

**Table 12: Summary of Hydrometric Monitoring Results, CR-WC-MS-06**

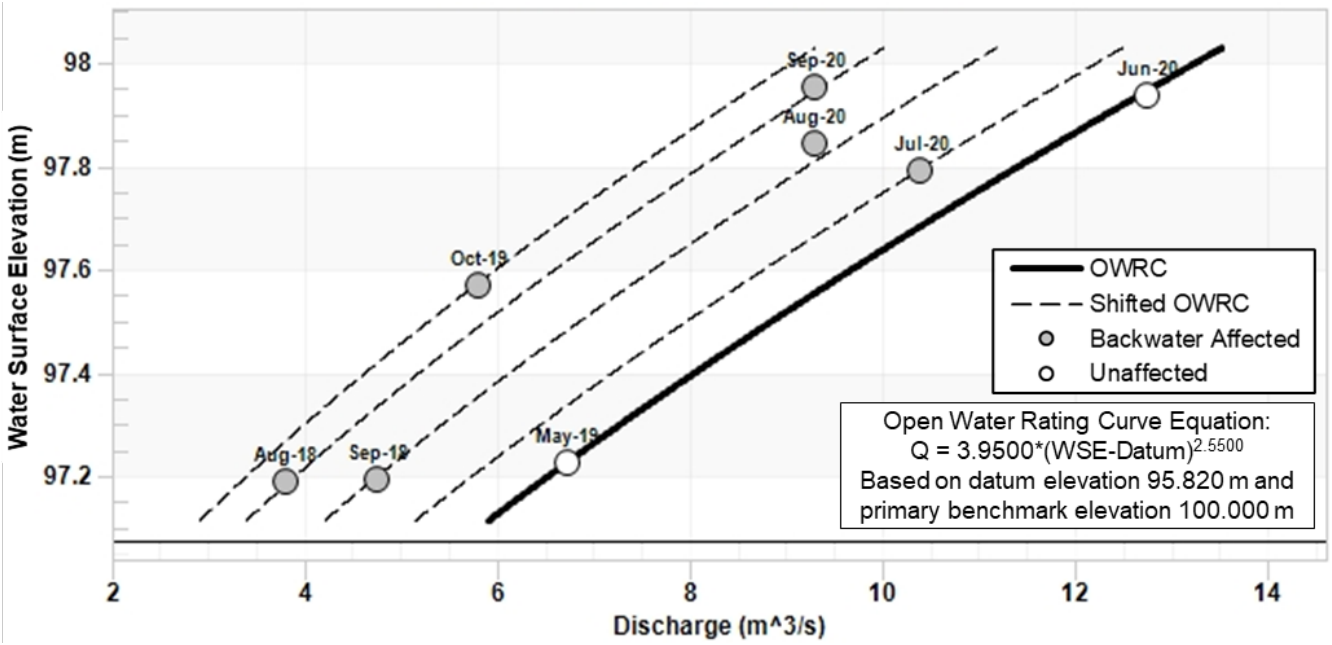
| Date and Time | WSE[(a)] (m; non-geodetic) | Staff Gauge Reading (m) | Discharge ($m^3/s$) |
|---|---|---|---|
| 4 August 2018 11:30 | 97.193 | n/a | 3.80 |
| 2 October 2018 13:00 | 97.198 | n/a | 4.75 |
| 17 May 2019 15:00 | 97.223 | n/a | 6.72 |
| 4 October 2019 12:00 | 97.571 | n/a | 5.80 |
| 4 May 2020 10:32 | 97.994 | n/a | n/d |
| 7 June 2020 12:15 | 97.938 | n/a | 12.7 |
| 11 July 2020 11:15 | 97.795 | n/a | 10.4 |
| 21 August 2020 13:30 | 97.848 | n/a | 9.30 |
| 24 September 2020 11:55 | 97.955 | n/a | 9.28 |

a) Water surface elevation (WSE) measured by levelling survey using anchor bolt in tree benchmark, CR-WC-MS-06_BM1.
TSS = total suspended solids; n/a = not applicable as no staff gauge installed; n/d = no data.

**Figure 26: Clearwater River above Mirror River Confluence, CR-WC-MS-06**

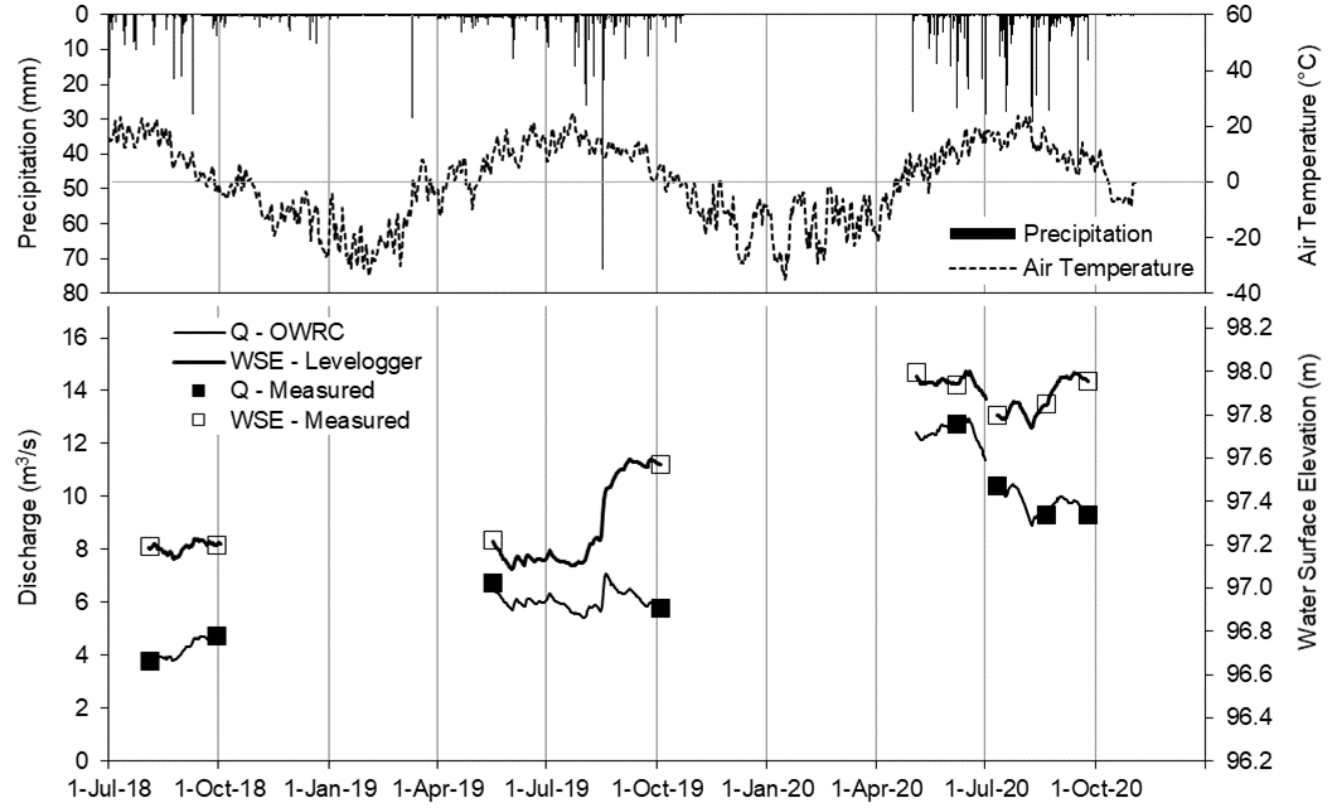
Note: View of CR-WC-MS-06 facing downstream (south) on 24 September 2020 from right bank (when facing downstream).

**Figure 27: Open Water Rating Curve for CR-WC-MS-06**




OWRC = open water rating curve; Q = discharge ($m^3/s$); WSE = water surface elevation.

**Figure 28: CR-WC-MS-06 Water Surface Elevation and Discharge, 2018 to 2020**




OWRC = open water rating curve; Q = discharge ($m^3/s$); WSE = water surface elevation.

### *5.3.1.7 Station CR-WC-MS-07: Clearwater River below Mirror River Confluence*

Hydrometric monitoring work at the Clearwater River below Mirror River confluence station (i.e., CR-WC-MS-07) began in 2018. The station is located just downstream of the confluence (Figure 4). The field results for CR-WC-MS-07 are summarized in Table 13. The Clearwater River at CR-WC-MS-07 is shown in Figure 29. Discharge was monitored at CR-WC-MS-07 to measure the inflows from the Mirror River by comparison with flows in the Clearwater River upstream of the Mirror River confluence. An OWRC was developed beginning in 2019, as benchmarks were first installed in May 2019; the stage-discharge points fit the base curve well (Figure 30). A wide range of WSE (i.e., 0.758 m) and discharge (i.e., 15.7 $m^3/s$ to 34.5 $m^3/s$) was measured at this station between August 2018 and September 2020 (Table 13).

The measured WSE and discharge data for this station, along with observed precipitation and air temperature, are presented in Figure 31. No Levelogger was installed at this station. Discharge measured upstream of the Mirror River confluence (i.e., CR-WC-MS-06) was approximately 30% of discharge measured at CR-WC-MS-07 on the same dates which is an expected results as the watershed area of CR-WC-MS-06 is about one-third that of the Clearwater River downstream of the confluence.

**Table 13: Summary of Hydrometric Monitoring Results, CR-WC-MS-07**

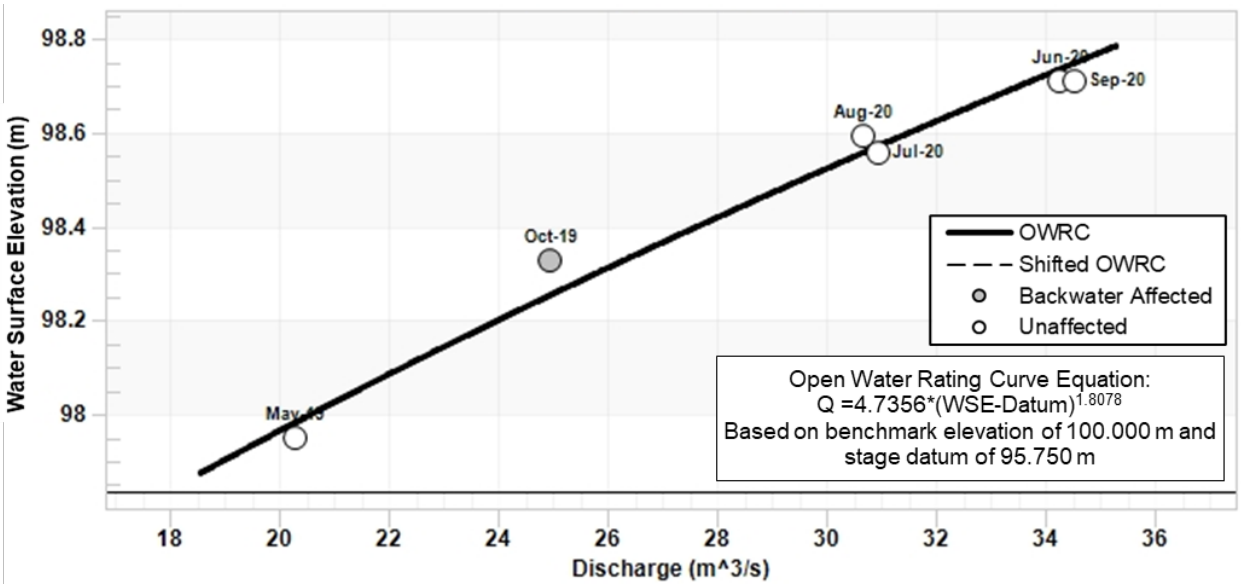
| Date and Time | WSE[(a)] (m; non-geodetic) | Staff Gauge Reading (m) | Discharge ($m^3/s$) |
|---|---|---|---|
| 4 August 2018 12:30 | n/a | n/a | 15.7 |
| 2 October 2018 14:00 | n/a | n/a | 18.0 |
| 17 May 2019 17:00 | 97.953 | n/a | 20.3 |
| 4 October 2019 14:15 | 98.328 | n/a | 24.9 |
| 7 June 2020 15:50 | 98.711 | n/a | 34.2 |
| 11 July 2020 13:06 | 98.558 | n/a | 30.9 |
| 21 August 2020 15:13 | 98.596 | n/a | 30.6 |
| 24 September 2020 13:36 | 98.711 | n/a | 34.5 |

a) Water surface elevation (WSE) measured by levelling survey using anchor bolt in tree benchmark, CR-WC-MS-07_BM1.
n/a = not applicable as no staff gauge and/or benchmarks installed.

**Figure 29: Clearwater River below Mirror River Confluence, CR-WC-MS-07**

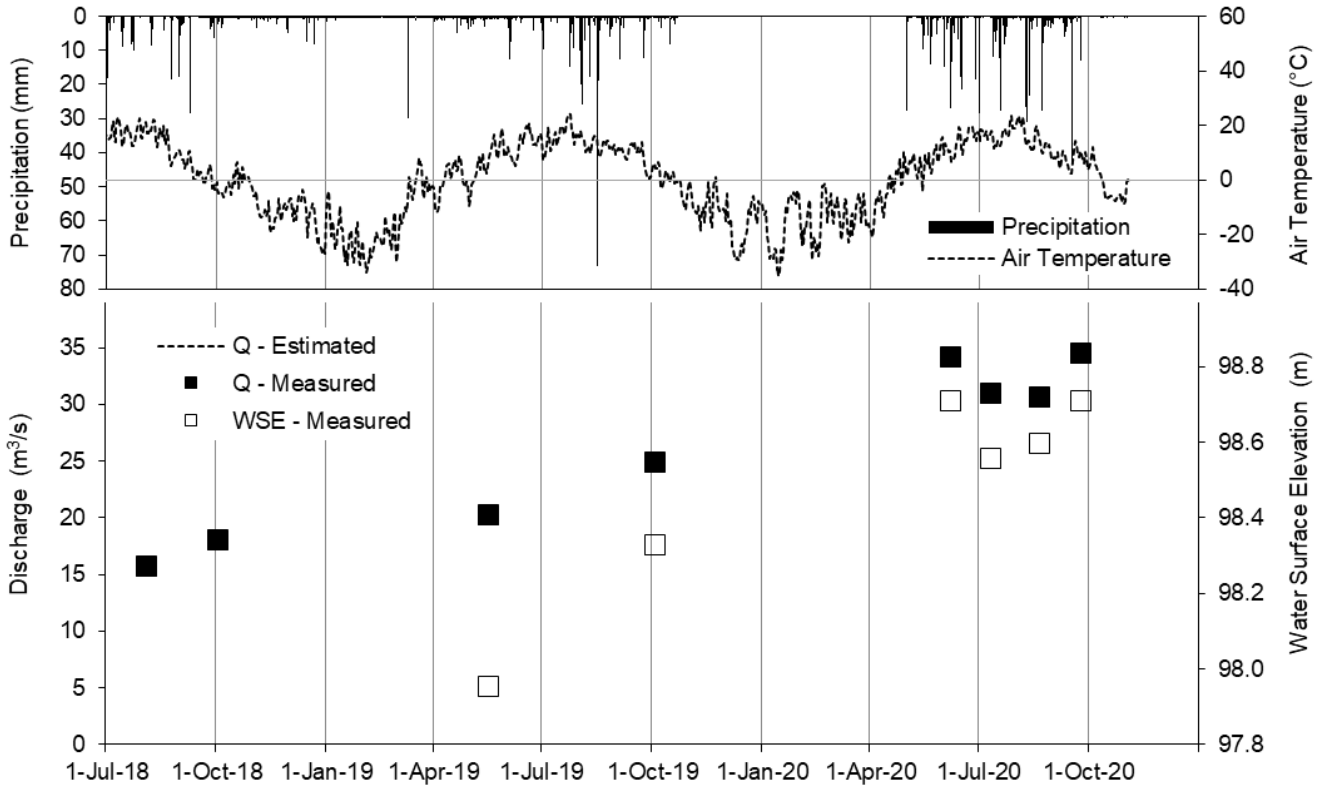
Note: View of CR-WC-MS-07 on 24 September 2020; view is from the right bank (when facing downstream) facing downstream (west).

**Figure 30: Open Water Rating Curve for CR-WC-MS-07**




OWRC = open water rating curve; Q = discharge ($m^3/s$); WSE = water surface elevation.

**Figure 31: CR-WC-MS-07 Water Surface Elevation and Discharge, 2018 to 2020**




OWRC = open water rating curve; Q = discharge ($m^3/s$); WSE = water surface elevation.

### *5.3.1.8 Station CR-WC-MS-08: Clearwater River at the Lloyd Lake Outlet*

Hydrometric monitoring at the Clearwater River at the Lloyd Lake outlet (i.e., CR-WC-MS-08) began in 2018. The station is located near the historical Water Survey of Canada (WSC) Station 07CD006. The WSC operated the hydrometric station on the Clearwater River at the Lloyd Lake outlet (WSC Station 07CD006) between 1973 and 1995 (ECCC 2016); this station was located approximately 45 km southeast and downstream of the anticipated area of the Project (Figure 4). CR-WC-MS-08 is within the boundaries of Clearwater River Provincial Park (Figure 4).

Prior to June 2020, measurements at CR-WC-MS-08 were collected at a location approximately 500 m downstream of the discontinued WSC Station 07CD006. This previous river cross section located just downstream of CR-WC-MS-08, rather than at WSC Station 07CD006, had been selected to improve safety associated with increased distance from downstream rapids and preferred helicopter landing locations. However, during the 7 June 2020 visit, a helicopter landing location deemed more safe than previous landing locations during high water levels was observed upstream of the rapids at the WSC Station 07CD006; from that date onward, this location upstream of the WSC station became the preferred hydrometric monitoring location. WSE was also periodically measured at the original downstream station to develop a WSE relationship between the two stations. The river cross-section at WSC Station 07CD006 is shown on Figure 32.

The field results for CR-WC-MS-08 are summarized in Table 14. The OWRC for data collected at the original downstream hydrometric station is presented in Figure 33. The daily mean WSE and discharge series derived from the Levelogger and OWRC, along with observed precipitation and air temperature, are presented in Figure 34. This station was not visited in June 2019, October 2019, or May 2020 due to logistical challenges, because it is downstream of the hydrology RSA and sufficient data had already been collected during the historical record.

**Table 14: Summary of Hydrometric Monitoring Results, CR-WC-MS-08**

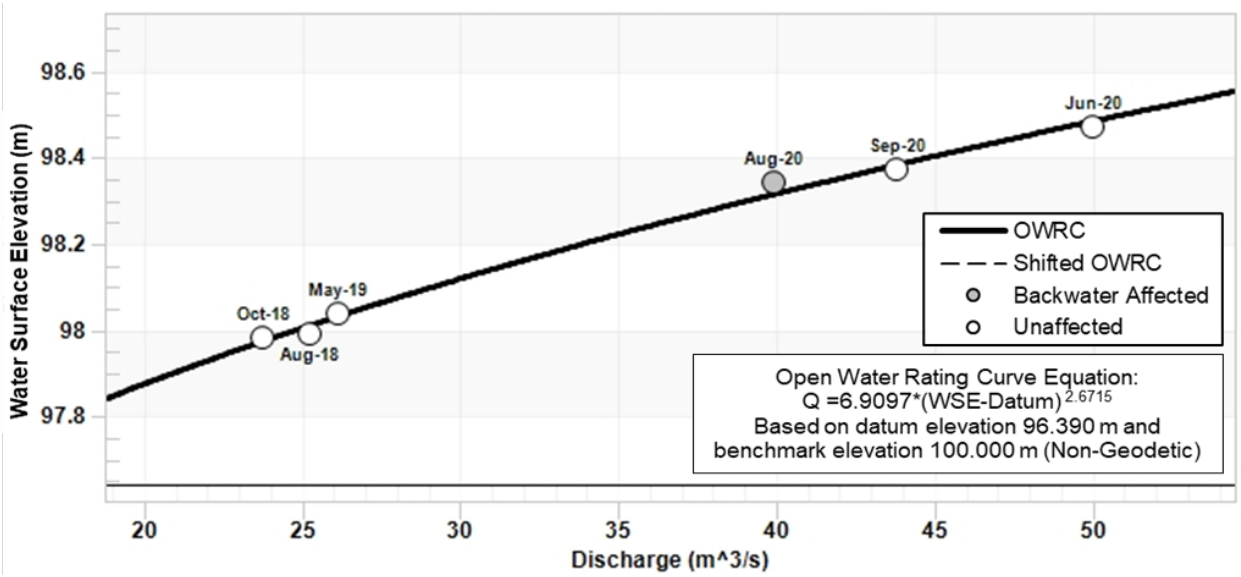
| Date and Time | WSE[a,b] (m; non-geodetic) | WSE[c] (m; non-geodetic) | Staff Gauge Reading (m) | Discharge ($m^3/s$) |
|---|---|---|---|---|
| 04 August 2018 11:30 | 97.995 | n/d | n/a | 25.2 |
| 02 October 2018 14:38 | 97.986 | n/d | n/a | 23.7 |
| 17 May 2019 17:00 | 98.040 | n/d | n/a | 26.1 |
| 7 June 2020 08:15 | 98.473 | 96.765 | n/a | 50.0 |
| 11 July 2020 08:50 | n/d | 96.718 | n/a | 43.9 |
| 23 August 2020 11:05 | 98.346 | 96.664 | n/a | 39.9 |
| 24 September 2020 07:53 | 98.374 | 96.673 | n/a | 43.8 |

Note: Water surface elevation (WSE) measured at Historical WSC Station 07CD006 using WSC benchmarks S7375 and S7376.
a) WSE measured by levelling survey using anchor bolt in tree benchmark, CR-WC-MS-08_BM1.
b) WSE measured at Golder hydrometric station.
n/a = not applicable as no staff gauge and/or benchmarks installed; n/d = no data.

**Figure 32: Clearwater River at Lloyd Lake, CR-WC-MS-08**

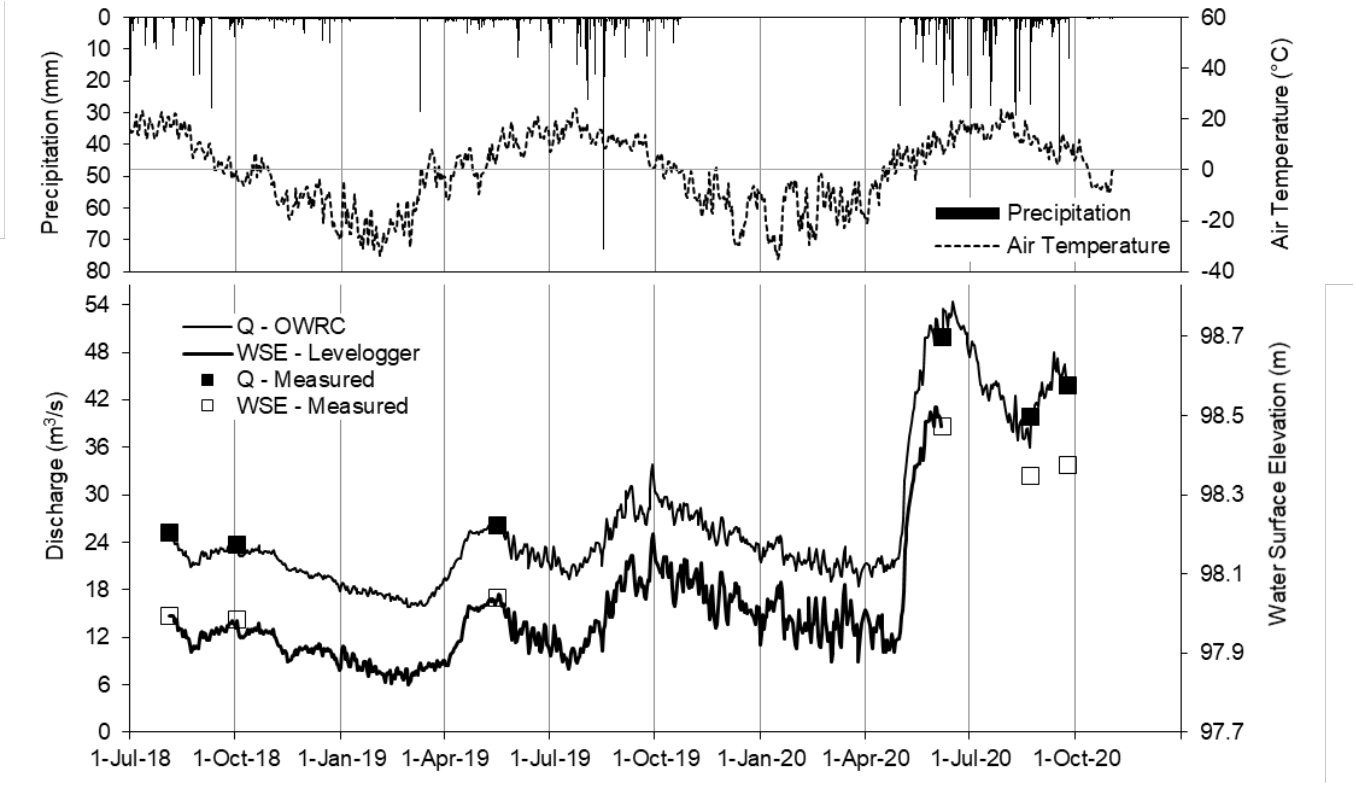
Note: View CR-WC-MS-08 near historical WSC station on 24 September 2020; view is from the right bank (when facing downstream) facing upstream (west).

**Figure 33: Open Water Rating Curve for CR-WC-MS-08 at the Golder Hydrometric Station**




OWRC = open water rating curve; Q = discharge ($m^3/s$); WSE = water surface elevation.

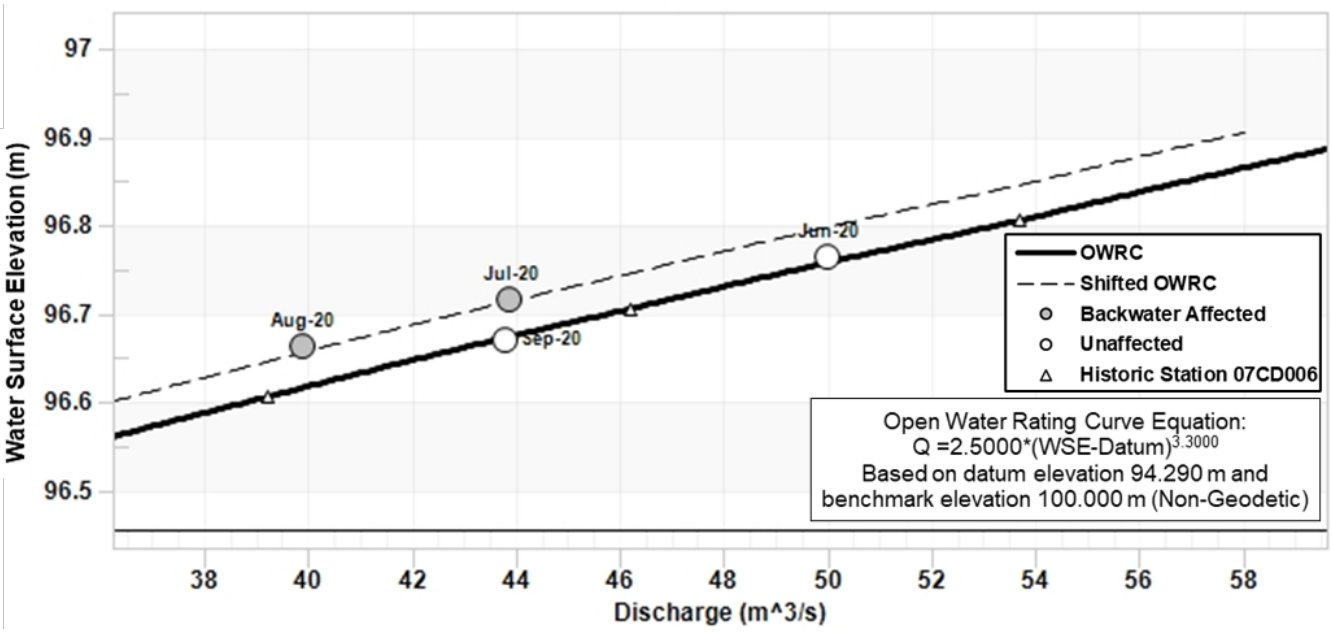
**Figure 34: CR-WC-MS-08 Water Surface Elevation and Discharge at the Golder Hydrometric Station, 2018 to 2020**




OWRC = open water rating curve; Q = discharge ($m^3/s$); WSE = water surface elevation.

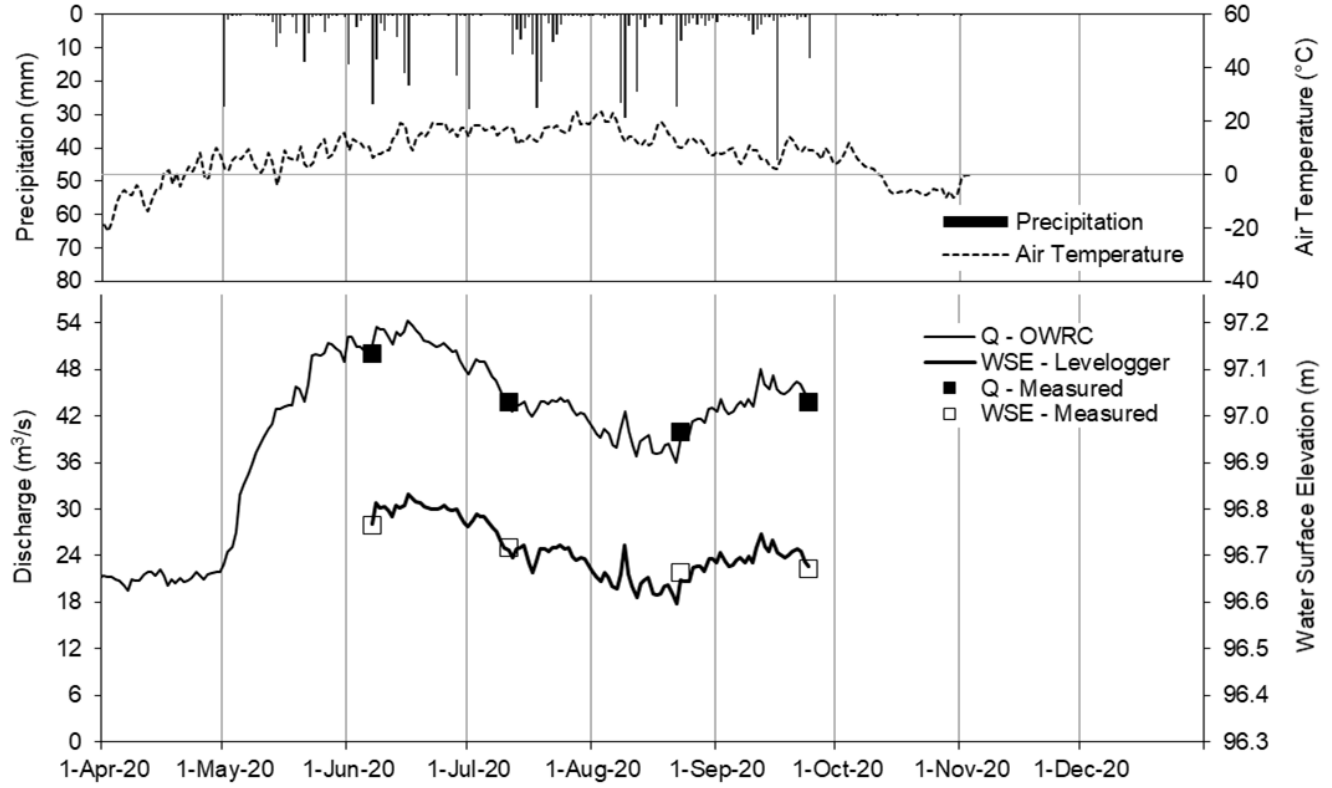
The OWRC for data collected at the WSC Station 07CD006 are presented in Figure 35. The most recent WSC stage-discharge rating table from 1995, for Station 07CD006 was verified in summer 2020. Of the four total measurements, two measurements perfectly fit the OWRC and two more were only 6% to 7% above the curve during the summer months (July and August 2020). The high flows measured 7 June 2020 exceeded all historically measured flows at the station. The daily mean WSE and discharge series derived from the Levelogger and OWRC, along with observed precipitation and air temperature, are presented in Figure 36.

**Figure 35: Open Water Rating Curve for CR-WC-MS-08 at the Historical WSC Station 07CD006**




OWRC = open water rating curve; Q = discharge ($m^3/s$); WSE = water surface elevation.

**Figure 36: CR-WC-MS-08 Water Surface Elevation and Discharge at the Historical WSC Station 07CD006, 2020**




OWRC = open water rating curve; Q = discharge ($m^3/s$); WSE = water surface elevation.

### *5.3.1.9 Station CR-WC-MS-09: Clearwater River at Warner Rapids*

Hydrometric monitoring at the Clearwater River at Warner Rapids (i.e., CR-WC-MS-09) began in 2018. The station is located approximately 100 m upstream of Warner Rapids (Figure 4). The field activities completed at CR-WC-MS-09 are summarized in Table 15. The Clearwater River at CR-WC-MS-09 is shown in Figure 37. The rating curve calibrated using available field measurements is shown in Figure 38. No rating curve shifts were required for this station as no backwatering was observed. The daily mean WSE and discharge series derived from the Levelogger and OWRC, along with observed precipitation and air temperature, are presented in Figure 39.

**Table 15: Summary of Hydrometric Monitoring Results, CR-WC-MS-09**

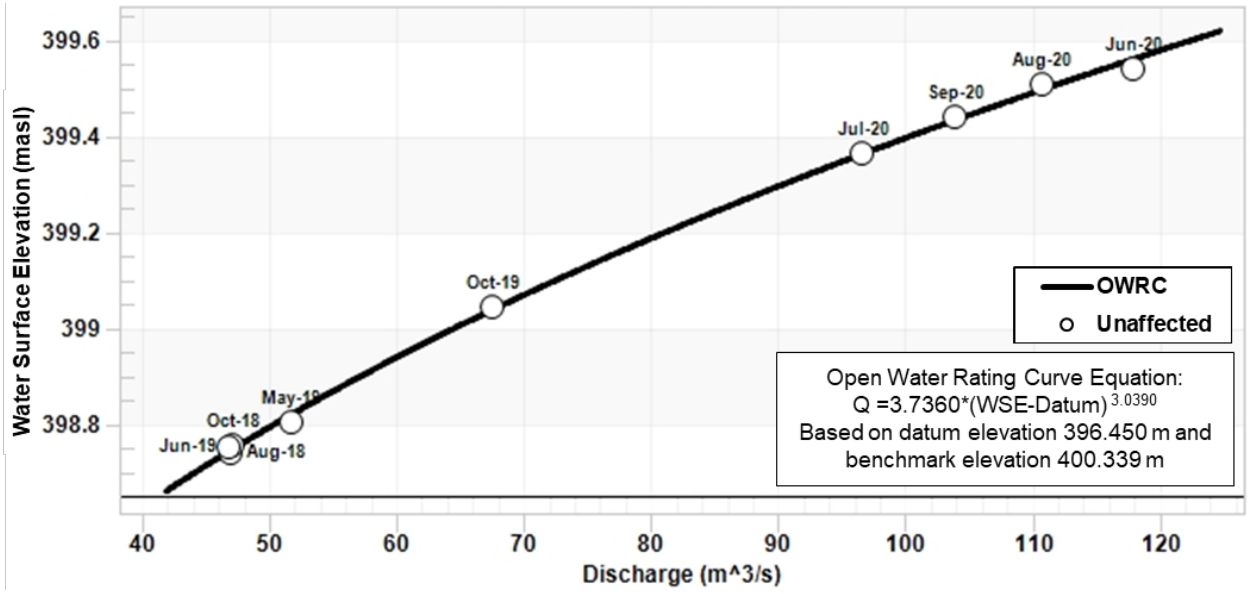
| Date and Time | WSE[(a)] (masl) | Staff Gauge Reading (m) | Discharge ($m^3/s$) |
|---|---|---|---|
| 8 August 2018 10:30 | 398.744 | n/a | 46.9 |
| 4 October 2018 11:00 | 398.759 | n/a | 47.1 |
| 29 March 2019 12:23 | 398.967 | n/a | 33.1 |
| 14 May 2019 16:45 | 398.807 | n/a | 51.6 |
| 30 May 2019 16:50 | 398.721 | n/a | n/d |
| 5 June 2019 09:40 | 398.757 | n/a | 46.7 |
| 5 October 2019 09:30 | 399.047 | n/a | 67.4 |
| 5 May 2020 07:10 | 399.607 | n/a | n/d |
| 8 June 2020 15:10 | 399.542 | n/a | 118 |
| 14 July 2020 09:35 | 399.369 | n/a | 96.4 |
| 25 August 2020 09:11 | 399.513 | n/a | 111 |
| 29 September 2020 09:43 | 399.441 | n/a | 104 |

a) Water surface elevation (WSE) measured by levelling survey using anchor bolt in tree benchmark, CR-WC-MS-09_BM1.
n/a = not applicable as a staff gauge was not installed; n/d = no data; masl = metres above sea level.

**Figure 37: Clearwater River at Warner Rapids, CR-WC-MS-09**

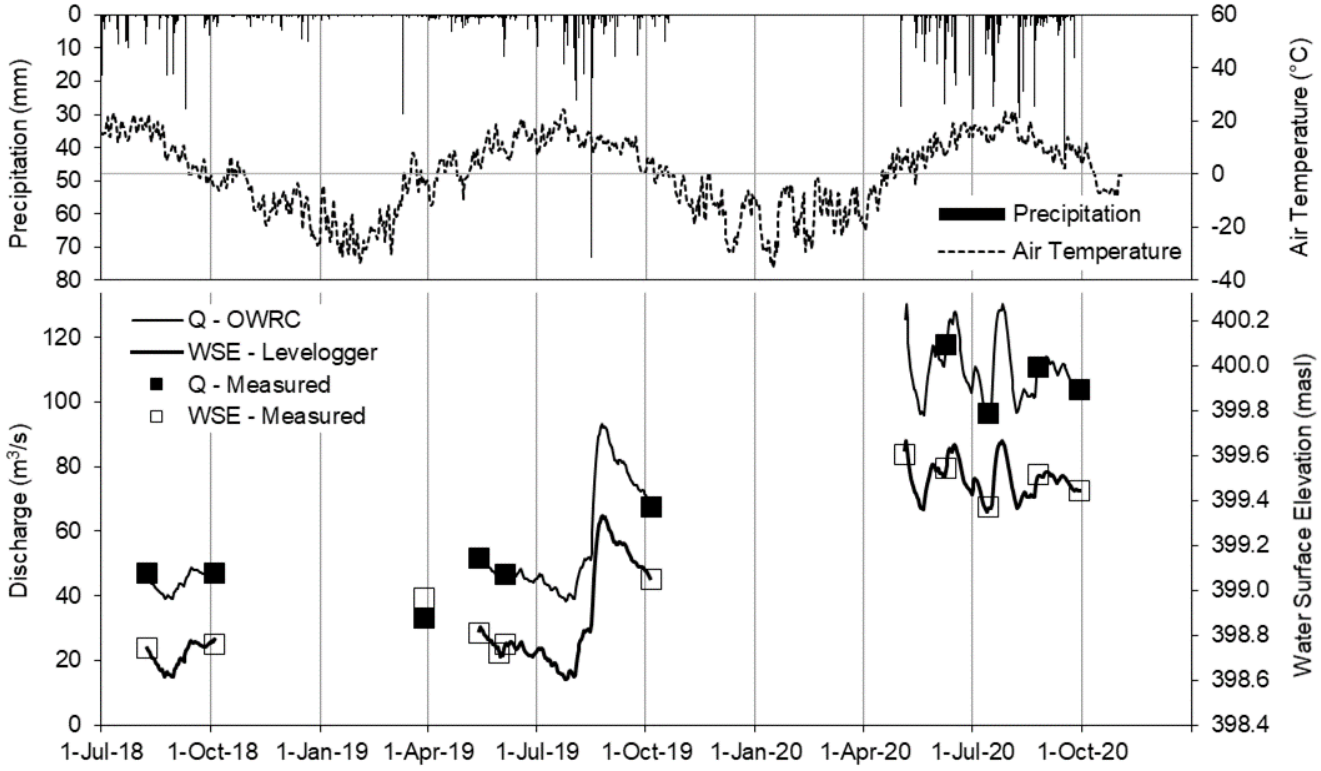
Note: View of CR-WC-MS-09 on 29 September 2020; view is from the right bank (when facing downstream) facing downstream (west).

**Figure 38: Open Water Rating Curve for CR-WC-MS-09**




OWRC = open water rating curve; Q = discharge ($m^3/s$); WSE = water surface elevation.

**Figure 39: CR-WC-MS-09 Water Surface Elevation and Discharge, 2018 to 2020**




OWRC = open water rating curve; Q = discharge ($m^3/s$); WSE = water surface elevation.

### *5.3.1.10 Station CR-WC-TI-01: Tributary Inflow above Forrest Lake*

Hydrometric monitoring at the Clearwater River Tributary Inflow above Forrest Lake (i.e., CR-WC-TI-01) began in 2018. The station is sited on an unnamed tributary located at the southwest corner of Forrest Lake (Figure 3). The field results for CR-WC-TI-01 are summarized in Table 16. The tributary inflow to Forrest Lake at CR-WC-TI-01 is shown in Figure 40.

The rating curve was based on available field measurements as shown in Figure 41. The daily mean WSE and discharge series derived from the Levelogger and OWRC, along with observed precipitation and air temperature, are presented in Figure 42. During every field visit in 2019, a beaver dam was found downstream of the station and dismantled. Backwater corrections (i.e., stage-shifts) were made to the discharge record that coincided with the beaver activity over time; therefore, the uncertainty in the discharge record at this station is high. The Levelogger and its base could not be located during the fall 2019 field visit; therefore, the water level and discharge time series end on 31 May 2019. A beaver may have relocated the Levelogger.

Monitoring at CR-WC-TI-01 was discontinued following the September 2019 field visit as persistent beaver activity resulted in relatively poor-quality data. This tributary is a minor inflow to the Clearwater River system, and discontinuing the station was not consequential for the hydrology baseline.

**Table 16: Summary of Hydrometric Monitoring Results, CR-WC-TI-01**

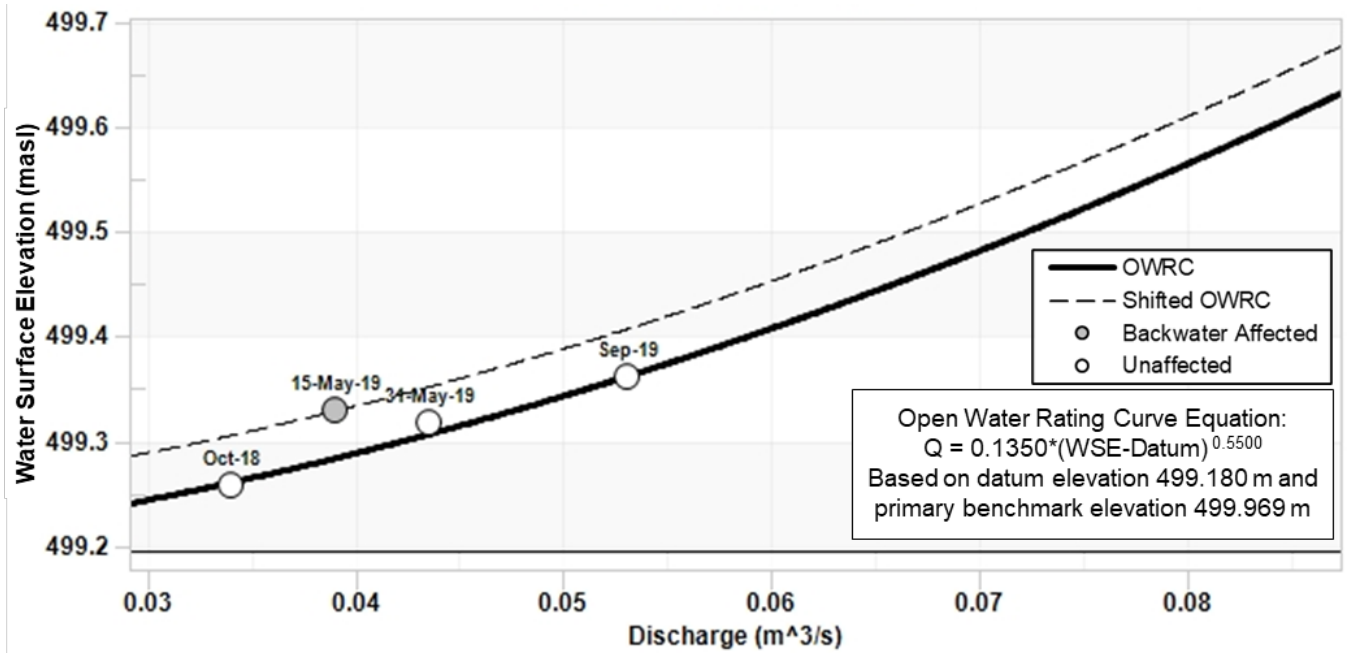
| Date and Time | WSE[a] (masl) | Staff Gauge Reading (m) | Discharge ($m^3/s$) |
|---|---|---|---|
| 2 August 2018 14:00 | 499.379 | 0.303 | 0.028 |
| 3 October 2018 16:30 | 499.259 | 0.260 | 0.034 |
| 15 May 2019 10:30 | 499.331 | 0.300 | 0.039 |
| 31 May 2019 13:10 | 499.883[b] | 0.980[b] | n/d |
| 31 May 2019 14:30 | 499.318[c] | 0.270[c] | 0.044 |
| 29 September 2019 12:00 | 499.363 | 0.322 | 0.053 |

a) Water surface elevation (WSE) measured by levelling survey using rebar benchmark, CR-WC-TI-01_BM1.
b) Measured before the beaver dam was dismantled.
c) Measured after the beaver dam was dismantled.
n/d = no measurement; masl = metres above sea level.

**Figure 40: Beaver Dam at Clearwater River Tributary Inflow above Forrest Lake, CR-WC-TI-01**

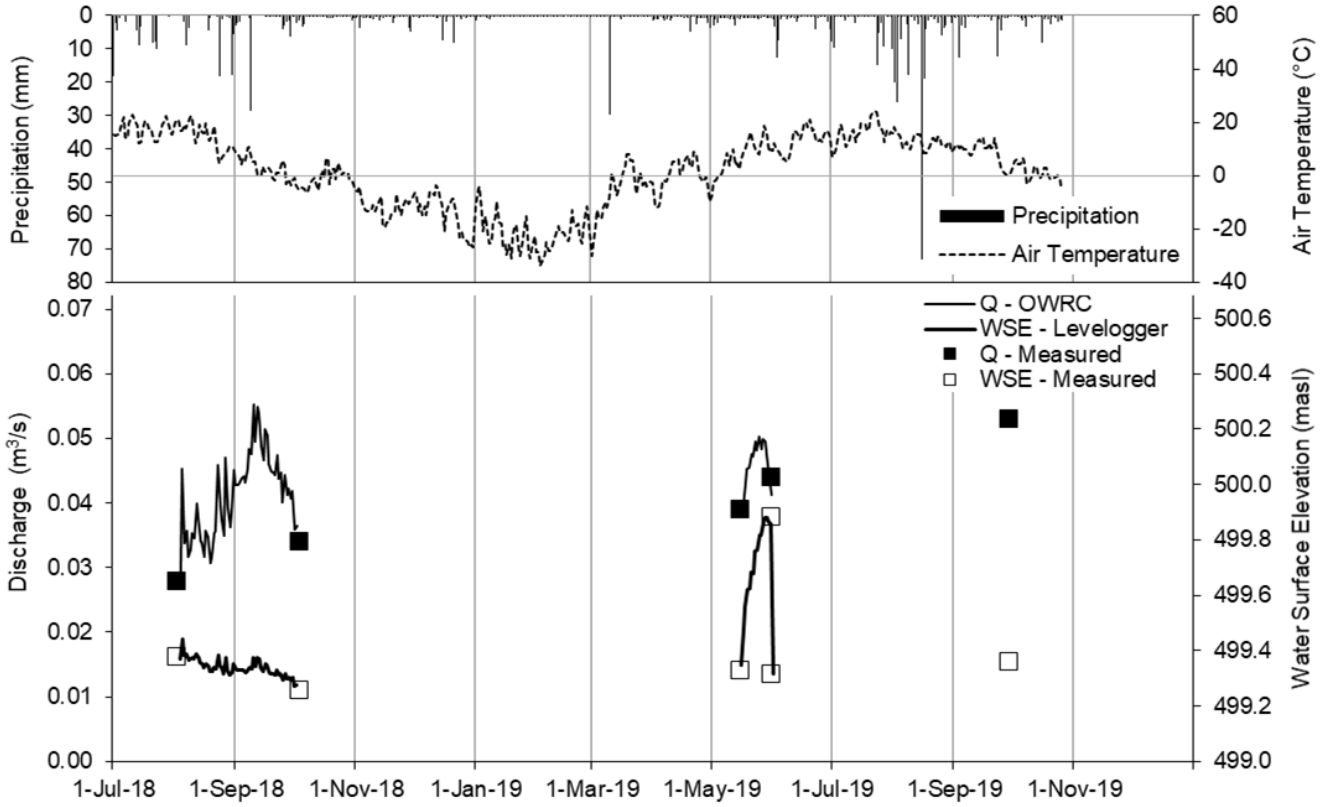

Note: View is facing upstream, 31 May 2019; view of inflow facing upstream.

**Figure 41: Preliminary Open Water Rating Curve for CR-WC-TI-01**




OWRC = open water rating curve; Q = discharge ($m^3/s$); WSE = water surface elevation.

**Figure 42: CR-WC-TI-01 Water Surface Elevation and Discharge, 2018 and 2019**




OWRC = open water rating curve; Q = discharge ($m^3/s$); WSE = water surface elevation.

### *5.3.1.11 Station CR-WC-TI-02: Clearwater River Tributary Inflow to Naomi Lake*

Hydrometric monitoring at the Clearwater River tributary inflow to Naomi Lake (i.e., CR-WC-TI-02) began in 2018. The station is located approximately 50 m upstream of the mouth of Naomi Lake and may be subject to backwater from the Clearwater River at Naomi Lake (Figure 3). The field results for CR-WC-TI-02 are summarized in Table 17. The watercourse at CR-WC-TI-02 is shown in Figure 43.

The OWRC was developed using eight field measurements, as shown in Figure 44. A wide range of WSE (i.e., 0.358 m) and discharge (i.e., 0.454 $m^3/s$ to 1.71 $m^3/s$) were measured during the open water monitoring period from August 2018 to September 2020 (Table 17). This station was observed to experience backwater that may be attributed to Naomi Lake being located downstream of the station, and/or to aquatic emergent vegetation growth during the summer that required stage-shift corrections for specific periods.

The daily mean WSE and discharge series derived from the Levelogger and OWRC, along with observed precipitation and air temperature, are presented in Figure 45.

**Table 17: Summary of Hydrometric Monitoring Results CR-WC-TI-02**

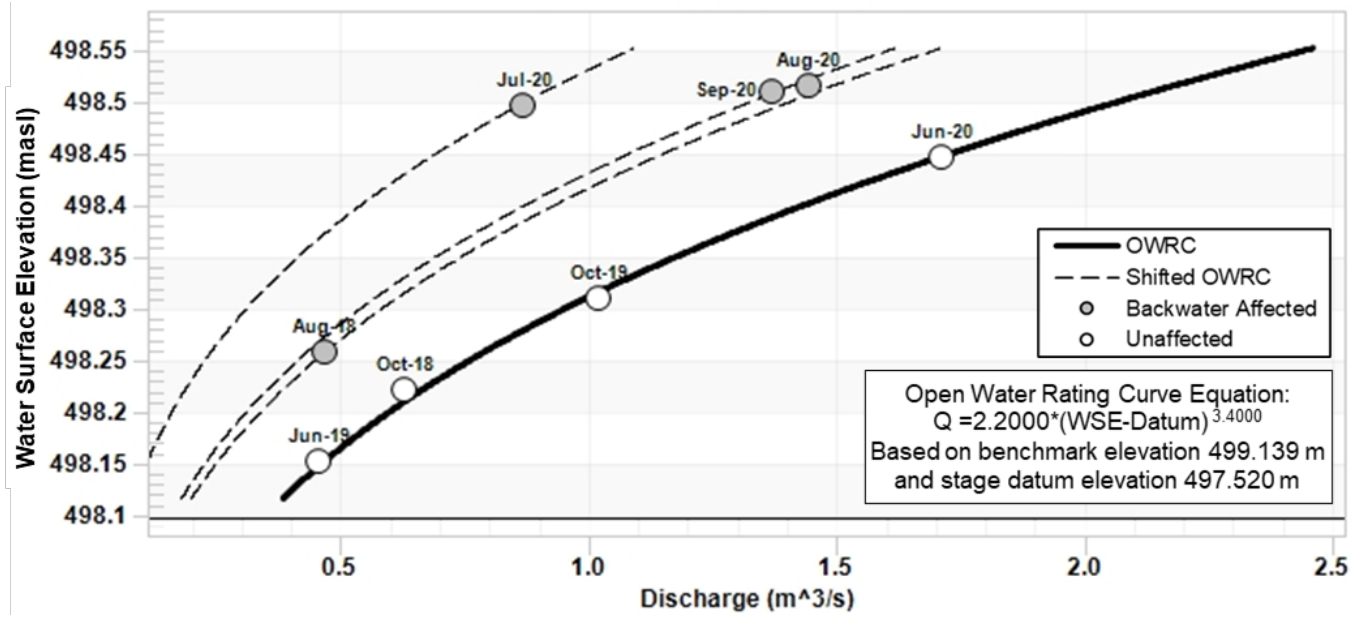
| Date and Time | WSE[(a)] (masl) | Staff Gauge Reading (m) | Discharge ($m^3/s$) |
|---|---|---|---|
| 5 August 2018 13:00 | 498.259 | 0.190 | 0.464 |
| 1 October 2018 15:30 | 498.223 | 0.140 | 0.628 |
| 28 March 2019 12:00 | n/d | n/d | 0.561 |
| 2 June 2019 11:45 | 498.159 | 0.053 | 0.454 |
| 2 October 2019 14:15 | 498.311 | 0.211 | 1.02 |
| 6 June 2020 10:50 | 498.449 | 0.375 | 1.71 |
| 13 July 2020 08:30 | 498.499 | 0.435 | 0.866 |
| 21 August 2020 08:33 | 498.517 | 0.468 | 1.44 |
| 27 September 2020 10:00 | 498.511 | 0.471 | 1.37 |

a) Water surface elevation (WSE) measured by levelling survey using rebar benchmark, CR-WC-TI-02_BM1.
n/d = no data; masl = metres above sea level.

**Figure 43: Clearwater River Tributary Inflow to Naomi Lake, CR-WC-TI-02**

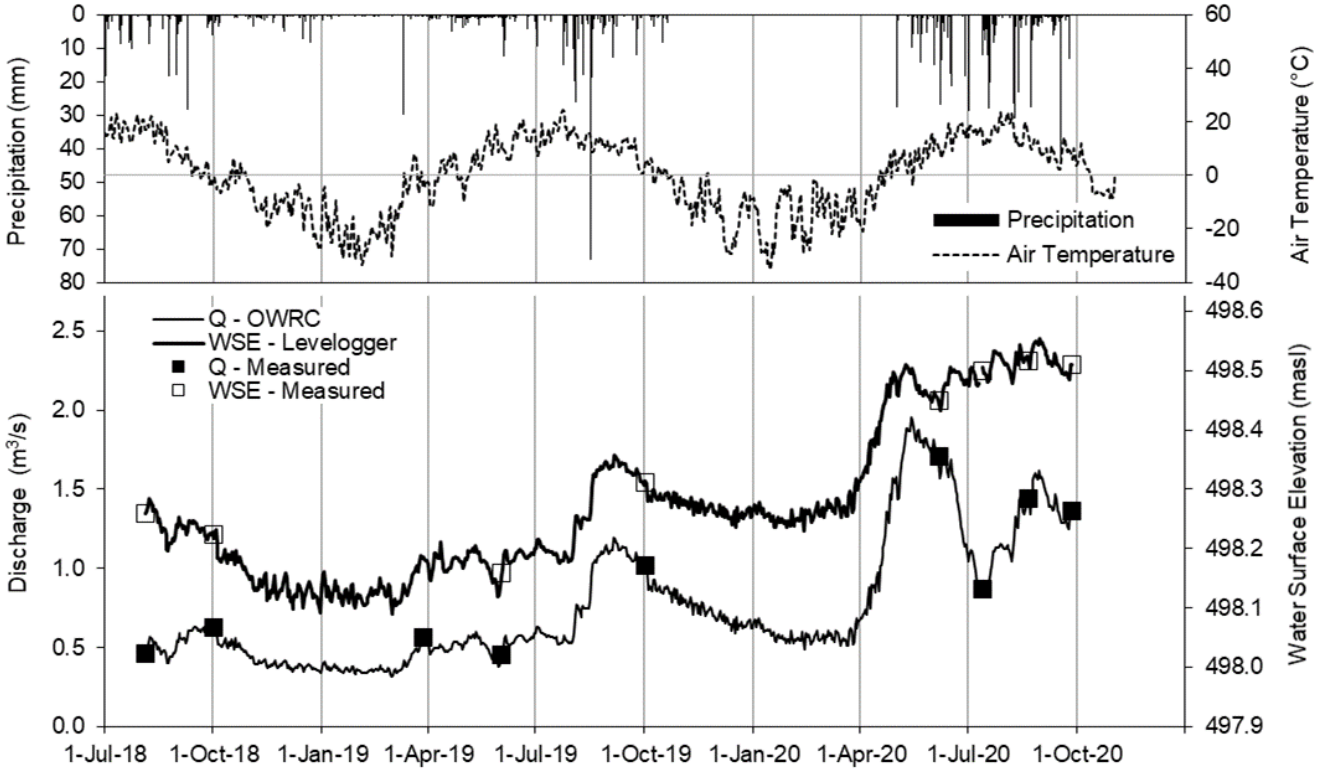
Note: View of CR-WC-TI-02 on 21 August 2020; view is from the right bank (when facing downstream) facing upstream (north).

**Figure 44: Open Water Rating Curve for CR-WC-TI-02**




OWRC = open water rating curve; Q = discharge ($m^3/s$); WSE = water surface elevation.

**Figure 45: CR-WC-TI-02 Water Surface Elevation and Discharge, 2018 to 2020**




OWRC = open water rating curve; Q = discharge ($m^3/s$); WSE = water surface elevation.

### 5.3.1.12 Station CR-WC-TI-03: Clearwater River Tributary Inflow Downstream of Naomi Lake

Hydrometric monitoring at the Clearwater River tributary inflow downstream of Naomi Lake (i.e., CR-WC-TI-03) began in 2018. The station is located approximately 100 m upstream of the Clearwater River tributary inflow (Figure 3). The field results for CR-WC-TI-03 are summarized in Table 18. The unnamed tributary at CR-WC-TI-03 is shown in Figure 46.

The OWRC was based on nine field measurements, as shown in Figure 47. A wide range of WSE (i.e., 0.356 m) and discharge (i.e., 0.255 $m^3/s$ to 0.848 $m^3/s$) were measured during the open water monitoring periods from August 2018 to September 2020. This station was observed to experience backwater that may be attributed to aquatic and terrestrial vegetation growth during the summer, and/or sandy bed mobility that required stage-shift corrections for specific periods.

The daily mean WSE and discharge series derived from the Levelogger and OWRC, along with observed precipitation and air temperature, are presented in Figure 48.

**Table 18: Summary of Hydrometric Monitoring Results, CR-WC-TI-03**

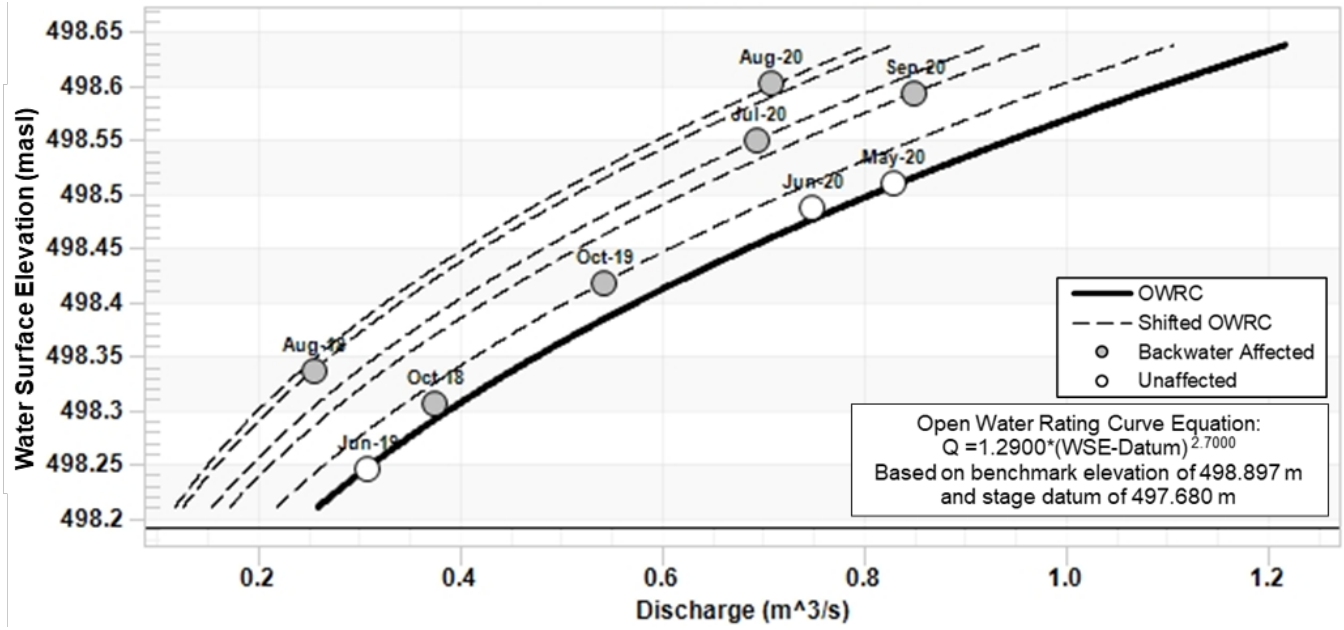
| Date and Time | WSE[(a)] (masl) | Staff Gauge Reading (m) | Discharge ($m^3/s$) |
|---|---|---|---|
| 5 August 2018 13:30 | 498.337 | 0.460 | 0.255 |
| 1 October 2018 16:00 | 498.307 | 0.435 | 0.375 |
| 1 June 2019 14:40 | 498.247 | 0.329 | 0.307 |
| 2 October 2019 12:00 | 498.404[(b)] | 0.496 | 0.542 |
| 4 May 2020 12:28 | 498.510 | 0.718 | 0.829 |
| 5 June 2020 15:43 | 498.489 | 0.688 | 0.748 |
| 10 July 2020 11:25 | 498.551 | 0.730 | 0.693 |
| 20 August 2020 13:58 | 498.603 | 0.792 | 0.707 |
| 26 September 2020 09:15 | 498.593 | 0.795 | 0.848 |

a) Water surface elevation (WSE) measured by levelling survey using anchor bolt in tree benchmark, CR-TI-WC-03_BM1.
b) This is based on BM1 assumed elevation of 498.897 masl as of 2 October 2019 field visit.
masl = metres above sea level.

**Figure 46: Clearwater River Tributary Inflow downstream of Naomi Lake, CR-WC-TI-03**

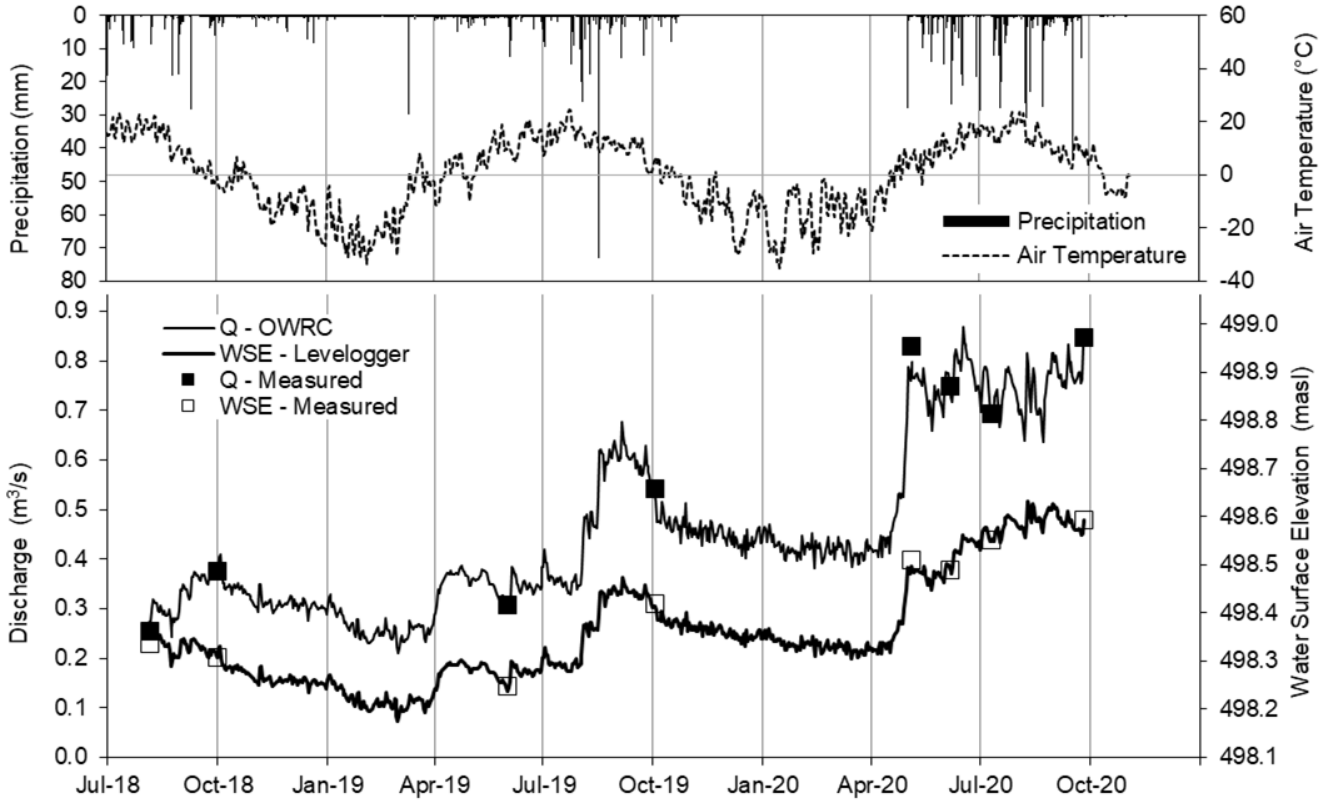
Note: View of CR-WC-TI-03 downstream of discharge transect 26 September 2020; view is from the right bank when facing upstream (northeast).

**Figure 47: Open Water Rating Curve for CR-WC-TI-03**




OWRC = open water rating curve; Q = discharge ($m^3/s$); WSE = water surface elevation.

**Figure 48: CR-WC-TI-03 Water Surface Elevation and Discharge, 2018 to 2020**




OWRC = open water rating curve; Q = discharge ($m^3/s$); WSE = water surface elevation.

### *5.3.1.13 Station HC-WC-MS-01: Hodge Creek below Hodge Lake*

Hydrometric monitoring at Hodge Creek below Hodge Lake (i.e., HC-WC-MS-01) began in 2020. The station is located approximately 10 m downstream of the Hodge Lake outlet (Figure 3). The field results for Station HC-WC-MS-01 are summarized in Table 19. Hodge Creek at HC-WC-MS-01 is shown in Figure 49.

The preliminary rating curve was based on four field measurements in 2020, as shown in Figure 50. Derived discharge results are considered adequate for the open water period in 2020 and provide spatially variable results outside the LSA.

The daily mean WSE and discharge series derived from the Levelogger and OWRC, along with observed precipitation and air temperature, are presented in Figure 48.

**Table 19: Summary of Hydrometric Monitoring Results, HC-WC-MS-01**

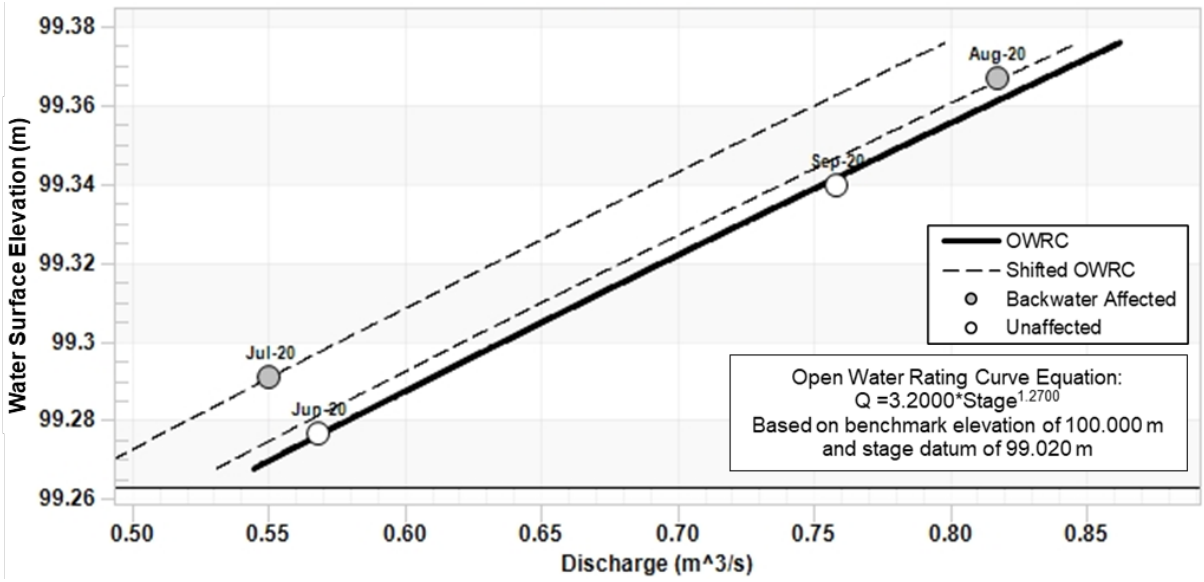
| Date and Time | WSE[(a)] (m; non-geodetic) | Staff Gauge Reading (m) | Discharge ($m^3/s$) |
|---|---|---|---|
| 8 June 2020 10:10 | 99.277 | 0.445 | 0.568 |
| 12 July 2020 11:30 | 99.291 | 0.460 | 0.550 |
| 22 August 2020 14:45 | 99.367 | 0.540 | 0.817 |
| 28 September 2020 11:05 | 99.339 | 0.520 | 0.758 |

a) Water surface elevation (WSE) measured by levelling survey using rebar benchmark, HC-WC-MS-01_BM1.

**Figure 49: Hodge Creek below Hodge Lake, HC-WC-MS-01**

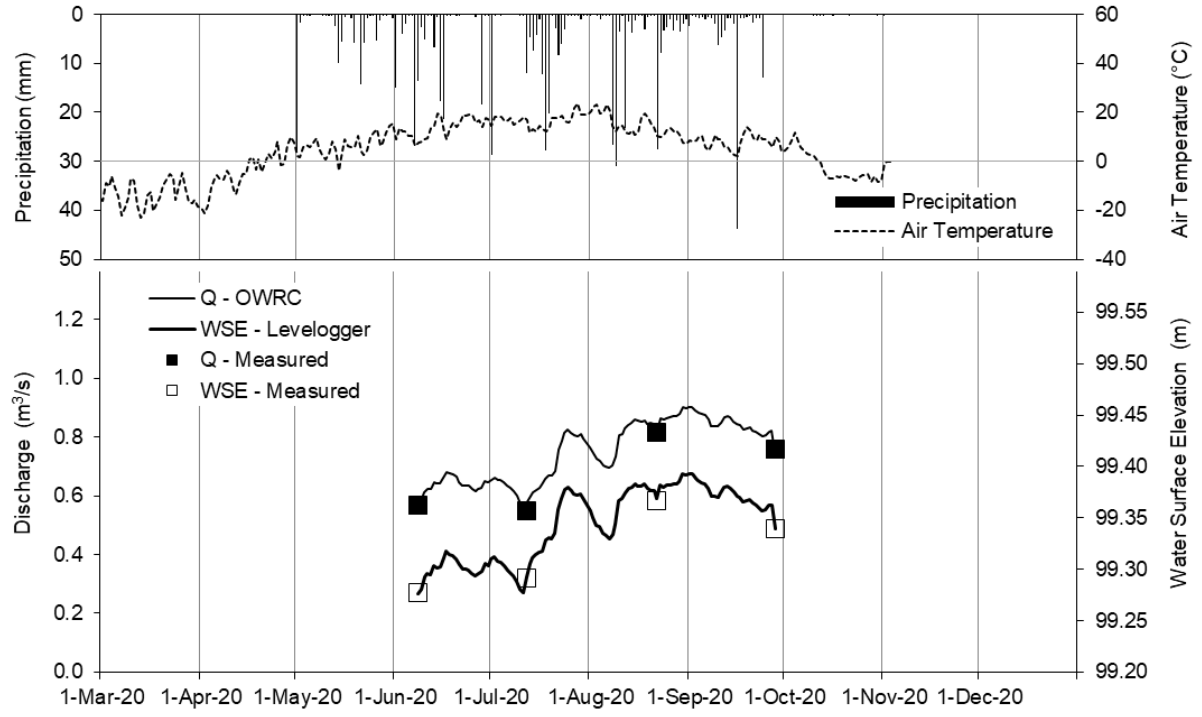
Note: View of HC-WC-MS-01 from the discharge measurement cross-section on 28 September 2020; view is facing downstream (west).

**Figure 50: Preliminary Open Water Rating Curve for HC-WC-MS-01**




OWRC = open water rating curve; Q = discharge ($m^3/s$); WSE = water surface elevation.

**Figure 51: HC-WC-MS-01 Water Surface Elevation and Discharge, 2020**




OWRC = open water rating curve; Q = discharge ($m^3/s$); WSE = water surface elevation.

## 5.3.2 Waterbody Hydrometric Monitoring

The WSE data collected for each hydrometric station during the 2018 to 2020 hydrology field programs are provided in the following subsections. Daily mean WSE and discharge data are included in Appendix D.

### *5.3.2.1 Station CR-WB-MS-01: Broach Lake*

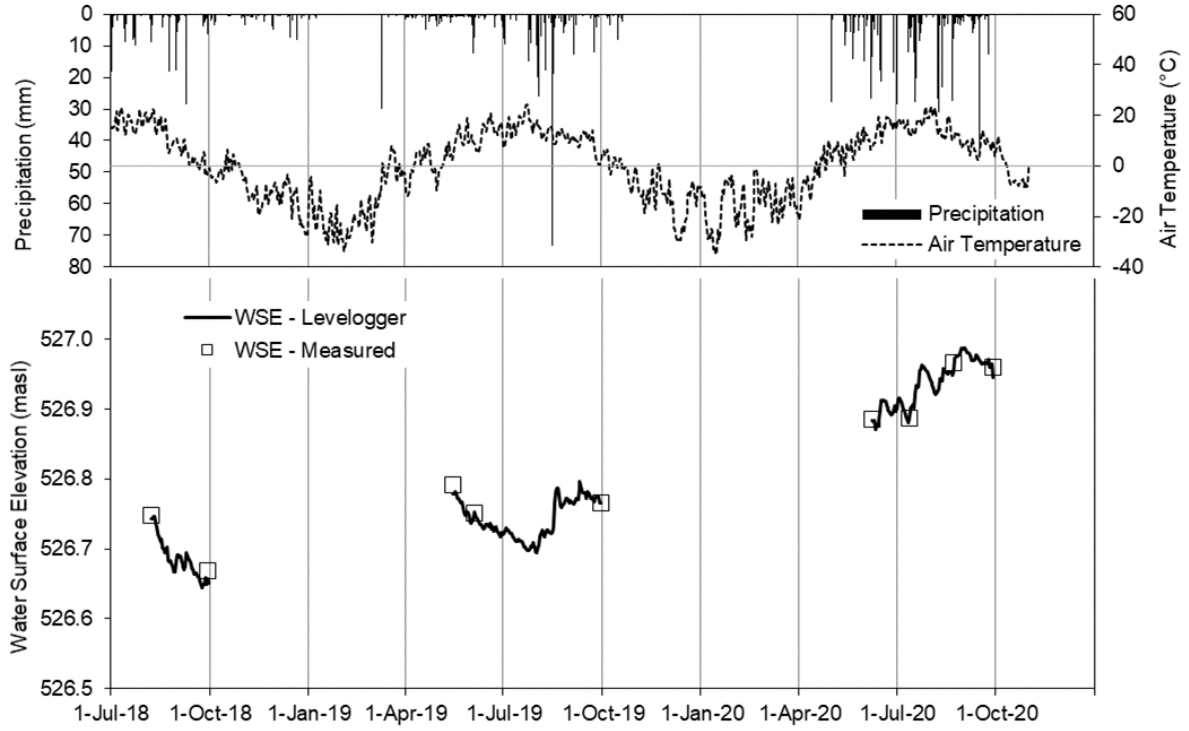
Broach Lake has a surface area of approximately 9.2 $km^2$ and is located at the headwaters of the Clearwater River (Figure 3). Hydrometric monitoring at Broach Lake (i.e., CR-WB-MS-01) began in August 2018. The station is located on the west shore of the lake. The field activities completed at CR-WB-MS-01 are summarized in Table 20. The daily mean WSE record derived from the Levelogger, along with observed precipitation and air temperature, are presented in Figure 52.

**Table 20: Summary of Hydrometric Monitoring Results, CR-WB-MS-01**

| Date and Time | WSE[(a)] (masl) | Staff Gauge Reading (m) |
|---|---|---|
| 7 August 2018 15:30 | 526.748 | 0.275 |
| 29 September 2018 16:11 | 526.668 | 0.185 |
| 15 May 2019 13:45 | 526.792 | 0.150 |
| 4 June 2019 14:00 | 526.751 | 0.152 |
| 29 September 2019 16:15 | 526.766 | 0.162 |
| 8 June 2020 09:10 | 526.885 | n/d[(b)] |
| 12 July 2020 13:00 | 526.887 | n/d[(b)] |
| 22 August 2020 16:50 | 526.966 | 0.430 |
| 28 September 2020 13:05 | 526.960 | 0.430 |

a) Water surface elevation (WSE) measured by levelling survey using rebar benchmark, CR-WB-MS-01_BM1.
b) Staff gauge lying on lake bed, re-established 22 August 2020.
n/d = no measurement; masl = metres above sea level.

**Figure 52: CR-WB-MS-01 Water Surface Elevation, 2018 to 2020**




WSE = water surface elevation.

### *5.3.2.2 Station CR-WB-MS-02: Patterson Lake*

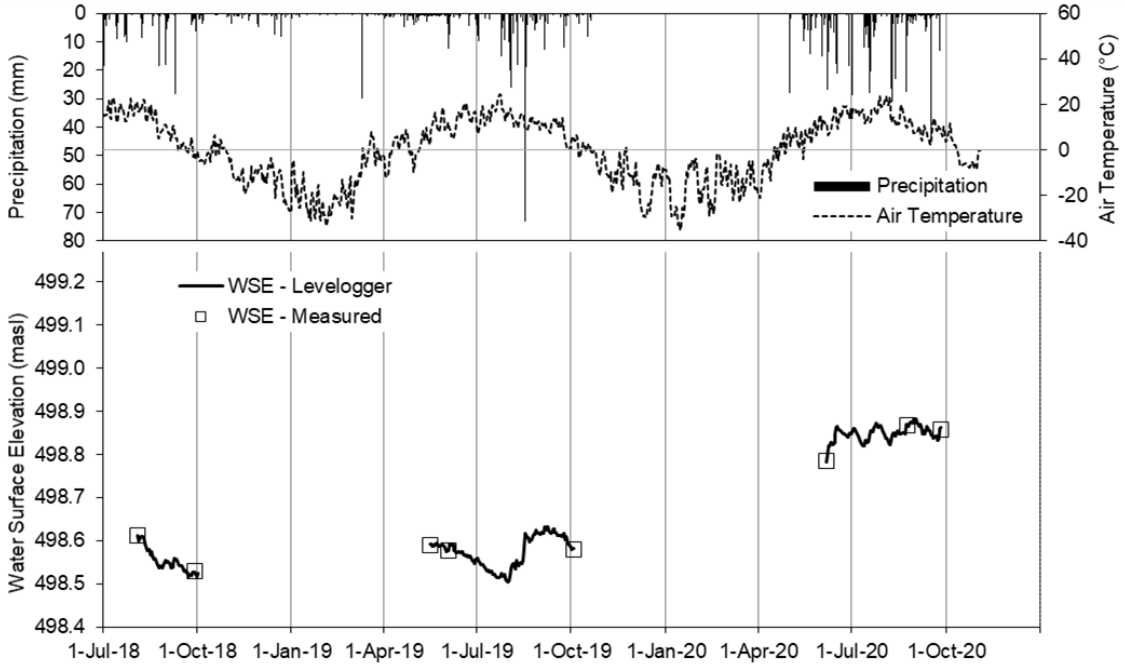
Patterson Lake has a surface area of approximately 38.2 km$^2$ and is located downstream of Broach Lake and upstream of Forrest Lake (Figure 3). Hydrometric monitoring work at Patterson Lake (i.e., Station CR-WB-MS-02) began in 2018. The station is located on the southeast side of the lake. The field activities completed at CR-WB-MS-02 are summarized in Table 21. The daily mean WSE record derived from the Levelogger, along with observed precipitation and air temperature, are presented in Figure 53.

**Table 21: Summary of Hydrometric Monitoring Results, CR-WB-MS-02**

| Date and Time | WSE[(a)] (masl) | Staff Gauge Reading (m) |
|---|---|---|
| 4 August 2018 08:30 | 498.612 | 0.415 |
| 29 September 2018 12:00 | 498.530 | 0.330 |
| 18 May 2019 16:10 | 498.585 | 0.830 |
| 3 June 2019 19:00 | 498.578 | 0.820 |
| 3 October 2019 15:15 | 498.581 | 0.845 |
| 6 June 2020 18:55 | 498.786 | n/d[(b)] |
| 10 July 2020 18:00 | n/d[(c)] | n/d[(b)] |
| 24 August 2020 12:45 | 498.868 | n/d[(b)] |
| 26 September 2020 17:21 | 498.857 | n/d[(b)] |

a) Water surface elevation (WSE) measured by levelling survey using rebar benchmark, CR-WB-MS-02_BM1.
b) Staff gauge completely submerged.
c) Survey error was identified and this result was likely an overestimate and has been omitted.
n/d = no data; masl = metres above sea level.

**Figure 53: CR-WB-MS-02 Water Surface Elevation, 2018 to 2020**




WSE = water surface elevation.

### 5.3.2.3 Station CR-WB-MS-03: Forrest Lake

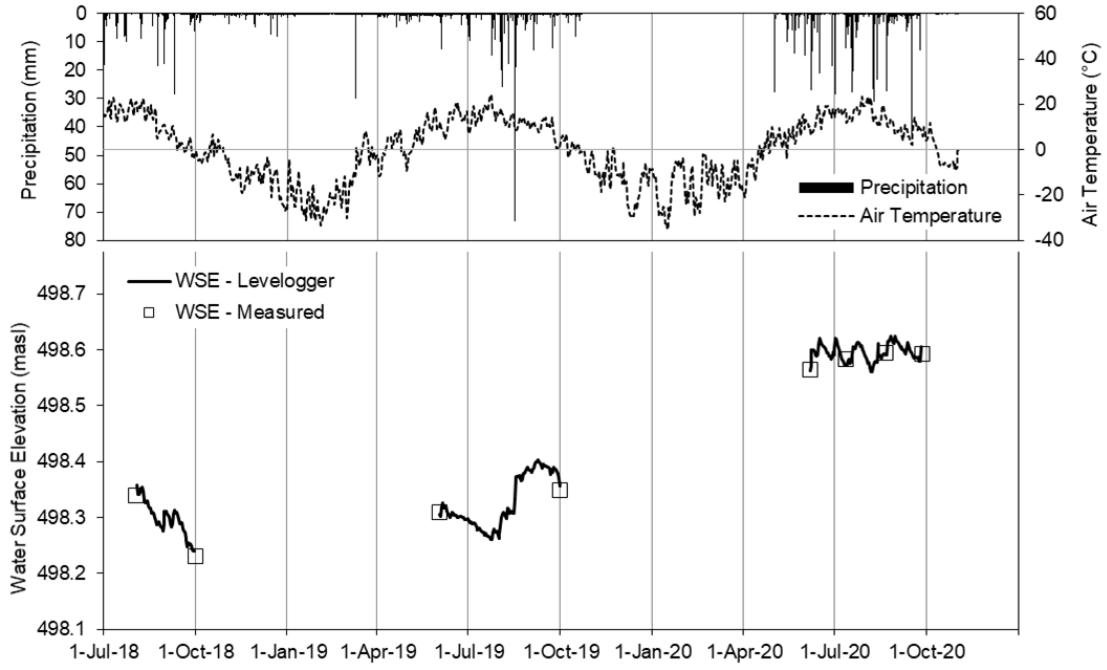
Forrest Lake has a surface area of approximately 40.1 km$^2$ and is located at the downstream end of Patterson Lake and upstream of Beet Lake (Figure 3). Hydrometric monitoring work at Forrest Lake (i.e., Station CR-WB-MS-03) began in 2018. The station is located on the northeast shore of the lake. The field activities completed at CR-WB-MS-03 are summarized in Table 22. The daily mean WSE record derived from the Levelogger, along with observed precipitation and air temperature, are presented in Figure 54.

**Table 22: Summary of Hydrometric Monitoring Results, CR-WB-MS-03**

| Date and Time | WSE[(a)] (masl) | Staff Gauge Reading (m) |
|---|---|---|
| 2 August 2018 16:15 | 498.340 | 0.395 |
| 1 October 2018 15:52 | 498.230 | 0.275 |
| 2 June 2019 17:30 | 498.310 | 0.475 |
| 30 September 2019 14:00 | 498.349 | 0.515 |
| 6 June 2020 08:05 | 498.565 | n/d[(b)] |
| 12 July 2020 08:40 | 498.584 | n/d[(b)] |
| 21 August 2020 11:07 | 498.594 | 0.380 |
| 25 September 2020 15:37 | 498.592 | 0.370 |

a) Water surface elevation (WSE) measured by levelling survey using rebar benchmark, CR-WB-MS-03_BM1.
b) Staff gauge lying on lake bed. Re-established 21 August 2020.
n/d = no data; masl = metres above sea level.

**Figure 54: Station CR-WB-MS-03 Water Surface Elevation, 2018 to 2020**




WSE = water surface elevation.

### 5.3.2.4 Station CR-WB-MS-04: Beet Lake

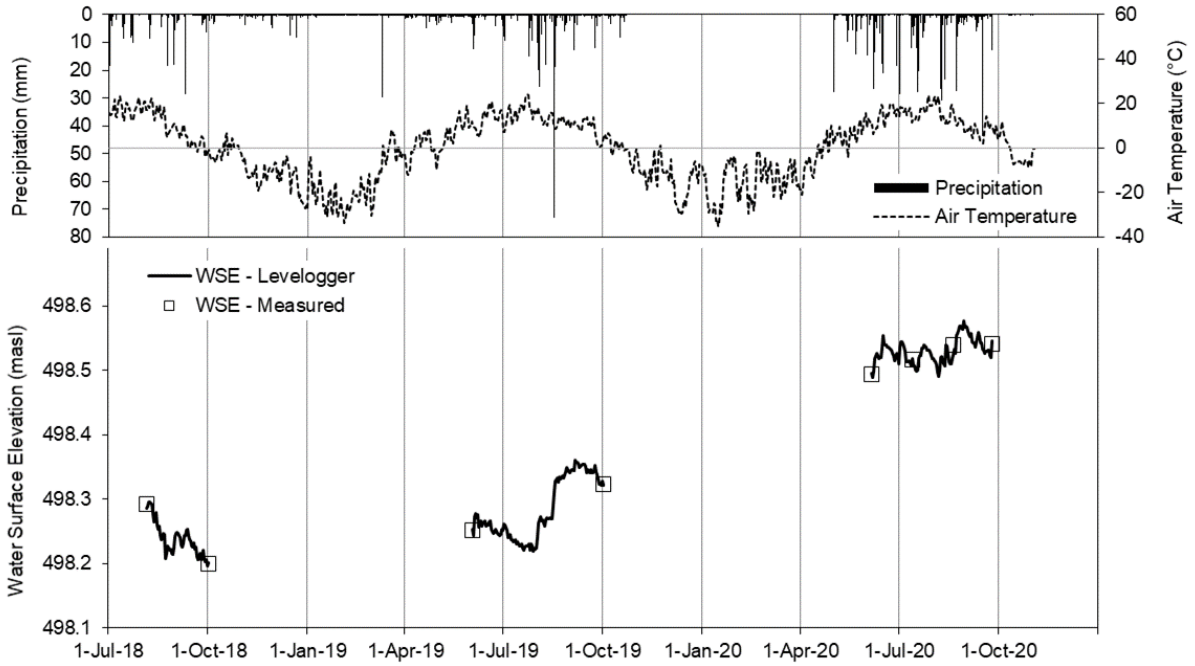
Beet Lake has a surface area of approximately 8.66 km$^2$ and is located downstream of Forrest Lake and upstream of Naomi Lake (Figure 3). Hydrometric monitoring at Beet Lake (i.e., CR-WB-MS-04) began in 2018. The station is located on the south shore of the lake. The field activities completed at CR-WB-MS-04 are summarized in Table 23. The daily mean WSE record derived from the Levelogger, along with observed precipitation and air temperature, are presented in Figure 55.

**Table 23: Summary of Hydrometric Monitoring Results, CR-WB-MS-04**

| Date and Time | WSE[(a)] (masl) | Staff Gauge Reading (m) |
|---|---|---|
| 5 August 2018 14:30 | 498.291 | 0.330 |
| 1 October 2018 14:27 | 498.200 | n/d |
| 2 June 2019 16:30 | 498.252 | 0.265 |
| 2 October 2019 17:00 | 498.323 | 0.342 |
| 6 June 2020 09:00 | 498.494 | n/d[(b)] |
| 13 July 2020 11:20 | 498.517 | n/d[(b)] |
| 20 August 2020 16:30 | 498.539 | 0.710 |
| 25 September 2020 14:20 | 498.541 | 0.725 |

a) Water surface elevation (WSE) measured by levelling survey using rebar benchmark, CR-WB-MS-04_BM1.
b) Staff gauge sheared, likely due to ice. Re-established 20 August 2020.
n/d = no data; masl = metres above sea level.

**Figure 55: CR-WB-MS-04 Water Surface Elevation, 2018 to 2020**




WSE = water surface elevation.

### 5.3.2.5 Station CR-WB-MS-05: Naomi Lake

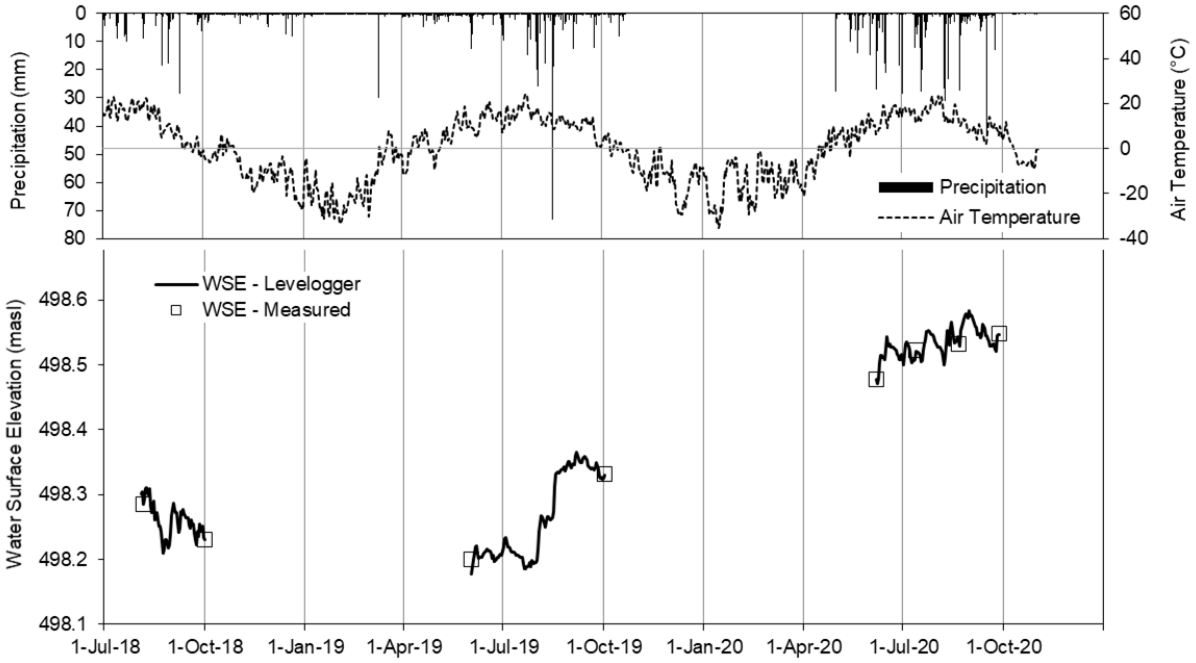
Naomi Lake has a surface area of approximately 2.4 km$^2$, is located downstream of Beet Lake and meets the Clearwater River downstream at the southeast end of the lake (Figure 3). Hydrometric monitoring work at Naomi Lake (i.e., CR-WB-MS-05) began in 2018. The station is located on the northwest shore of Naomi Lake. The field activities completed at CR-WB-MS-05 are summarized in Table 24. The daily mean WSE record derived from the Levelogger, along with observed precipitation and air temperature, are presented in Figure 56.

**Table 24: Summary of Hydrometric Monitoring Results, CR-WB-MS-05**

| Date and Time | WSE[(a)] (masl) | Staff Gauge Reading (m) |
|---|---|---|
| 5 August 2018 16:00 | 498.285 | 0.235 |
| 1 October 2018 13:00 | 498.230 | 0.180 |
| 2 June 2019 14:00 | 498.200 | 0.028 |
| 2 October 2019 11:00 | 498.331 | 0.175 |
| 6 June 2020 10:15 | 498.487 | 0.300 |
| 13 July 2020 10:20 | 498.524 | 0.368 |
| 21 August 2020 10:07 | 498.532 | 0.385 |
| 27 September 2020 12:08 | 498.548 | 0.390 |

a) Water surface elevation (WSE) measured by levelling survey using rebar benchmark, CR-WB-MS-05_BM1.
masl = metres above sea level.

**Figure 56: CR-WB-MS-05 Water Surface Elevation, 2018 to 2020**




WSE = water surface elevation.

### 5.3.2.6 Station CR-WB-TI-01: Lake H

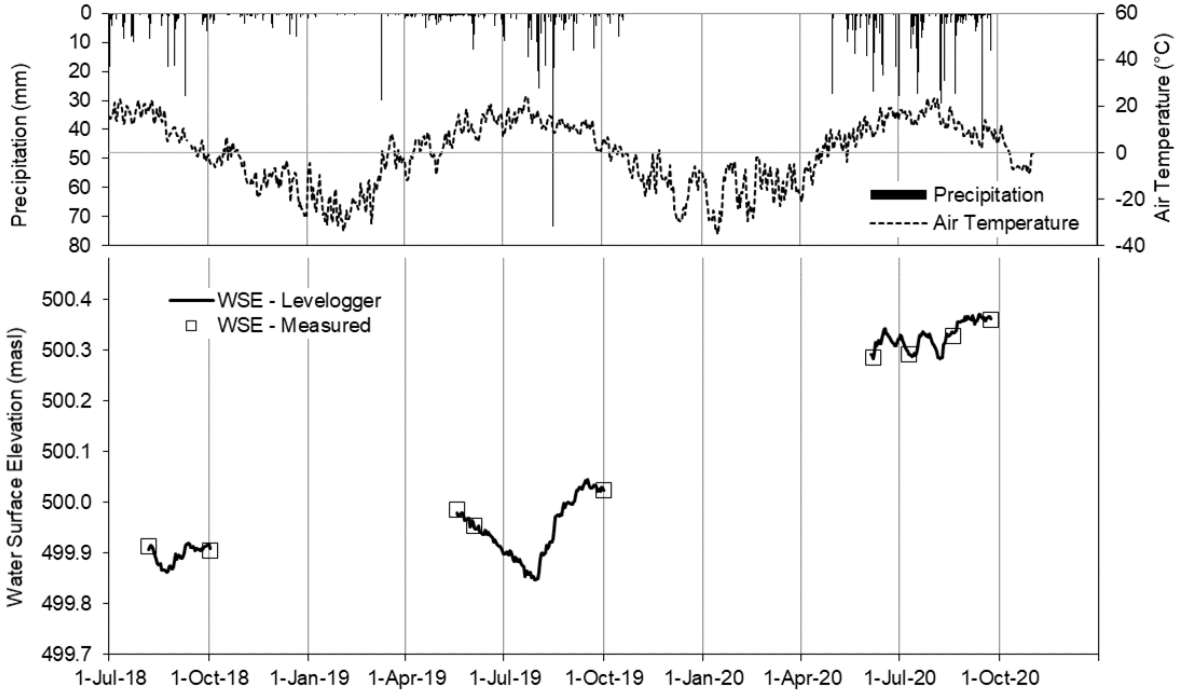
Lake H has a surface area of approximately 1.7 km$^2$ and is located near the upstream portion of Patterson Lake (Figure 3). Hydrometric monitoring at Lake H (i.e., CR-WB-TI-01) began in 2018. The station is located on the southwest shore of Lake H. The field activities completed at CR-WB-TI-01 are summarized in Table 25. The daily mean WSE record derived from the Levelogger, along with observed precipitation and air temperature, are presented in Figure 57.

**Table 25: Summary of Hydrometric Monitoring Results, CR-WB-TI-01**

| Date and Time | WSE[(a)] (masl) | Staff Gauge Reading (m) |
|---|---|---|
| 6 August 2018 11:00 | 499.900 | 0.264 |
| 2 October 2018 15:00 | 499.900 | 0.245 |
| 18 May 2019 11:45 | 499.985 | 0.230 |
| 3 June 2019 15:05 | 499.954 | 0.195 |
| 1 October 2019 11:00 | 500.024 | 0.260 |
| 4 June 2020 16:10 | 500.285 | 0.525 |
| 9 July 2020 13:50 | 500.291 | 0.525 |
| 19 August 2020 14:00 | 500.329 | 0.570 |
| 23 September 2020 13:09 | 500.360 | 0.600 |

a) Water surface elevation (WSE) measured by levelling survey using rebar benchmark, CR-WB-TI-01_BM1.
masl = metres above sea level.

**Figure 57: CR-WB-TI-01 Water Surface Elevation, 2018 to 2020**




WSE = water surface elevation.

### 5.3.2.7 Station CR-WB-TI-02: Lake G

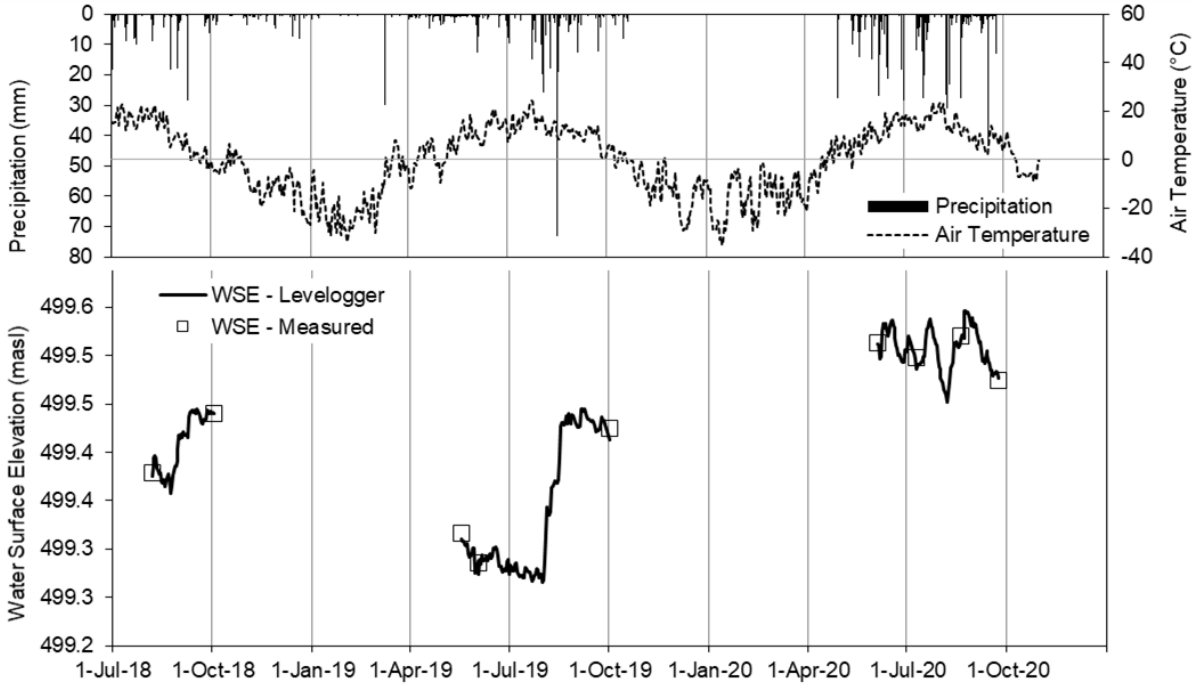
Lake G has a surface area of approximately 0.57 km$^2$ and is located near the upstream portion of Patterson Lake (Figure 3). Hydrometric monitoring at Lake G (i.e., CR-WB-TI-02) began in 2018 in support of the hydrological baseline. The CR-WB-TI-02 station is located on the north shore of Lake G. The field activities completed at CR-WB-TI-02 are summarized in Table 26. The daily mean WSE record derived from the Levelogger, along with observed precipitation and air temperature, are presented in Figure 58.

**Table 26: Summary of Hydrometric Monitoring Results, CR-WB-TI-02**

| Date and Time | WSE[(a)] (masl) | Staff Gauge Reading (m) |
|---|---|---|
| 6 August 2018 13:00 | 499.379 | 0.306 |
| 2 October 2018 16:00 | 499.440 | 0.375 |
| 18 May 2019 10:45 | 499.316 | 0.575 |
| 3 June 2019 10:25 | 499.286 | 0.548 |
| 1 October 2019 10:15 | 499.425 | 0.675 |
| 4 June 2020 15:15 | 499.513 | 0.773 |
| 9 July 2020 12:46 | 499.498 | 0.748 |
| 19 August 2020 13:05 | 499.521 | 0.778 |
| 23 September 2020 12:05 | 499.474 | 0.738 |

a) Water surface elevation (WSE) measured by levelling survey using anchor bolt in tree benchmark, CR-WB-TI-02_BM1.
masl = metres above sea level.

**Figure 58: CR-WB-TI-02 Water Surface Elevation, 2018 to 2020**




WSE = water surface elevation.

### 5.3.2.8 Station CR-WB-TI-03: Lake F

Lake F has a surface area of approximately 1.19 km$^2$ and is located near adjacent to the north basin of Forrest Lake (Figure 3 and Figure 4). Hydrometric monitoring at Lake F (i.e., CR-WB-TI-03) began in 2018. The field activities completed at CR-WB-TI-03 are summarized in Table 27. Lake F was monitored opportunistically as it is near CR-WB-MS-03. Monitoring activities included instantaneous measurements of WSE during field visits. A Levelogger was not installed at this station as it is considered a lower priority due to its location on a small waterbody far from the proposed Project.

**Table 27: Summary of Hydrometric Monitoring Results, CR-WB-TI-03**

| Date and Time | WSE[(a)] (masl) | Staff Gauge Reading (m) |
|---|---|---|
| 2 August 2018 13:00 | 498.795 | 0.410 |
| 1 October 2018 16:00 | 498.797 | 0.400 |
| 30 September 2019 14:15 | 499.022 | 0.543 |
| 6 June 2020 08:05 | 499.345 | 0.915 |
| 12 July 2020 08:40 | 499.405 | 0.962 |
| 21 August 2020 11:07 | 499.425 | 0.990 |
| 25 September 2020 15:37 | 499.500 | n/d[(b)] |

a) Water surface elevation (WSE) measured by levelling survey using rebar benchmark, CR-WB-TI-03_BM1.
b) Staff gauge submerged.
n/d = no measurement; masl = metres above sea level.

### 5.3.2.9 Station HC-WB-MS-01: Hodge Lake

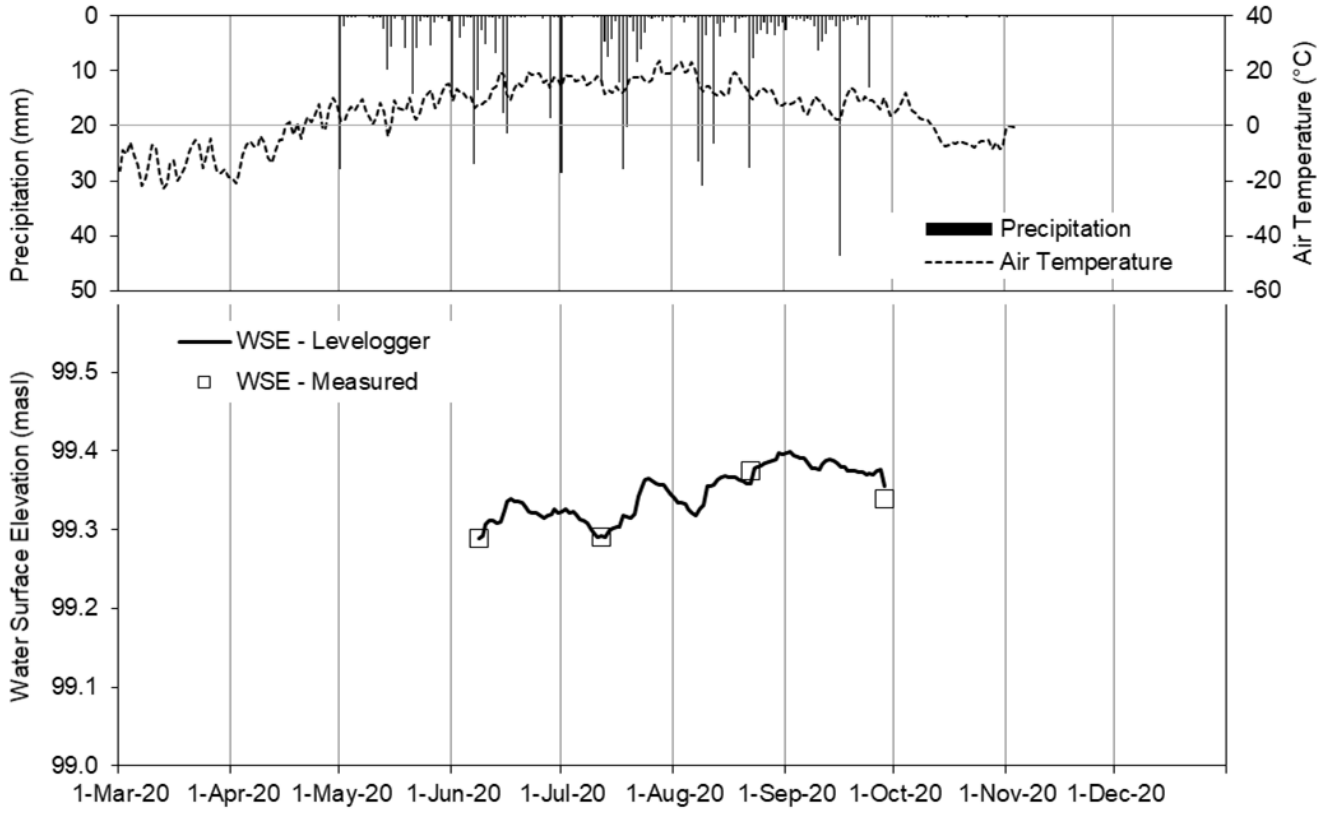
Hodge Lake has a surface area of approximately 13.02 km$^2$ and is located approximately 16 km north of Broach Lake (Figure 3). Hydrometric monitoring at the Hodge Lake (i.e., HC-WB-MS-01) began in June 2020 in support of the hydrological baseline. The station is located on the west shore of Hodge Lake near the outlet. The field activities completed at HC-WB-MS-02 are summarized in Table 28. The daily mean WSE record derived from the Levelogger, along with observed precipitation and air temperature, are presented in Figure 59.

**Table 28: Summary of Hydrometric Monitoring Results, HC-WB-MS-01**

| Date and Time | WSE[(a)] (masl) | Staff Gauge Reading (m) |
|---|---|---|
| 8 June 2020 10:10 | 99.289 | 0.450 |
| 12 July 2020 11:30 | 99.290 | 0.460 |
| 22 August 2020 14:45 | 99.375 | 0.555 |
| 28 September 2020 11:05 | 99.339 | 0.520 |

a) Water surface elevation (WSE) measured by levelling survey using rebar benchmark, HC-WB-MS-01_BM1.
masl = metres above sea level.

**Figure 59: HC-WB-MS-01 Water Surface Elevation, 2020**

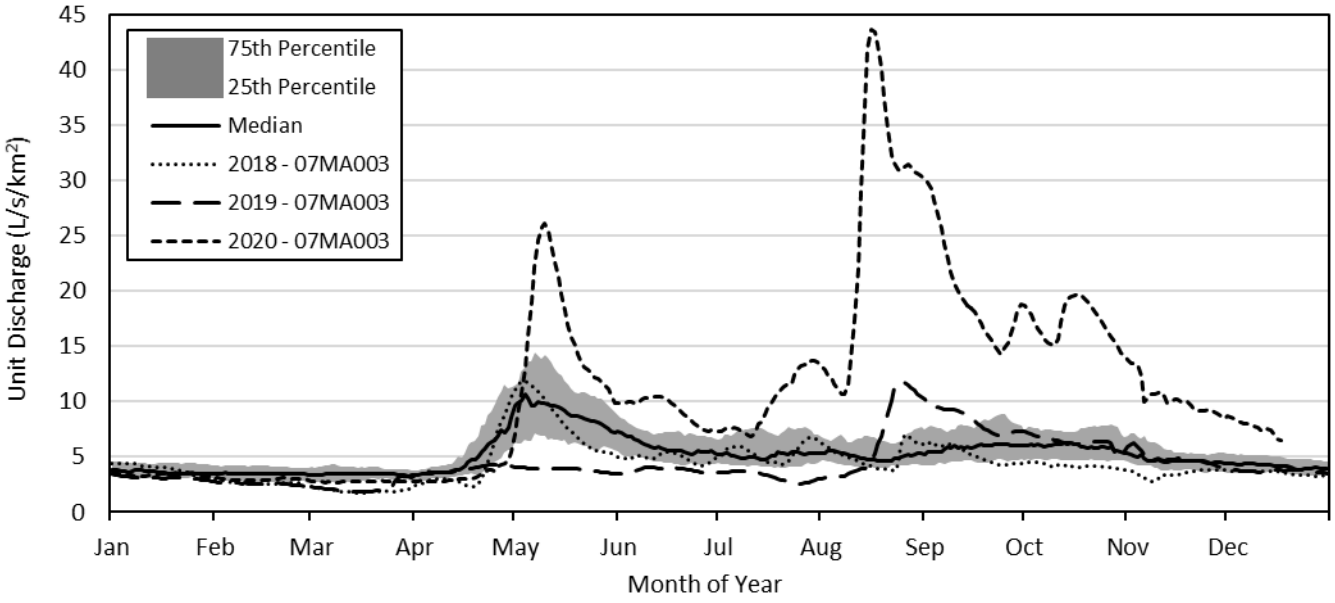



WSE = water surface elevation.

### 5.3.3 Comparison to Historical Regional Records

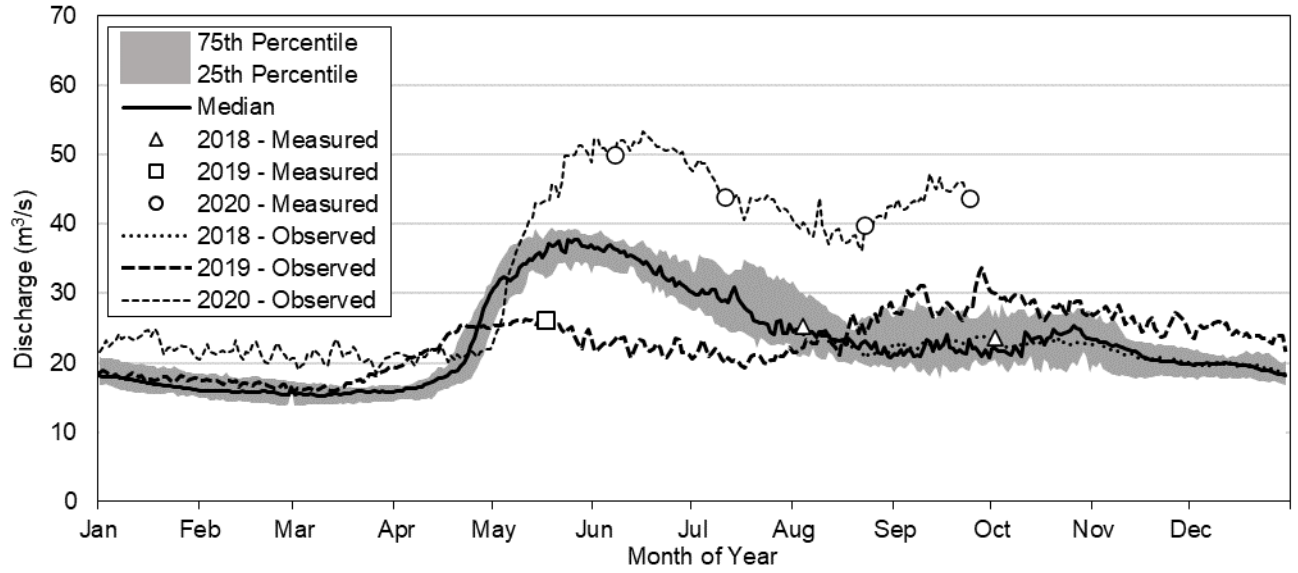
The 2018, 2019, and 2020 hydrometric baseline study provisional discharge records for the Douglas River (i.e., WSC Station 07MA003) were compared with long-term values for the years 1975 to 2020 (Figure 60; WSC 2020). Most of 2018 and 2019 had near or below normal discharge including spring 2018. The August 2019 peak flow that occurred on the Douglas River was well above normal conditions for that time of year and would be close to a 1-in-2-year flood event for that station. Discharge measured in 2020 was above normal beginning in early May until the end of the year. The August 2020 peak flow was approximately timed with the 2019 peak and a secondary peak in 2018. The August 2020 peak flow would be greater than the 1-in-100-year flood event for that station.

**Figure 60: Comparison of 2018 to 2020 Hydrographs for the Douglas River near Cluff Lake (Station 07MA003) with Long-Term Discharge Records**




A comparison of 2018, 2019, and 2020 hydrometric baseline study discharge records for the Clearwater River at Outlet of Lloyd Lake (CR-WC-MS-08) with historical observations for the Clearwater River (i.e., WSC Station 07CD006) is shown in Figure 61 (WSC 2020). Discharge records at CR-WC-MS-08 were near normal in 2018. Discharge observed in May to August 2019 was well below normal, and in September 2019 through April 2020 was above normal. During 2020 freshet, the observed discharge was well above normal, and this trend continued through October 2020.

**Figure 61: Comparison of 2018 to 2020 Observations at the Clearwater River at Outlet of Lloyd Lake to Historical Observations at Station 07CD006 Clearwater River at Outlet of Lloyd Lake, 1974 to 1995**



# 5.4 Sediment

## 5.4.1 Bed Substrate Particle Size

River bed substrate samples were collected in October 2018 at three hydrometric stations on the Clearwater River downstream of Patterson Lake to characterize particle size. At all three hydrometric stations, the bed was observed to be uniform and composed of fine to medium sand. Characteristic particle sizes are summarized in Table 29. The full grain size distributions analyzed for each of the samples are included in Appendix E Total Suspended Solids and Bed Load Laboratory Results.

**Table 29: Bed Substrate Characteristics at Selected Stations on the Clearwater River**

| Watercourse | Hydrometric Station | Sample Number | $D_{15}$ (mm) | $D_{50}$ (mm) | $D_{85}$ (mm) |
|---|---|---|---|---|---|
| Clearwater River below Patterson Lake | CR-WC-MS-03 | SL6312 | 0.177 | 0.282 | 0.393 |
| Clearwater River below Beet Lake | CR-WC-MS-04 | SL6313 | 0.189 | 0.306 | 0.422 |
| Clearwater River below Naomi Lake | CR-WC-MS-05 | SL6314 | 0.271 | 0.381 | 0.673 |

Note: Samples collected October 2018.
D = particle size diameter, with the subscript number referring to the percentage of particles that are finer than this size.

## 5.4.2 Suspended and Bed Load

Suspended load and bed load observations were made during each field visit in 2018, 2019, and 2020 at three hydrometric stations on the Clearwater River downstream of Patterson Lake. The measured TSS concentration in the water column and bed load concentration are summarized in Table 30. The highest TSS measured was 3 mg/L at CR-WC-MS-04 on 6 June 2020 and at CR-WC-MS-05 on 5 June 2020 which coincided with the highest discharge measured during the monitoring program. Measurements of 2 mg/L TSS were obtained at CR-WC-MS-04 on 1 June 2019 and 13 July 2020 and at CR-WC-MS-05 on 13 July 2020. All the remaining TSS samples were at or below the detection limit of 1 mg/L.

For bed load, if insufficient mass or no mass could be collected within the sampling duration, these samples were not submitted to the laboratory for further analysis and are indicated as “not detected” in Table 30. Even the highest bed load concentrations were low concentrations compared to many natural streams when measured over a period of hours at CR-WC-MS-03 of 0.0029 mg/L on 4 Jun 2019 and 0.0028 mg/L on 4 June 2019, which correspond to slightly higher mean velocities than the other results shown in Table 30. No regional sediment monitoring data are available for the Clearwater River in Saskatchewan (including the RSA) or surrounding watersheds for comparison with the local sampling results.

**Table 30: Suspended and Bed Load Sampling Results, 2018 to 2020**

| Hydrometric Station and Watercourse | Date | TSS (mg/L) | Bed Load (mg/L) | Bed Load Sampling Duration (s) | Daily Load (t/d) | Discharge ($m^3/s$) | Mean Velocity (m/s) |
|---|---|---|---|---|---|---|---|
| Clearwater River below Patterson Lake CR-WC-MS-03 | 4 August 2018 | <1 | Not Detected | 3,600 | Not Detected | 1.16 | 0.250 |
| | 1 October 2018 | <1 | Not Detected | 3,600 | Not Detected | 0.98 | 0.253 |
| | 18 May 2019 | <1 | 0.0021 | 60,480 | 0.0083 | 1.46 | 0.318 |
| | 4 June 2019 | <1 | 0.0028 | 49,800 | 0.0102 | 1.33 | 0.282 |
| | 30 September 2019 | <1 | 0.0010 | 86,400 | 0.0031 | 1.17 | 0.234 |
| | 3 May 2020 | n/d | Not Detected | 88,500 | Not Detected | 1.56 | 0.241 |
| | 8 June 2020 | <1 | 0.0000 | 138,420 | 0.0002 | 2.22 | 0.311 |
| | 14 July 2020 | 1 | 0.0002 | 69,120 | 0.0049 | 2.35 | 0.307 |
| | 25 August 2020 | <1 | 0.0003 | 69,900 | 0.0090 | 2.32 | 0.294 |
| | 28 September 2020 | <1 | 0.0001 | 75,000 | 0.0041 | 2.16 | 0.232 |
| Clearwater River below Beet Lake CR-WC-MS-04 | 5 August 2018 | <1 | Not Detected | 3,600 | Not Detected | 1.92 | 0.133 |
| | 1 October 2018 | <1 | Not Detected | 3,600 | Not Detected | 1.70 | 0.242 |
| | 1 June 2019 | 2 | Not Detected | 6,060 | Not Detected | 2.54 | 0.242 |
| | 2 October 2019 | <1 | Washload only | 1,500 | 0.0043 | 1.83 | 0.108 |
| | 6 June 2020 | 3 | 0.0001 | 57,900 | 0.0108 | 5.50 | 0.261 |
| | 13 July 2020 | 2 | 0.0001 | 243,540 | 0.0074 | 4.80 | 0.266 |
| | 21 August 2020 | <1 | 0.0000 | 66,420 | 0.0013 | 3.87 | 0.184 |
| | 26 September 2020 | <1 | 0.0001 | 67,560 | 0.0087 | 4.65 | 0.248 |
| Clearwater River below Naomi Lake CR-WC-MS-05 | 5 August 2018 | <1 | Not Detected | 3,600 | Not Detected | 2.95 | 0.208 |
| | 1 October 2018 | <1 | Not Detected | 3,600 | Not Detected | 3.01 | 0.250 |
| | 1 June 2019 | <1 | Not Detected | 6,060 | Not Detected | 2.90 | 0.157 |
| | 2 October 2019 | <1 | Washload only | 90,660 | 0.0000 | 3.51 | 0.219 |
| | 5 June 2020 | 3 | 0.0000 | 18,180 | 0.0062 | 8.23 | 0.402 |
| | 10 July 2020 | 2 | 0.0001 | 16,200 | 0.0098 | 6.30 | 0.377 |
| | 20 August 2020 | <1 | 0.0000 | 14,100 | 0.0010 | 5.82 | 0.307 |
| | 27 September 2020 | 2 | 0.0000 | 88,320 | 0.0037 | 7.38 | 0.358 |

TSS = total suspended solids; < = less than.

## 5.5 Uncertainty and Limitations

The purpose of this section is to identify the key sources of uncertainty and discuss how uncertainty has been addressed to increase the level of confidence in results. The confidence in hydrology results are related to:

- natural variability in meteorological and hydrological conditions over time;
- period of baseline data collection and timing of field visits in relation to natural variability; and
- accuracy of baseline data collected, methods used, and application of QA/QC measures.

### 5.5.1 Natural Variability over Time

The baseline hydrology program and field visits documented in this report occurred over a limited period of two calendar years with data collected in three open-water seasons. Short-term records such as this do not usually adequately characterize the entire range of natural variability of hydrology that long-term records would. However, the hydrology records collected capture both relatively dry and wet periods, which is a better result than expected in a short-term record. The range of water level and discharge conditions measured during the 2018 and 2019 field visits at the hydrometric stations was relatively low; however, as additional data were collected in 2020, the upper ranges of many rating curves became more reliable, and these uncertainties were reduced.

As described in Section 5.0, baseline hydrology data including total precipitation, peak SWE for the winters of 2017-2018 and 2018-2019, and water levels and discharge records were all collected during relatively dry to near-average precipitation conditions. Exceptional events were also recorded. For instance, the total monthly recorded precipitation in August 2019 exceeded historical precipitation for this month based on long-term European Re-analysis Interim (ERAI) data from 1979 to 2019.

Based on a comparison of 2018 and 2019 discharge at the Douglas River (i.e., WSC Station 07MA003), most of this baseline period had near normal or below normal discharge, including spring 2018 and 2019. The peak flow that occurred in August 2019 and early September 2019 on the Douglas River was well above normal conditions for that time of year but would be just below a 1-in-2-year flood event for that station. With the exception of the winter 2019 to 2020 discharge, nearly all of 2020 was well above normal conditions, including one portion above the 1-in-100-year flood.

No snow survey was completed in 2020. The limited baseline data collection period may not characterize the full range of hydrological conditions that could occur. End-of-winter snow surveys are important in characterizing the interannual variation of snowfall, sublimation, and water available during spring freshet. Ground-based measurements are valuable for validating the publicly available remote sensing data. Comparing the 2018 and 2019 snow surveys to the remote sensing data provided some confidence that the 2020 remote sensing data provided an adequate representation of the conditions at the Project site; the ground-based data further increased this confidence and reduce the uncertainty.

### 5.5.2 Period of Baseline Data Collection

The hydrology assessment relies on a combination of available climate and hydrometric data and short-term monitoring of flows and water levels in the RSA and farther downstream. Hydrology data were collected at numerous stations over a period of just over two years, which is a relatively short period of time. However, most stations were visited several times or more frequently which increased the validity of the data set, and a wide range of conditions were observed between August 2018 and September 2020, which lends additional confidence to the results.

### 5.5.3 Data Collection Methods and Quality Assurance and Quality Control

A high level of prediction confidence was maintained during data collection and analysis by managing uncertainty as follows:

- carefully selecting sites;
- using standard methods and QA/QC in the field program;

- correcting data;
- using corrected datasets (e.g., precipitation data were adjusted); and
- comparing short-term data from the baseline study with long-term data observed at regional stations that would be most representative of the anticipated area of the Project, as well as with long-term results from the calibrated hydrological model.

The delineation of watershed boundaries and the stream network was determined for the 22 hydrology stations using digital elevation model and mapped stream network data and compared with visible streams, wetlands, and upland features shown on recent satellite imagery for the region. Canadian Digital Elevation Data for the surrounding region were used as the digital elevation model base data (NRCAN 2019a). The mapped stream network was represented by the National Hydrologic Network dataset for the region (NRCAN 2019b). These data were imported to the ECCC software ENSIM (GreenKenue 2010) and used to delineate watershed boundaries for hydrometric station locations. These initial watershed boundaries and stream network results were plotted on satellite imagery using Google Earth Pro to compare them with features on the ground. Although the topography in general in this region is sufficient to be confident in the boundaries, there is less certainty in watershed boundary locations and flow directions in flatter areas such as peatlands. For example, some peatlands flow out in multiple directions and have varying water levels and connections to downstream areas. The focus of QC effort was on these more difficult areas, and more effort was placed on QC in the RSA. These uncertainties affect the synthesized flow and flood frequency results, which are based on watershed areas.

Uncertainties in the results of the hydrometric monitoring study were reduced using the QA and QC methods identified in Section 4.7. However, there are still limits in accuracy and precision of measurements, in understanding/interpretation of the physical processes affecting the hydrology data analysis, and limits in the physical range of water level and flow conditions that occurred during the monitoring period that leads to uncertainty in extrapolation of flows beyond the measured values.

Uncertainties in discharge measurements can be attributed to precision in channel width, depth, and velocity measurements, and particularly the number of verticals and number of points in each vertical (WMO 2010). Increasing the duration of velocity measurements decreases the influence from natural variations or pulsations over time due to turbulence; this influence was reduced by measuring for a standard 40-second period for each vertical. An increased number of verticals and increased number of points in each vertical also increases confidence in discharge results with the acoustic Doppler velocimeter (ADV). The standard number of measurement verticals proposed for a cross-section for this program was 20, with more verticals located near the thalweg, which is deepest point of the cross-section and therefore is the line of lowest elevation along the watercourse. Increased points in each vertical were required whenever the water depth exceeded 0.75 m. This standard was not universally carried out as some stream channels were too narrow to obtain 20 measurement verticals with the proper spacing for the current meter used.

Discharge during the field visits was measured with a Sontek Flowtracker ADV, Flowtracker2 ADV, and RiverSurveyor M9 acoustic Doppler current profiler (ADCP). These devices do not require recalibration; however, the QA tests were completed prior to starting measurements and the ADCP received an additional compass calibration before use. The range of discharge measured at most hydrometric stations was well within the acceptable range for the equipment used. The range of uncertainty measured with the ADVs varied with each

site; most measurements had low uncertainty (5%), but one station (CR-WC-TI-01) had low flows and a narrow channel such that uncertainty was usually high (>10%).

The objective was to have at least three, preferably four, ADCP measurements that were within 5% of the averaged discharge measurements, and the average discharge was used. Although most sites did not have visibly moving beds, the GPS-Generalized Gradient Approximation (GGA) track reference usually provided a more accurate channel width than the bottom tracking track reference mode.

Water level surveys were typically completed using an optical level, and the accuracy of these surveys is up to 1 cm (0.01 m) but was usually less. Two complete water level surveys (including survey of all local benchmarks) were conducted for each hydrometric station during each field visit. The results of the two complete water level surveys were compared to each other: A measurement was considered good quality if the difference was within 5 mm, and acceptable if within 1 cm. In windy and wavy exposed locations, particularly on the waterbodies with large fetch, the water level survey results were expected to have larger variance, and a difference greater than 1 cm was sometimes deemed acceptable based on professional opinion. The benchmark elevations and top of staff gauge elevations were compared to previous elevation results and potential for movement or heaving of the primary benchmark was identified in some cases.

Two stations were located in predominantly organic terrain including CR-TI-WC-02 and Lake G CR-TI-WB-02 and had benchmarks that were not likely to be as stable over time as at other stations. Over the course of the monitoring period, benchmarks were occasionally lost due to beavers cutting down the trees that the survey spikes had been embedded in, or due to these trees falling down from extreme wind events or other natural causes. However, three benchmarks were always maintained at each hydrometric station and any lost benchmarks were replaced during the next field visit with no consequence to data quality or continued data collection.

Staff gauge readings were compared with previous field visit results at each site that had a staff gauge, and the survey to the top of the staff gauge was used to estimate alternate WSE, which were then compared with the direct WSE readings. Staff gauges were used to provide a QC on the WSE surveys to local benchmarks which provide more reliable data. Staff gauges often shifted position or were lost during the winter however. In all of these cases, staff gauges were re-established and re-surveyed during the next field visit with no consequence to data quality or continued data collection.

Aquarius software was used to store and correct the hydrometric data and check or generate stage-discharge rating curves. Continuous water level records were corrected using the water level survey measurements and compared with local precipitation and air temperature records to assist with QC and corrections. For the hydrometric stations that had Leveloggers in place over the winter of 2018-2019, water levels were corrected over the winter for backwater using WSE survey data from late March 2019. There is uncertainty in the corrected data prior to that field visit; however, it was assumed that water levels receded gradually over the winter under the ice until mid-March when air temperatures increased and snowmelt started. Using discharge measurements or unit-area discharge estimates for the stations not visited in late March 2019, the winter discharge records were further corrected, if required. For the hydrometric stations that had Leveloggers in place over the winter of 2019-2020, water levels were corrected similarly using WSE survey data from early May 2020 or early June 2020. Similar procedures were followed to complete the winter discharge records.

As part of standard field practice, rating curves were extrapolated above and below the measured water level and discharge records in 2018 to 2020; in most cases, the rating curve extrapolation function in Aquarius was used to extrapolate discharge from higher water levels. Higher confidence was placed on periods when water levels were within the range of measured stage-discharge values. To understand and address uncertainty in extrapolating higher discharge from the rating curves, unit-area runoff hydrographs for all the watercourse stations were plotted together for comparison. This QC step was completed for all streamflow stations and provided an indication of when the upper end of the rating curves needed to be modified. The upper extrapolated regions of the rating curves were adjusted if required to avoid overestimating peak discharge.

Backwater can cause discharge to be overestimated for a given stage value. There is more uncertainty in the results at certain streamflow stations that experienced, or were inferred to have had, backwater conditions during the open-water periods. All streamflow stations experience backwater during ice-covered conditions. Stations with noted potential for backwater conditions included:

- observations of dense aquatic vegetation in the channel at CR-WC-MS-06 and CR-WC-TI-02;
- beaver dams and beaver activity at the inflow to Forrest Lake at CR-WC-TI-01;
- observed or inferred conditions during ice-covered periods at all the streamflow stations; and
- due to the low gradients in this area – the location of tributary inflow stations near the confluence with the Clearwater River and/or upstream of its waterbodies causes increased uncertainty for the monitoring periods in between field measurements (e.g., CR-WC-MS-02 is located upstream of Patterson Lake and was backwatered as lake levels increased in 2020, as well as CR-WC-TI-01, CR-WC-TI-02 and CR-WC-TI-03).

Backwater effects are alleviated using frequent (e.g., monthly) field measurements of coincident stage and discharge, which allow the base stage-discharge curves (unaffected by backwater) to be shifted upward to provide a more correct derived discharge. Hydrometric monitoring for this program included frequent measurements at key locations such as along the Clearwater River main stem in the LSA which greatly improves confidence in the results and reduces uncertainty. Stage-shifts are a method used to improve the discharge data derived from the stage-discharge rating curves. They were used for the stage-discharge pairs in which stage was 5% above or below the rating curves (WSC 2012). The magnitudes and dates of stage shifts for each rating curve were summarized in Appendix B.

# 6.0 SUMMARY

Extensive baseline hydrology field data was collected at 22 hydrometric monitoring stations with most located in the hydrology RSA in the Clearwater River watershed. This included eight waterbody and 12 watercourse locations in the Clearwater River watershed, and one watercourse and one waterbody in the adjacent Hodge Creek watershed. The monitoring period included in this report started in August 2018 and continued to September 2020; 11 field visits were conducted during this time. The hydrology field program also included snow surveys in late winter, which provided results for snow accumulation available for snowmelt in Patterson Lake watershed, suspended sediment sampling and bed load monitoring at three locations in the local study area (LSA) downstream of Patterson Lake. Local meteorological data from the Rook I station were also collected and used to support interpretation of hydrology monitoring data.

A wide range of hydrological conditions were observed during the monitoring period with lower water levels and flows in 2018 and spring 2019 and higher water levels and flows observed throughout the 2020 open water season. Water level and discharge observations during the 2020 open-water period were well above long-term average values at the Douglas and Clearwater rivers at regional Water Survey of Canada gauging stations. At most local hydrometric stations, the highest water level and discharge were recorded following heavy rainfalls in August and mid-September 2020.

The high number of field visits made at key locations in the LSA and the wide range of conditions observed increases confidence in the hydrology results. Therefore, the main objective of this study has been met in that the hydrology baseline provides sufficient and detailed information to support an Environmental Assessment for the Project.

Results from the hydrology monitoring program met the overall objective of describing the existing hydrological conditions in the baseline study area to support an EA for the Project.

# CLOSING

Golder is pleased to submit this report to NexGen in support of the environmental assessment for the Rook I Project. For details on the limitations and use of information presented in this report, please refer to the Study Limitations section following this page. If you have any questions or require additional details related to this study, please contact the undersigned.

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**APPENDIX A**

# Geodetic Survey Summary

# TECHNICAL MEMORANDUM

**DATE** April 7, 2021 **Reference No.** 19114981

**TO** Susan Mathieu
NexGen Energy Ltd.

**CC** Ross Phillips, Marci Mehl

**FROM** Kyle Nontell **EMAIL kyle_nontell@golder.com**

**TOPOGRAPHIC SURVEYS COMPLETED FOR HYDROLOGICAL BASELINE 2018**

## 1.0 INTRODUCTION

The Rook I Project (Project) is a proposed new uranium mining and milling operation that is 100% owned by NexGen Energy Ltd. (NexGen). The Project is located in northwestern Saskatchewan, approximately 40 km east of the Alberta-Saskatchewan border, 130 km north of the town of La Loche, and 640 km northwest of the city of Saskatoon. The Project resides within Treaty 8 territory and within the Homeland of the Metis. At a regional scale, the Project is situated within the southern Athabasca Basin adjacent to Patterson Lake, along the upper Clearwater River system. Access to the Project will be from an existing road off Highway 955.

The Project includes underground and surface facilities to support the extraction and processing of uranium ore from the Arrow deposit, a land-based, basement hosted, high grade uranium deposit. The terrain and soils baseline report is a component of a comprehensive baseline program that documents the natural and socio-economic environments in the anticipated area of the Project. The terrain and soils baseline program was undertaken to provide context from which effects to terrain and soils from the Project can be assessed in the Rook I Environmental Impact Statement.

## 2.0 SURVEY METHODS

### 2.1 Survey Setup

The 2018 survey program required both Real-Time Kinematic (RTK) and Static Occupation (Static) surveys be performed. Golder utilized four GNSS receivers – two receivers were used as an RTK base and rover system, while the remaining receivers were available to perform Static surveys at various survey control points.

The GNSS receivers used during the program were Sokkia GRX2 units which have 226 satellite tracking channels and one (1) watt UHF2 internal radios.

All Static surveys were performed using tripods and tri-brachs to ensure stable positioning during the occupations, with the exception of the occupation at the geodetic monument 94V063 where the tribrach was placed directly on top of the plate on the concrete pier.

All RTK surveys were performed using a base station receiver affixed to a tripod and tribrach and a rover receiver attached to a two-piece carbon fibre pole. During the RTK survey at the hydrometric station on the Clearwater

River directly upstream of the Highway 955 bridge crossing, the base station receiver's tribrach was placed directly on top of the plate of geodetic monument 94V063.

## 2.2 Control Points

The survey data collection relied on eight control points; four of these control points were intended for use only during the field program which they were installed. Details of the four long-term control points are summarized in Table 1. A photograph of 94V063 at the time of the survey is shown on Figure 1.

**Table 1: NexGen Rook I Survey Control Information**

| ID | Northing (m) | Easting (m) | Elevation (m) | Location | Type | Date (yyyy-mm-dd) | Method | Length of Occupation (hh:mm:ss) | Sigma Y (m) | Sigma X (m) | Sigma Z (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 94V063 | 6307623.834 | 623044.631 | 415.419 | Approximately 250 m south of the HWY 955 bridge crossing the Clearwater River | Concrete pier monument | 2018-09-29 | Static Occupation | 18:04:45 | 0.005 | 0.008 | 0.014 |
| Golder CP1 | 6391350.689 | 603199.134 | 506.962 | At the south west edge of the Rook 1 camp. South of the parking area on the crest of the slope towards Patterson Lake. | 600 mm x 15 mm rebar | 2018-10-02 | Static Occupation | 24:00:15 | 0.003 | 0.004 | 0.009 |
| Golder CP2 | 6390524.359 | 605154.616 | 500.168 | Approximately 20 m southwest of the south abutment of the bridge crossing the Clearwater River on the Rook 1 camp access road. | 600 mm x 15 mm rebar | 2018-10-02 | RTK Averaging | 20 seconds (performed twice) | 0.002 | 0.001 | 0.002 |
| Golder CP11 | 6398241.468 | 594649.090 | 528.652 | Approximately 20 m north of the Broach Lake boat launch at the northern edge of the vehicle turnaround area. | 600 mm x 15 mm rebar | 2018-09-30 | Static Occupation | 7:26:00 | 0.005 | 0.010 | 0.020 |

Notes: All coordinates are in UTM Zone 12, NAD83

1. 94V063 exhibits signs of damage to the concrete pier which are not expected to affect the stability of the monument. The centering bolt at the top of the pier was missing and the plate appeared slightly damaged at the time of the field program. The damage found on the plate is not expected to have significant impact on the accuracy of the Static occupation. Photographs are provided below.
2. CP11 has been retained to maintain consistency with communications from NRCan.

**Figure 1: Geodetic Monument 94V063 at the Time of Golder's Static Survey**

## 3.0 GEODETIC SURVEY OF HYDROMETRIC STATION BENCHMARKS

Local benchmarks established at each watercourse and waterbody hydrometric station were surveyed using RTK survey equipment in reference to geodetic control established through Static surveys. The results of the survey are summarized in Table 2. This will allow all water surface elevation surveys completed throughout the monitoring program to be related to a consistent, geodetic datum. This task is considered essential to improve the quality and future value of the data collected during the baseline monitoring program, and will tie the bathymetry and water level data into the site's topographic surfaces, support ESIA modeling activities, and allow data comparison between sites.

## 4.0 STREAM CHANNEL SURVEY

A stream channel survey of a reach of the Clearwater River was completed on October 2 and 3, 2018 downstream of Patterson Lake extending to the inlet of Forrest Lake. The survey data collected will be used to characterize channel geomorphology and inform estimates of potential bank erosion and bed scour associated with changes in flows associated with Project activities. A plan showing the cross sections surveyed as part of the stream channel survey is presented in Figure 2.

**Table 2: Hydrometric Station Geodetic BM Data**

| Sr. No. | Name | Station | Field Site ID | Northing (m) | Easting (m) | Elevation (m) | Field BM ID |
|---|---|---|---|---|---|---|---|
| 1 | Clearwater River below Broach Lake | CR-WC-MS-01 | Broach Lake east | 6398465.111 | 600437.410 | 527.604 | BROACH LK WEST BM3 REBAR |
| | | | | 6398466.136 | 600439.333 | 527.766 | BROACH LK WEST BM2 |
| | | | | 6398624.904 | 600436.801 | 528.356 | BROACH LK WEST CP101 |
| 2 | Broach Lake | CR-WB-MS-01 | Broach Lake west | 6398269.315 | 594670.637 | 528.250 | CAN NORTH BM1 |
| | | | | 6398271.122 | 594672.261 | 527.725 | CAN NORTH BM2 |
| | | | | 6398271.571 | 594670.321 | 528.068 | CAN NORTH REBAR BM3 |
| 3 | Clearwater River above Patterson Lake | CR-WC-MS-02 | North Patterson Lake Tributary | 6396407.687 | 607826.372 | 499.290 | NORTH PATTERSON TRIB SOUTH BM |
| | | | | 6396409.975 | 607824.797 | 499.186 | NORTH PATTERSON TRIB NORTH BM |
| | | | | 6396407.655 | 607825.052 | 499.344 | NORTH PATTERSON TRIB REBAR BM |
| 4 | Lake H | CR-WB-MS-02 | Lake H | 6394933.031 | 608527.545 | 501.642 | LK H BM1 |
| | | | | 6394925.401 | 608526.724 | 501.358 | LK H BM3 |
| | | | | 6394930.916 | 608522.481 | 500.675 | LK H BM2 REBAR |
| 5 | Lake G | CR-WB-MS-03 | Lake G | 6393993.920 | 607640.945 | 500.171 | LK G BM1 |
| | | | | 6393993.003 | 607648.552 | 500.250 | LK G BM3 |
| 6 | Patterson Lake | CR-WB-MS-04 | Patterson Lake at camp | 6391308.068 | 603277.066 | 500.351 | BM1 |
| | | | | 6391312.349 | 603278.840 | 500.585 | BM2 |
| | | | | 6391309.701 | 603270.978 | 500.139 | BM3 |
| | | | Patterson Lake West | 6389233.534 | 597607.292 | 500.840 | PATTERSON WEST NORTH BM |
| | | | | 6389229.266 | 597606.521 | 500.694 | PATTERSON WEST SOUTH BM |
| | | | | 6389231.895 | 597605.668 | 501.165 | PATTERSON WEST REBAR |

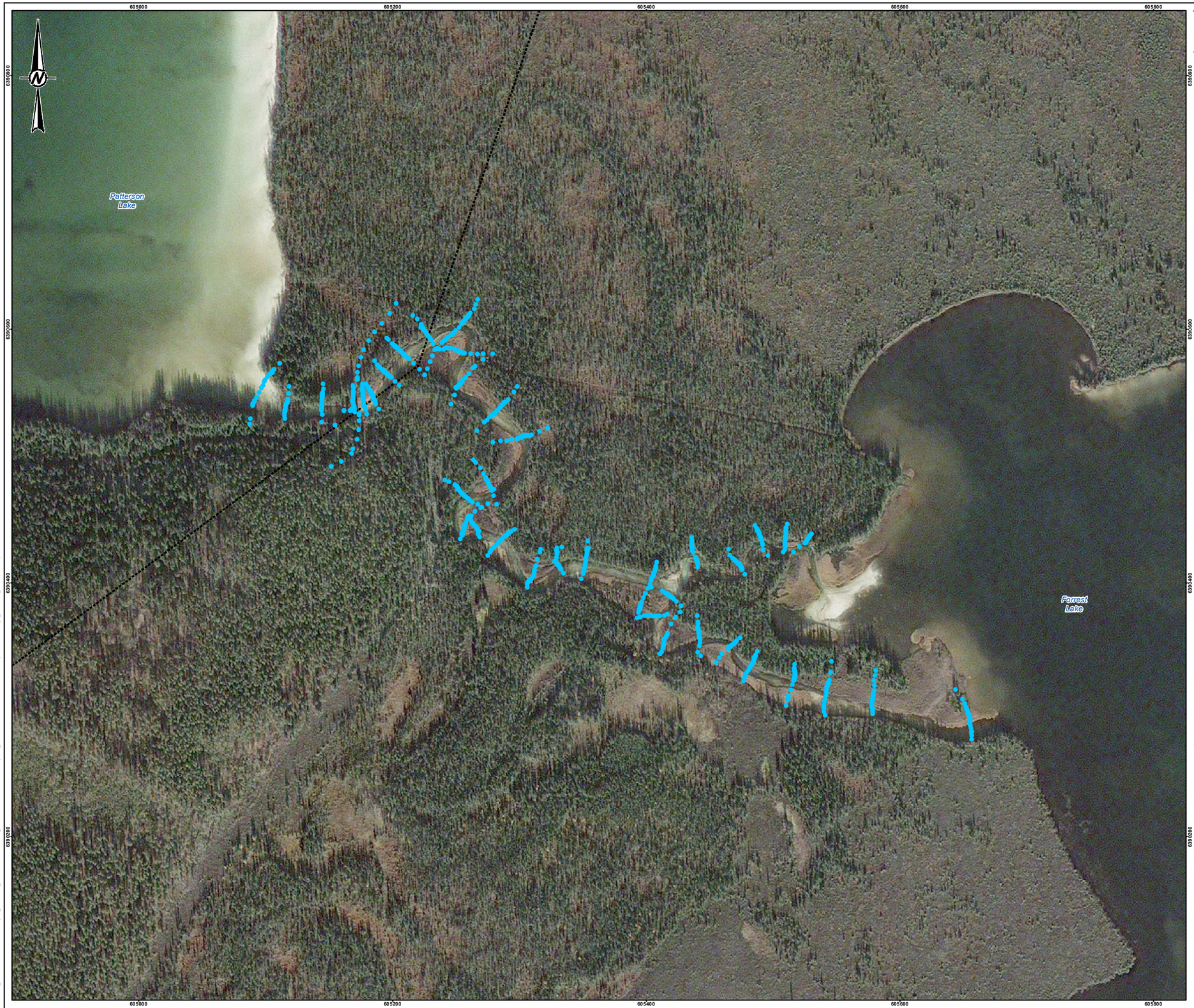
**Table 2: Hydrometric Station Geodetic BM Data**

| Sr. No. | Name | Station | Field Site ID | Northing (m) | Easting (m) | Elevation (m) | Field BM ID |
|---|---|---|---|---|---|---|---|
| 7 | Clearwater River below Patterson Lake | CR-WC-MS-03 | Clearwater at access road bridge | 6390535.777 | 605161.710 | 499.975 | RIVER BM WEST |
| | | | | 6390536.771 | 605167.781 | 499.569 | RIVER BM EAST |
| | | | | 6390535.707 | 605166.562 | 499.699 | RIVER BM REBAR |
| 9 | Forrest Lake | CR-WB-MS-05 | Forrest Lake / Lake F | 6388735.981 | 606636.803 | 500.175 | FOREST LK REBAR BM |
| | | | | 6388731.958 | 606644.797 | 500.278 | FOREST LK SOUTH BM |
| | | | | 6388745.306 | 606641.476 | 499.621 | FOREST LK NORTH BM |
| 11 | Beet Lake | CR-WB-MS-07 | Beet Lake | 6390290.831 | 611334.239 | 500.067 | REBAR BM |
| | | | | 6390289.754 | 611334.316 | 500.133 | SOUTH BM |
| | | | | 6390294.489 | 611337.066 | 499.238 | NORTH BM |
| 12 | Clearwater River below Beet Lake | CR-WC-MS-04 | Clearwater River DS of Beet Lake | 6390618.789 | 613268.095 | 498.741 | NORTH BM |
| | | | | 6390616.048 | 613267.102 | 498.750 | SOUTH BM |
| | | | | 6390617.622 | 613269.728 | 498.788 | REBAR BM |
| 13 | Tributary Inflow to Naomi Lake | CR-WC-TI-02 | North end of Naomi Lake | 6392557.918 | 613770.515 | 498.982 | NAOMI NORTH BM1 |
| | | | | 6392573.689 | 613765.014 | 499.175 | NAOMI NORTH GOLDER BM1 |
| | | | | 6392567.894 | 613764.181 | 499.139 | NAOMI NORTH REBAR BM |
| 14 | Naomi Lake | CR-WB-MS-08 | Northwest end of Naomi Lake | 6392109.920 | 613375.547 | 500.296 | NAOMI NW REBAR BM |
| | | | | 6392109.416 | 613383.590 | 498.847 | NAOMI NW SOUTH BM |
| 15 | Tributary Inflow Downstream of Naomi Lake | CR-WC-TI-03 | Clearwater Tributary DS of Naomi Lake | 6390951.279 | 615802.259 | 499.062 | NAOMI TRIB BM3 |
| | | | | 6390961.232 | 615808.257 | 498.912 | NAOMI TRIB BM1 |
| | | | | 6390967.717 | 615802.627 | 499.505 | NAOMI TRIB BM2 |

**Table 2: Hydrometric Station Geodetic BM Data**

| Sr. No. | Name | Station | Field Site ID | Northing (m) | Easting (m) | Elevation (m) | Field BM ID |
|---|---|---|---|---|---|---|---|
| 16 | Clearwater River below Naomi Lake | CR-WC-MS-05 | Clearwater River DS of Naomi Lake | 6390515.704 | 616453.763 | 498.855 | BM SOUTH |
| | | | | 6390516.746 | 616451.983 | 498.711 | BM NORTH |
| | | | | 6390517.983 | 616451.735 | 498.867 | BM REBAR |
| 19 | Clearwater River at Warner Rapids | CR-WC-MS-08 | Clearwater at 955 | 6307938.673 | 623078.305 | 400.339 | YELLOW TAG BM1 |

Notes: All coordinates are in UTM Zone 12, NAD83




**LEGEND**

- STREAM SURVEY POINT
- EXISTING ACCESS ROAD (APPROXIMATE)

0 50 100
1:3,000 METRES

**REFERENCE(S)**

1. IMAGERY OBTAINED FROM THE CLIENT, SEPT. 2018. IMAGERY DATE: 2015.
PROJECTION: UTM ZONE 12 DATUM: NAD 83

CLIENT

NexGen Energy Ltd.

PROJECT

ROOK 1 PROJECT

TITLE

**STREAM SURVEY LOCATIONS**

CONSULTANT

GOLDER

| | |
|---|---|
| YYYY-MM-DD | 2019-01-31 |
| DESIGNED | RP |
| PREPARED | LMS |
| REVIEWED | NPS |
| APPROVED | NPS |

| PROJECT NO. | PHASE | REV. | FIGURE |
|---|---|---|---|
| 1899581 | 2003 | 0 | **2** |

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm

PATH: G:_Clients\NexGen\Rook1\Project_SASK\99_PROJECTS\1899581_Rook1\StreamChannelSurveys\02_PRODUCTION\MXD\GeodeticSurveyTechMemo\Fig2_1899581_StreamSurveys.mxd

## 5.0 CLOSURE

We trust that this memo sufficiently documents the survey work completed in 2018 at the NexGen Rook I site.

Prepared By:

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*Water Resources Engineer*

Reviewed by:

Nathan Schmidt, Ph.D.
*Principal, Senior Water Resources Specialist*

KN/RWP/NPS/pls/jlb

https://golderassociates.sharepoint.com/sites/122721/project files/5 technical work/02_hydrology/03 - reporting/07 - 2020 hydrometric report/appendices/appendix a - geodetic survey summary/appendixb.docx

**APPENDIX B**

# Rating Curve Shift Reports

**Table B-1: 2018-20 Rating Shift Report for CR-WC-MS-01**

**SHIFT REPORT**

**STATION NUMBER CR-WC-MS-01 Clearwater River below Broach Lake**
**Date Processed: 2020-12-15 09:49:07 By JHogan**

**Rating QR # 001**

**SHIFT CURVES**
**2018-08-01 - 2020-09-30**
**DD 1, Discharge (m^3/s)**

| | STARTS | | | ENDS | INPUT | SHIFT | INPUT | SHIFT | INPUT | SHIFT |
|---|---|---|---|---|---|---|---|---|---|---|
| PRV: | 2018-05-01 | 7:09:24 | [UTC-06:00] | | 526.820 | 0.015 | | | | |
| 1 | 2018-09-15 | 7:09:24 | [UTC-06:00] | | 526.800 | 0.000 | | | | |
| 2 | 2020-05-03 | 7:09:24 | [UTC-06:00] | | 526.930 | -0.015 | | | | |
| 3 | 2020-06-06 | 14:09:24 | [UTC-06:00] | | 526.940 | 0.024 | | | | |
| 4 | 2020-09-24 | 14:09:24 | [UTC-06:00] | | 526.930 | -0.020 | | | | |

**Table B-2: 2018-20 Rating Shift Report for CR-WC-MS-02**

**SHIFT REPORT**

**STATION NUMBER CR-WC-MS-02 Clearwater river above Patterson lake**
**Date Processed: 2020-12-17 12:51:41 By JHogan**

**Rating QR # 001**

**SHIFT CURVES**
**2018-08-01 - 2020-09-30**
**DD 1, Discharge (m^3/s)**

| | STARTS | | ENDS | INPUT | SHIFT | INPUT | SHIFT | INPUT | SHIFT |
|---|---|---|---|---|---|---|---|---|---|
| PRV: | 2018-08-01 | 12:00:00 [UTC-06:00] | | 498.655 | -0.070 | | | | |
| 1 | 2018-08-01 | 12:00:00 [UTC-06:00] | | 498.655 | -0.070 | | | | |
| 2 | 2018-10-02 | 12:00:00 [UTC-06:00] | | 498.610 | -0.065 | | | | |
| 3 | 2019-03-25 | 12:00:00 [UTC-06:00] | | 498.550 | 0.000 | | | | |
| 4 | 2019-05-16 | 13:50:00 [UTC-06:00] | | 498.590 | -0.015 | | | | |
| 5 | 2019-06-03 | 13:50:00 [UTC-06:00] | | 498.650 | -0.004 | | | | |
| 6 | 2019-10-01 | 13:00:00 [UTC-06:00] | | 498.650 | -0.050 | | | | |
| 7 | 2020-04-15 | 12:00:00 [UTC-06:00] | | 498.600 | -0.050 | | | | |
| 8 | 2020-05-04 | 12:00:00 [UTC-06:00] | | 498.730 | 0.000 | | | | |
| 9 | 2020-06-04 | 12:00:00 [UTC-06:00] | | 498.880 | -0.120 | | | | |
| 10 | 2020-07-09 | 12:00:00 [UTC-06:00] | | 498.850 | -0.220 | | | | |
| 11 | 2020-08-19 | 12:00:00 [UTC-06:00] | | 498.940 | -0.220 | | | | |
| 12 | 2020-09-23 | 12:00:00 [UTC-06:00] | | 498.870 | -0.220 | | | | |

**Table B-3: 2018-20 Rating Shift Report for CR-WC-MS-03**

**SHIFT REPORT**

**STATION NUMBER CR-WC-MS-03 Clearwater River below Patterson Lake**
**Date Processed: 2020-12-13 14:52:20 By JHogan**

**Rating # 002**

**SHIFT CURVES**
**2018-08-01 - 2020-09-30**
**DD 1, Discharge (m^3/s)**

| | STARTS | | ENDS | INPUT | SHIFT | INPUT | SHIFT | INPUT | SHIFT |
|---|---|---|---|---|---|---|---|---|---|
| PRV: | 2018-08-04 | 0:00:00 [UTC-06:00] | | 498.580 | -0.029 | | | | |
| 1 | 2018-08-04 | 0:00:00 [UTC-06:00] | | 498.580 | -0.029 | | | | |
| 2 | 2019-04-15 | 0:00:00 [UTC-06:00] | | 498.500 | 0.000 | | | | |
| 3 | 2019-05-01 | 0:00:00 [UTC-06:00] | | 498.550 | 0.050 | | | | |
| 4 | 2019-05-15 | 0:00:00 [UTC-06:00] | | 498.530 | 0.100 | 498.850 | 0.000 | | |
| 5 | 2019-06-04 | 0:00:00 [UTC-06:00] | | 498.530 | 0.070 | 498.850 | 0.000 | | |
| 6 | 2019-06-30 | 0:00:00 [UTC-06:00] | | 498.560 | 0.000 | | | | |
| 7 | 2020-05-01 | 0:00:00 [UTC-06:00] | | 498.660 | 0.000 | | | | |
| 8 | 2020-06-02 | 0:00:00 [UTC-06:00] | | 498.760 | 0.016 | | | | |
| 9 | 2020-07-03 | 0:00:00 [UTC-06:00] | | 498.790 | 0.000 | | | | |
| 10 | 2020-08-15 | 0:00:00 [UTC-06:00] | | 498.840 | -0.052 | | | | |
| 11 | 2020-09-16 | 0:00:00 [UTC-06:00] | | 498.830 | -0.066 | | | | |

**Table B-4: 2018-20 Rating Shift Report for CR-WC-MS-04**

**SHIFT REPORT**

**STATION NUMBER CR-WC-MS-04 Clearwater River below Beet Lake**
**Date Processed: 2020-12-14 20:51:04 By JHogan**

**Rating QR # 001**

**SHIFT CURVES**
**2018-08-01 - 2020-09-30**
**DD 1, Discharge (m^3/s)**

| | STARTS | | ENDS | INPUT | SHIFT | INPUT | SHIFT | INPUT | SHIFT |
|---|---|---|---|---|---|---|---|---|---|
| PRV: | 2018-08-05 | 13:00:00 [UTC-06:00] | | 498.250 | -0.045 | | | | |
| 1 | 2018-08-05 | 13:00:00 [UTC-06:00] | | 498.250 | -0.045 | | | | |
| 2 | 2018-10-01 | 15:00:00 [UTC-06:00] | | 498.190 | 0.000 | | | | |
| 3 | 2019-03-28 | 10:36:00 [UTC-06:00] | | 498.355 | -0.125 | | | | |
| 4 | 2019-05-10 | 16:45:00 [UTC-06:00] | | 0.100 | 0.000 | | | | |
| 5 | 2019-06-01 | 16:45:00 [UTC-06:00] | | 498.150 | 0.075 | | | | |
| 6 | 2019-07-10 | 16:45:00 [UTC-06:00] | | 498.300 | 0.000 | | | | |
| 7 | 2019-10-02 | 16:45:00 [UTC-06:00] | | 498.285 | -0.083 | | | | |
| 8 | 2020-05-03 | 15:00:00 [UTC-06:00] | | 498.425 | -0.016 | | | | |
| 9 | 2020-06-05 | 13:00:00 [UTC-06:00] | | 498.400 | 0.000 | | | | |
| 10 | 2020-07-10 | 14:00:00 [UTC-06:00] | | 498.460 | -0.060 | | | | |
| 11 | 2020-08-20 | 14:00:00 [UTC-06:00] | | 498.500 | -0.150 | | | | |
| 12 | 2020-09-25 | 14:00:00 [UTC-06:00] | | 498.510 | -0.110 | | | | |

**Table B-5: 2018-20 Rating Shift Report for CR-WC-MS-05**

**SHIFT REPORT**

**STATION NUMBER CR-WC-MS-05 Clearwater River Below Naomi Lake**
**Date Processed: 2020-12-15 12:42:32 By JHogan**

**Rating QR # 001**

**SHIFT CURVES**
**2018-08-01 - 2020-09-30**
**DD 1, Discharge (m^3/s)**

| | STARTS | | | ENDS | INPUT | SHIFT | INPUT | SHIFT | INPUT | SHIFT |
|---|---|---|---|---|---|---|---|---|---|---|
| PRV: | 2018-08-03 | 0:00:00 | [UTC-06:00] | | 498.180 | -0.100 | | | | |
| 1 | 2018-08-03 | 0:00:00 | [UTC-06:00] | | 498.180 | -0.100 | | | | |
| 2 | 2018-10-01 | 0:00:00 | [UTC-06:00] | | 498.120 | -0.037 | | | | |
| 3 | 2019-03-28 | 0:00:00 | [UTC-06:00] | | 0.100 | 0.000 | | | | |
| 4 | 2019-05-16 | 0:00:00 | [UTC-06:00] | | 498.100 | 0.000 | | | | |
| 5 | 2019-06-01 | 13:00:00 | [UTC-06:00] | | 498.075 | 0.000 | | | | |
| 6 | 2019-10-02 | 11:00:00 | [UTC-06:00] | | 498.240 | -0.110 | | | | |
| 7 | 2020-05-03 | 11:00:00 | [UTC-06:00] | | 498.200 | 0.000 | | | | |
| 8 | 2020-06-05 | 11:00:00 | [UTC-06:00] | | 498.200 | 0.000 | | | | |
| 9 | 2020-07-10 | 11:00:00 | [UTC-06:00] | | 498.390 | -0.088 | | | | |
| 10 | 2020-08-20 | 11:00:00 | [UTC-06:00] | | 498.460 | -0.180 | | | | |
| 11 | 2020-09-25 | 11:00:00 | [UTC-06:00] | | 498.480 | -0.128 | | | | |

**Table B-6: 2018-20 Rating Shift Report for CR-WC-MS-06**

**SHIFT REPORT**

**STATION NUMBER CR-WC-MS-06 Clearwater River above Mirror River Confluence**
**Date Processed: 2020-12-14 12:21:54 By JHogan**

**Rating QR # 001**

**SHIFT CURVES**
**2018-08-01 - 2020-09-30**
**DD 1, Discharge (m^3/s)**

| | STARTS | | ENDS | INPUT | SHIFT | INPUT | SHIFT | INPUT | SHIFT |
|---|---|---|---|---|---|---|---|---|---|
| PRV: | 2018-08-01 | 14:23:55 [UTC-06:00] | | 97.220 | -0.390 | | | | |
| 1 | 2018-08-01 | 14:23:55 [UTC-06:00] | | 97.220 | -0.390 | | | | |
| 2 | 2018-09-29 | 12:54:00 [UTC-06:00] | | 97.800 | -0.255 | | | | |
| 3 | 2019-05-17 | 14:23:55 [UTC-06:00] | | 97.200 | 0.000 | | | | |
| 4 | 2019-07-16 | 14:23:55 [UTC-06:00] | | 97.300 | 0.000 | | | | |
| 5 | 2019-08-18 | 14:23:55 [UTC-06:00] | | 97.380 | -0.150 | | | | |
| 6 | 2019-08-30 | 14:23:55 [UTC-06:00] | | 97.570 | -0.360 | | | | |
| 7 | 2019-09-29 | 14:23:55 [UTC-06:00] | | 97.570 | -0.475 | | | | |
| 8 | 2020-06-07 | 14:23:55 [UTC-06:00] | | 97.900 | 0.000 | | | | |
| 9 | 2020-07-11 | 14:23:55 [UTC-06:00] | | 97.800 | -0.110 | | | | |
| 10 | 2020-08-21 | 14:23:55 [UTC-06:00] | | 97.800 | -0.290 | | | | |
| 11 | 2020-09-22 | 14:23:55 [UTC-06:00] | | 97.960 | -0.400 | | | | |

**Table B-7: 2018-20 Rating Shift Report for CR-WC-MS-08**

**SHIFT REPORT**

**STATION NUMBER CR-WC-MS-08 Clearwater River at Lloyd Lake**
**Date Processed: 2020-12-22 09:58:30 By JHogan**

**Rating # HQ4**

**SHIFT CURVES**
**2020-06-07 - 2020-09-30**
**DD 1, Discharge (m^3/s)**

| | STARTS | | ENDS | INPUT | SHIFT | INPUT | SHIFT | INPUT | SHIFT |
|---|---|---|---|---|---|---|---|---|---|
| PRV: | 2020-06-07 | 8:54:37 [UTC-06:00] | | 96.765 | 0.000 | | | | |
| 1 | 2020-06-07 | 8:54:37 [UTC-06:00] | | 96.765 | 0.000 | | | | |
| 2 | 2020-07-01 | 8:54:37 [UTC-06:00] | | 96.700 | -0.040 | | | | |
| 3 | 2020-08-23 | 8:54:37 [UTC-06:00] | | 96.664 | -0.040 | | | | |
| 4 | 2020-09-24 | 8:54:37 [UTC-06:00] | | 96.700 | 0.000 | | | | |

**Table B-8: 2018-19 Rating Shift Report for CR-WC-TI-01**

**SHIFT REPORT**

**STATION NUMBER CR-WC-TI-01 Tributary Inflow above Forrest Lake**
**Date Processed: 2020-12-22 14:02:08 By jdonnelly**

**Rating QR # 001**

**SHIFT CURVES**
**2018-08-01 - 2020-09-30**
**DD 1, Discharge (m^3/s)**

| | STARTS | | ENDS | INPUT | SHIFT | INPUT | SHIFT | INPUT | SHIFT |
|---|---|---|---|---|---|---|---|---|---|
| PRV: | 2018-08-01 | 0:00:00 [UTC-06:00] | | 499.380 | -0.140 | | | | |
| 1 | 2018-08-01 | 0:00:00 [UTC-06:00] | | 499.380 | -0.140 | | | | |
| 2 | 2018-09-10 | 0:00:00 [UTC-06:00] | | 499.360 | 0.000 | | | | |
| 3 | 2019-05-10 | 0:00:00 [UTC-06:00] | | 499.330 | -0.045 | | | | |
| 4 | 2019-05-15 | 23:00:00 [UTC-06:00] | | 499.330 | -0.045 | | | | |
| 5 | 2019-05-16 | 3:00:00 [UTC-06:00] | | 499.400 | -0.200 | | | | |
| 6 | 2019-05-31 | 0:00:00 [UTC-06:00] | | 499.600 | -0.570 | | | | |

**Table B-9: 2018-20 Rating Shift Report for CR-WC-TI-02**

**SHIFT REPORT**

**STATION NUMBER CR-WC-TI-02 Tributary Inflow to Naomi Lake**
**Date Processed: 2020-12-15 12:32:32 By JHogan**

**Rating QR # 001**

**SHIFT CURVES**
**2018-08-01 - 2020-09-30**
**DD 1, Discharge (m^3/s)**

| | STARTS | | ENDS | INPUT | SHIFT | INPUT | SHIFT | INPUT | SHIFT |
|---|---|---|---|---|---|---|---|---|---|
| PRV: | 2018-08-01 | 14:46:21 [UTC-07:00] | | 498.250 | -0.105 | | | | |
| 1 | 2018-08-01 | 14:46:21 [UTC-07:00] | | 498.250 | -0.105 | | | | |
| 2 | 2018-10-01 | 4:00:00 [UTC-07:00] | | 498.220 | -0.010 | | | | |
| 3 | 2019-10-02 | 4:00:00 [UTC-07:00] | | 498.300 | 0.000 | | | | |
| 4 | 2020-04-20 | 4:00:00 [UTC-07:00] | | 498.400 | -0.100 | | | | |
| 5 | 2020-05-20 | 4:00:00 [UTC-07:00] | | 498.500 | 0.000 | | | | |
| 6 | 2020-06-06 | 4:00:00 [UTC-07:00] | | 498.400 | 0.000 | | | | |
| 7 | 2020-07-13 | 8:00:00 [UTC-07:00] | | 498.500 | -0.220 | | | | |
| 8 | 2020-08-21 | 8:00:00 [UTC-07:00] | | 498.500 | -0.120 | | | | |

**Table B-10: 2018-20 Rating Shift Report for CR-WC-TI-03**

**SHIFT REPORT**

**STATION NUMBER CR-WC-TI-03 Tributary Inflow D/S of Naomi Lake**
**Date Processed: 2020-12-16 09:21:14 By JHogan**

**Rating # 002B**

**SHIFT CURVES**
**2018-08-01 - 2020-09-30**
**DD 1, Discharge (m^3/s)**

| | STARTS | | ENDS | INPUT | SHIFT | INPUT | SHIFT | INPUT | SHIFT |
|---|---|---|---|---|---|---|---|---|---|
| PRV: | 2018-08-02 | 13:00:00 [UTC-07:00] | | 498.335 | -0.130 | | | | |
| 1 | 2018-08-02 | 13:00:00 [UTC-07:00] | | 498.335 | -0.130 | | | | |
| 2 | 2018-10-02 | 12:00:00 [UTC-07:00] | | 498.310 | -0.014 | | | | |
| 3 | 2019-06-01 | 14:40:00 [UTC-07:00] | | 498.250 | 0.000 | | | | |
| 4 | 2019-10-02 | 12:00:00 [UTC-07:00] | | 498.419 | -0.034 | | | | |
| 5 | 2020-05-04 | 11:00:00 [UTC-07:00] | | 498.510 | 0.000 | | | | |
| 6 | 2020-06-05 | 15:00:00 [UTC-07:00] | | 498.490 | -0.013 | | | | |
| 7 | 2020-07-10 | 11:00:00 [UTC-07:00] | | 498.550 | -0.096 | | | | |
| 8 | 2020-08-20 | 11:00:00 [UTC-07:00] | | 498.600 | -0.140 | | | | |
| 9 | 2020-09-26 | 9:31:00 [UTC-07:00] | | 498.590 | -0.078 | | | | |

**APPENDIX C**

# Snow Survey Data

| Year | Point (Object ID) | Easting | Northing | Summarized Landcover | Slope Classification | Aspect Classification | Mean Depth (cm) | Depth in Snow Tube (cm) | Snow Sample Mass (kg) | Snow Sample Volume ($cm^3$) | Density ($g/cm^3$) | SWE (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 to 16 April 2018 | 022 | 605195 | 6396914 | Jack Pine, Tall Shrub | Low Slope | W | 68.3 | 74 | 0.56 | 4,299 | 0.13 | 89.0 |
| | 023 | 605210 | 6396733 | Open Canopy, Jack Pine, Ecosite C | Low Slope | W | 70.0 | 70 | 0.54 | 4,066 | 0.13 | 93.0 |
| | 024 | 605063 | 6396756 | Open Canopy, Mature Jack Pine, Ecosite C | 10-33 | S | 41.0 | 40 | 0.42 | 2,324 | 0.18 | 74.1 |
| | 025 | 605041 | 6396727 | Black Spruce, Dominant Treed Bog | Low Slope | S | 64.0 | 58 | 0.49 | 3,369 | 0.15 | 93.1 |
| | 026 | 605271 | 6396897 | Shrub, Jack Pine | 10-33 | E | 74.0 | 66 | 0.45 | 3,834 | 0.12 | 86.9 |
| | 027 | 605307 | 6396956 | Shrub, Jack Pine | 10-33 | W | 63.3 | 68 | 0.30 | 3,950 | 0.08 | 48.1 |
| | 028 | 603021 | 6396557 | Shrub, Jack Pine | Low Slope | N | 76.7 | 72 | 0.43 | 4,182 | 0.10 | 78.8 |
| | 029 | 602970 | 6396510 | Open Canopy, Jack Pine | 10-33 | N | 63.0 | 63 | 0.52 | 3,660 | 0.14 | 89.5 |
| | 030 | 603075 | 6396531 | Open Canopy, Jack Pine | 10-33 | W | 30.7 | 26 | 0.14 | 1,510 | 0.09 | 28.4 |
| | 031 | 602759 | 6396451 | Open Canopy, Jack Pine | Low Slope | N | 54.3 | 60 | 0.57 | 3,485 | 0.16 | 88.9 |
| | 032 | 602627 | 6396347 | Open Canopy, Jack Pine | 10-33 | E | 67.7 | 70 | 0.53 | 4,066 | 0.13 | 88.2 |
| | 033 | 602118 | 6396202 | Open Canopy, Jack Pine | 10-33 | S | 46.3 | 42 | 0.52 | 2,440 | 0.21 | 98.8 |
| | 034 | 602073 | 6396165 | Tall Shrub, Jack Pine | 10-33 | N | 70.7 | 76 | 0.60 | 4,415 | 0.14 | 96.0 |
| | 035 | 601848 | 6396064 | Tall Shrub, Jack Pine | 10-33 | N | 61.3 | 62 | 0.56 | 3,601 | 0.16 | 95.4 |
| | 036 | 601560 | 6396027 | Tall Shrub, Jack Pine | 10-33 | S | 66.7 | 64 | 0.52 | 3,718 | 0.14 | 93.2 |
| | 037 | 600399 | 6395883 | Tall Shrub, Jack Pine | 10-33 | W | 73.0 | 80 | 0.78 | 4,647 | 0.17 | 122.5 |
| | 038 | 594337 | 6398222 | Open Canopy, Jack Pine | 10-33 | N | 53.0 | 60 | 0.52 | 3,485 | 0.15 | 79.1 |
| | 039 | 594324 | 6398205 | Open Canopy, Jack Pine | Low Slope | N | 52.3 | 52 | 0.55 | 3,021 | 0.18 | 95.3 |
| | 041 | 596123 | 6390222 | Tall Shrub, Jack Pine | 10-33 | W | 59.0 | 60 | 0.39 | 3,485 | 0.11 | 66.0 |
| | 043 | 596064 | 6390076 | Tall Shrub, Jack Pine | 10-33 | S | 34.7 | 42 | 0.34 | 2,440 | 0.14 | 48.3 |
| | 044 | 605261 | 6390814 | Black Spruce Bog | Low Slope | N | 57.7 | 72 | 0.66 | 4,182 | 0.16 | 91.0 |
| | 045 | 604013 | 6391415 | Black Spruce, Jack Pine | 10-33 | S | 56.7 | 58 | 0.59 | 3,369 | 0.18 | 99.2 |
| | 046 | 603237 | 6391297 | Lake | Lake | E | 22.0 | 23 | 0.19 | 1,336 | 0.14 | 31.3 |
| | 047 | 603293 | 6391367 | Black Spruce | Low Slope | S | 51.3 | 61 | 0.45 | 3,543 | 0.13 | 65.2 |
| | 048 | 603373 | 6391488 | Black Spruce | Low Slope | S | 39.3 | 42 | 0.32 | 2,440 | 0.13 | 51.6 |
| | 049 | 603384 | 6391332 | Lake Edge | Lake | S | 60.7 | 64 | 0.65 | 3,718 | 0.17 | 106.1 |
| | 050 | 603284 | 6391310 | Lake Edge | Lake | S | 51.0 | 44 | 0.39 | 2,556 | 0.15 | 77.8 |
| | 051 | 604523 | 6393494 | Tall Shrub, Jack Pine | Low Slope | W | 84.0 | 88 | 0.80 | 5,112 | 0.16 | 131.5 |
| | 052 | 603057 | 6391181 | Black Spruce | 10-33 | S | 23.7 | 30 | 0.29 | 1,743 | 0.17 | 39.4 |
| | 053 | 603028 | 6391181 | Black Spruce | 10-33 | S | 39.7 | 42 | 0.34 | 2,440 | 0.14 | 55.3 |
| | 054 | 603038 | 6391157 | Lake Shore | Lake | W | 32.0 | 42 | 0.40 | 2,440 | 0.16 | 52.5 |
| | 055 | 599785 | 6387109 | Tall Shrub, Jack Pine (See Comments) | 10-33 | W | 66.0 | 62 | 0.42 | 3,601 | 0.12 | 77.0 |
| | 056 | 596371 | 6387008 | Black Spruce | 10-33 | N | 58.7 | 64 | 0.52 | 3,718 | 0.14 | 82.1 |
| | 057 | 596158 | 6387264 | Open Canopy, Jack Pine | 10-33 | S | 40.7 | 55 | 0.45 | 3,195 | 0.14 | 57.3 |
| 21 to 23 March, 2019 | 1 | 604825 | 6391544 | Jack pine | 10-33 | S | 24.0 | 23 | 0.30 | 1,016 | 0.30 | 70.9 |
| | 2 | 601287 | 6390389 | Jack pine -partially closed | Low slope | S | 24.3 | 27 | 0.34 | 1,193 | 0.29 | 69.4 |
| | 3 | 601346 | 6390391 | Jack pine | Low slope | S | 33.0 | 34 | 0.45 | 1,502 | 0.30 | 98.9 |
| | 4 | 603634 | 6391521 | Mature jack pine | Low slope | S | 32.3 | 34 | 0.24 | 1,502 | 0.16 | 51.7 |
| | 5 | 603493 | 6396640 | Mature jack pine - open | Low slope | E | 27.7 | 28 | 0.25 | 1,237 | 0.20 | 55.9 |
| | 6 | 603258 | 6396584 | Mature jack pine - open | Low slope | E | 23.3 | 25 | 0.23 | 1,104 | 0.21 | 48.6 |
| | 7 | 603838 | 6396818 | Mature jack pine - open | Low slope | E | 46.7 | 49 | 0.33 | 2,165 | 0.15 | 71.1 |
| | 8 | 601034 | 6395746 | Jack pine -open | Low slope | S | 35.0 | 36 | 0.23 | 1,590 | 0.14 | 50.6 |
| | 9 | 597761 | 6395978 | Jack pine | Low slope | S | 27.7 | 35 | 0.38 | 1,546 | 0.25 | 68.0 |
| | 10 | 604999 | 6391440 | Jack pine | Low slope | S | 37.3 | 42 | 0.29 | 1,856 | 0.16 | 58.3 |
| | 11 | 604945 | 6391483 | Jack pine | Low slope | S | 27.3 | 28 | 0.27 | 1,237 | 0.22 | 59.7 |
| | 12 | 605144 | 6391396 | Jack pine | Low slope | W | 28.7 | 30 | 0.45 | 1,325 | 0.34 | 97.3 |
| | 13 | 605126 | 6391350 | Jack pine | Low slope | W | 40.7 | 45 | 0.16 | 1,988 | 0.08 | 32.7 |
| | 14 | 605024 | 6390434 | Mature black spruce -open | Low slope | N | 33.0 | 34 | 0.29 | 1,502 | 0.19 | 63.7 |
| | 15 | 604997 | 6390417 | Mature black spruce -open | Low slope | N | 49.3 | 49 | 0.40 | 2,165 | 0.18 | 91.2 |
| | 16 | 601367 | 6388182 | Mature jack pine- semi open | Low slope | N | 29.3 | 31 | 0.24 | 1,370 | 0.18 | 51.4 |
| | 17 | 601327 | 6388186 | Mature jack pine- open | Low slope | N | 26.0 | 29 | 0.19 | 1,281 | 0.15 | 38.6 |
| | 18 | 607968 | 6396339 | Old burn jack pine -very open | Flat | N/A | 14.7 | 16 | 0.27 | 707 | 0.38 | 56.0 |
| | 19 | 608008 | 6396292 | Old burn jack pine -very open | Flat | N/A | 34.3 | 35 | 0.46 | 1,546 | 0.30 | 102.1 |
| | 20 | 597270 | 6385290 | Jack pine | Flat | N/A | 35.7 | 35 | 0.31 | 1,546 | 0.20 | 71.5 |
| | 21 | 597296 | 6385327 | Jack pine | Flat | N/A | 41.3 | 42 | 0.40 | 1,856 | 0.22 | 89.1 |
| | 22 | 594282 | 6397398 | Mature jack pine -open | Flat | N/A | 21.7 | 22 | 0.13 | 972 | 0.13 | 29.0 |
| | 23 | 594302 | 6397357 | Mature jack pine -open | Flat | N/A | 28.7 | 30 | 0.24 | 1,325 | 0.18 | 51.9 |
| | 24 | 595705 | 6388752 | Mature jack pine -open | Flat | N/A | 30.0 | 36 | 0.47 | 1,590 | 0.30 | 88.7 |
| | 25 | 595718 | 6396248 | Jack pine -open | 10-33 | W | 35.3 | 37 | 0.40 | 1,635 | 0.24 | 86.5 |
| | 26 | 594900 | 6395568 | Mature jack pine - open | Low slope | N | 23.3 | 25 | 0.24 | 1,104 | 0.22 | 50.7 |
| | 27 | 595731 | 6396302 | Jack pine -partially closed | 10-33 | N | 37.7 | 41 | 0.44 | 1,811 | 0.24 | 91.5 |
| | 28 | 598041 | 6396035 | Mature jack pine - open | Low slope | E | 45.0 | 49 | 0.28 | 2,165 | 0.13 | 58.2 |
| | 29 | 598309 | 6396014 | Mature jack pine - open | Low slope | E | 29.0 | 30 | 0.25 | 1,325 | 0.19 | 54.7 |
| | 30 | 597839 | 6392158 | Mature mixed -open | Low slope | E | 17.3 | 18 | 0.29 | 795 | 0.36 | 63.2 |
| | 31 | 597955 | 6392569 | Mature mixed -open | Low slope | E | 29.7 | 30 | 0.38 | 1,325 | 0.29 | 85.1 |
| | 32 | 599282 | 6395948 | Jack pine -open | Low slope | W | 27.3 | 30 | 0.34 | 1,325 | 0.26 | 70.1 |
| | 33 | 599325 | 6395942 | Jack pine -open | Low slope | W | 28.7 | 30 | 0.37 | 1,325 | 0.28 | 80.0 |
| | 34 | 600552 | 6395865 | Jack pine -open | Low slope | W | 34.0 | 36 | 0.32 | 1,590 | 0.20 | 68.4 |
| | 35 | 600607 | 6395859 | Jack pine -open | Low slope | W | 30.0 | 29 | 0.51 | 1,281 | 0.40 | 119.4 |
| | 36 | 601435 | 6396005 | Mature jack pine - open | Low slope | E | 37.0 | 37 | 0.32 | 1,635 | 0.20 | 72.4 |
| | 37 | 601439 | 6396045 | Mature jack pine - open | Low slope | E | 29.7 | 31 | 0.26 | 1,370 | 0.19 | 56.3 |
| | 38 | 602229 | 6396027 | Mature jack pine - open | Low slope | E | 43.0 | 47 | 0.44 | 2,076 | 0.21 | 91.1 |
| | 39 | 602116 | 6396080 | Jack pine - open | Low slope | N | 36.3 | 37 | 0.40 | 1,635 | 0.24 | 88.9 |
| | 40 | 603283 | 6391304 | Lake edge | Flat | N/A | 26.3 | 26 | 0.33 | 1,149 | 0.29 | 75.7 |
| | 41 | 598382 | 6391073 | Lake | Flat | N/A | 31.3 | 32 | 0.77 | 1,414 | 0.54 | 170.7 |
| | 42 | 602998 | 6390366 | Lake | Flat | N/A | 14.7 | 16 | 0.07 | 707 | 0.10 | 14.5 |
| | 43 | 599727 | 6389685 | Lake | Flat | N/A | 15.0 | 16 | 0.21 | 707 | 0.30 | 44.6 |
| | 44 | 607396 | 6395868 | Lake | Flat | N/A | 31.3 | 32 | 0.27 | 1,414 | 0.19 | 59.8 |
| | 45 | 599569 | 6392809 | Lake | Flat | N/A | 24.7 | 26 | 0.37 | 1,149 | 0.32 | 79.5 |
| | 46 | 601448 | 6393624 | Lake | Flat | N/A | 23.3 | 24 | 0.11 | 1,060 | 0.10 | 24.2 |
| | 47 | 608751 | 6395117 | Lake | Flat | N/A | 13.3 | 15 | 0.33 | 663 | 0.50 | 66.4 |
| | 48 | 594989 | 6398179 | Lake | Flat | N/A | 23.7 | 24 | 0.39 | 1,060 | 0.37 | 87.1 |
| | 49 | 595857 | 6398163 | Lake | Flat | N/A | 34.7 | 35 | 0.55 | 1,546 | 0.36 | 123.3 |
| | 50 | 596694 | 6398016 | Lake | Flat | N/A | 17.0 | 18 | 0.38 | 795 | 0.48 | 81.2 |

Note: All coordinates are in UTM Zone 12 NAD 83. cm = centimetres; kg=kilograms; $cm^3$ = cubic centimetres; $g/cm^3$ = grams per cubic centimetre

**APPENDIX D**

# Hydrometric Monitoring Daily Data

**Table C-1: 2018-19 Daily Precipitation at NexGen Rook I Site**

| DATE | 2018 | | | | | | | | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | 0.0 | 0.0 | 0.0 | 0.0 | 6.4 | 1.3 | 18.3 | 0.0 | 2.9 | 0.3 | 0.9 | 0.0 | 1.6 | 0.2 | 0.5 | 1.7 | 0.4 | 1.1 | 8.0 | 10.1 | 0.2 | 0.0 | ND | ND |
| 2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 6.1 | 2.1 | 0.0 | 2.2 | 2.2 | 0.1 | 0.0 | 0.1 | 0.1 | 0.1 | 1.0 | 3.2 | 3.5 | 9.6 | 19.9 | 0.9 | 0.0 | ND | ND |
| 3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.7 | 4.3 | 0.0 | 1.9 | 1.6 | 3.6 | 0.0 | 0.2 | 0.3 | 0.1 | 1.1 | 1.2 | 12.6 | 0.2 | 26.0 | 0.3 | 0.0 | ND | ND |
| 4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 5.2 | 0.6 | 0.0 | 0.0 | 0.5 | 0.3 | 0.0 | 0.3 | 0.5 | 0.1 | 1.0 | 2.4 | 7.5 | 0.0 | 0.4 | 12.8 | 0.0 | ND | ND |
| 5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5.3 | 0.0 | 0.0 | 0.0 | 3.5 | 0.7 | 0.0 | 0.4 | 0.4 | 0.1 | 0.2 | 0.8 | 1.0 | 0.1 | 7.1 | 2.9 | 0.6 | ND | ND |
| 6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.8 | 0.0 | 2.5 | 0.8 | 0.0 | 0.1 | 0.4 | 0.1 | 0.9 | 0.8 | 0.4 | 0.2 | 0.0 | 0.2 | 1.5 | ND | ND |
| 7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.1 | 8.8 | 0.0 | 0.2 | 0.4 | 0.0 | 0.7 | 0.3 | 0.2 | 1.4 | 0.7 | 0.1 | 0.1 | 0.0 | 3.6 | 0.6 | ND | ND |
| 8 | 0.0 | 0.0 | 0.0 | 0.0 | 1.6 | 0.0 | 0.0 | 3.7 | 0.6 | 0.2 | 0.9 | 0.0 | 1.3 | 0.2 | 0.2 | 1.1 | 0.7 | 1.2 | 1.6 | 2.7 | 0.2 | 3.5 | ND | ND |
| 9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 28.5 | 0.2 | 0.9 | 0.0 | 0.2 | 0.2 | 0.1 | 0.1 | 0.6 | 0.3 | 0.2 | 18.0 | 0.2 | 0.4 | ND | ND |
| 10 | 0.0 | 0.0 | 1.7 | 0.0 | 0.0 | 11.9 | 0.0 | 0.0 | 0.0 | 0.3 | 1.1 | 0.0 | 0.0 | 0.2 | 29.9 | 1.3 | 1.0 | 0.6 | 0.0 | 0.1 | 0.2 | 0.3 | ND | ND |
| 11 | 0.0 | 0.0 | 6.8 | 0.0 | 0.0 | 2.6 | 0.0 | 0.0 | 0.0 | 0.1 | 0.4 | 0.0 | 0.1 | 0.2 | 0.1 | 0.6 | 0.5 | 0.2 | 0.1 | 0.2 | 0.1 | 0.8 | ND | ND |
| 12 | 0.0 | 0.0 | 4.4 | 0.0 | 0.0 | 3.2 | 0.0 | 0.0 | 0.0 | 0.3 | 0.1 | 0.0 | 0.0 | 0.1 | 0.3 | 0.3 | 1.2 | 0.7 | 0.1 | 1.5 | 0.2 | 0.5 | ND | ND |
| 13 | 0.0 | 0.0 | 0.0 | 0.0 | 2.7 | 2.4 | 4.6 | 0.0 | 0.0 | 0.4 | 1.7 | 0.0 | 0.2 | 0.5 | 0.3 | 0.2 | 3.0 | 1.9 | 2.1 | 0.1 | 0.6 | 0.3 | ND | ND |
| 14 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 1.6 | 8.8 | 0.0 | 0.0 | 0.1 | 0.2 | 0.0 | 0.2 | 0.4 | 0.5 | 0.1 | 0.9 | 0.9 | 0.2 | 2.7 | 0.2 | 0.1 | ND | ND |
| 15 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.3 | 0.0 | 0.0 | 0.2 | 0.8 | 0.0 | 0.5 | 0.3 | 0.2 | 0.3 | 0.9 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | ND | ND |
| 16 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.4 | 0.2 | 0.0 | 0.3 | 0.0 | 1.1 | 0.3 | 0.5 | 0.2 | 0.1 | 73.2 | 0.0 | 8.2 | ND | ND |
| 17 | 0.0 | 0.0 | 0.0 | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 | 0.0 | 0.3 | 0.4 | 0.2 | 0.9 | 0.8 | 0.2 | 0.1 | 18.9 | 0.1 | 1.0 | ND | ND |
| 18 | 0.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 0.0 | 4.4 | 0.2 | 0.8 | 0.0 | 0.0 | 0.3 | 0.3 | 0.2 | 0.4 | 0.9 | 0.1 | 0.3 | 4.1 | 0.1 | 0.3 | ND | ND |
| 19 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.9 | 0.1 | 0.6 | 0.0 | 0.0 | 0.2 | 0.1 | 0.2 | 0.6 | 0.8 | 0.1 | 0.1 | 1.3 | 0.1 | 1.3 | ND | ND |
| 20 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.8 | 0.0 | 0.0 | 0.0 | 0.3 | 0.3 | 5.0 | 0.7 | 0.1 | 0.2 | 0.1 | 1.6 | 2.5 | ND | ND |
| 21 | 0.0 | 0.0 | 0.0 | 2.5 | 0.0 | 0.0 | 8.2 | 0.0 | 0.3 | 0.2 | 0.0 | 0.0 | 0.0 | 0.2 | 0.4 | 0.5 | 0.6 | 0.3 | 0.1 | 0.0 | 0.1 | 0.3 | ND | ND |
| 22 | 0.0 | 0.0 | 0.0 | 5.3 | 0.0 | 0.0 | 7.6 | 0.0 | 0.2 | 0.3 | 0.0 | 0.0 | 0.2 | 0.1 | 0.3 | 0.2 | 0.8 | 0.2 | 0.1 | 1.2 | 0.1 | 0.2 | ND | ND |
| 23 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 10.1 | 0.6 | 0.3 | 0.2 | 0.0 | 0.0 | 0.3 | 0.2 | 0.5 | 2.6 | 0.7 | 4.2 | 0.1 | 0.2 | 12.2 | 0.9 | ND | ND |
| 24 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 18.4 | 0.1 | 0.3 | 0.0 | 0.0 | 0.3 | 0.2 | 0.3 | 0.9 | 0.8 | 0.7 | 15.0 | 2.4 | 1.1 | 1.8 | ND | ND |
| 25 | 0.0 | 0.0 | 0.0 | 0.0 | 11.0 | 0.0 | 0.0 | 1.2 | 4.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.2 | 0.1 | 0.8 | 1.1 | 0.1 | 5.0 | 0.5 | 4.3 | 1.3 | ND | ND |
| 26 | 0.0 | 0.0 | 0.0 | 0.0 | 6.8 | 14.6 | 0.0 | 0.0 | 3.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.8 | 0.6 | 0.1 | 2.3 | 6.0 | 0.2 | 1.3 | ND | ND |
| 27 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.6 | 0.0 | 0.0 | 2.0 | 0.3 | 0.0 | 0.0 | 0.3 | 0.1 | 0.5 | 0.8 | 0.5 | 0.1 | 9.3 | 3.8 | 0.8 | ND | ND | ND |
| 28 | 0.0 | 0.0 | 0.0 | 0.2 | 0.3 | 7.7 | 0.0 | 0.2 | 1.6 | 0.4 | 0.0 | 0.0 | 0.5 | 0.3 | 0.1 | 0.8 | 0.3 | 0.1 | 0.0 | 3.2 | 0.9 | ND | ND | ND |
| 29 | 0 | - | 0 | 0 | 0 | 15.8 | 0.6 | 0.8 | 6.3 | 0.1 | 0.0 | 0.0 | 0.2 | - | 0.3 | 2.2 | 0.6 | 2.0 | 0.1 | 0.1 | 0.2 | ND | ND | ND |
| 30 | 0 | - | 0 | 0 | 0 | 0.1 | 0.0 | 17.9 | 0.1 | 1.4 | 0.0 | 0.0 | 0.0 | - | 0.5 | 3.9 | 0.9 | 4.1 | 0.1 | 0.2 | 0.2 | ND | ND | ND |
| 31 | 0 | - | 0 | - | 0 | - | 0 | 5.6 | - | 0.6 | - | 0.0 | 0.1 | - | 0.3 | - | 0.6 | - | 0.1 | 2.2 | - | ND | - | ND |

Note: Precipitation data in table is in millimetres. Prior to September 15, 2018 precipitation was rainfall monitored by a tipping bucket. As a result solid precipitaiton before that time would be under reported. Following September 15, 2018 a Geonor total precipitation gauge was installed.

ND= No data

**Table C-2: 2018 Daily Precipitation at ECCC Fort McMurry Station (ID: 3062697)**

| DATE | 2018 | | | | | | | | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | 0.0 | ND | ND | 0.0 | 0.5 | 1.4 | 0.0 | 1.2 | 2.3 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | ND | 0.2 | 7.0 | 12.7 | 1.0 | 0.0 | 0.0 | 0.0 | ND |
| 2 | 0.0 | ND | 0.0 | 0.0 | 0.0 | 4.3 | 11.4 | 0.0 | ND | ND | 0.0 | 0.0 | 0.0 | 2.2 | 0.0 | ND | 0.0 | 3.5 | 5.1 | 11.5 | 0.8 | 0.0 | 0.0 | ND |
| 3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | ND | 0.0 | 0.0 | ND | 1.1 | 0.0 | 0.0 | 0.1 | 0.0 | 1.1 | 5.1 | 6.3 | 0.4 | 0.4 | 0.0 | 12.2 | 0.6 | ND |
| 4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | ND | ND | 0.0 | 0.0 | ND | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.6 | 0.4 | 0.8 | 2.9 | 0.0 | 0.0 | ND |
| 5 | 0.0 | 0.0 | 1.6 | 0.0 | 0.0 | ND | 0.0 | 0.0 | 0.0 | ND | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 7.6 | 0.7 | 4.8 | 0.0 | ND |
| 6 | ND | 0.0 | ND | 0.0 | 0.0 | ND | ND | 0.5 | 0.0 | ND | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.6 | 0.4 | 0.0 | 0.0 | 0.5 | 0.0 | 0.0 | 0.0 | ND |
| 7 | ND | 0.0 | 0.0 | 0.0 | 0.0 | ND | 6.5 | 0.0 | 0.8 | 0.0 | 0.0 | 0.0 | 0.7 | 0.0 | 0.0 | 2.6 | 0.0 | 0.0 | 0.0 | 0.0 | 11.4 | 2.4 | 0.0 | ND |
| 8 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | ND | ND | 0.0 | 16.8 | 0.0 | 0.0 | ND | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5.5 | 6.4 | 0.8 | 0.0 | 0.0 | ND |
| 9 | 5.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.4 | 0.0 | 0.0 | ND | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 0.4 | 2.3 | 0.0 | 0.0 | 0.0 | ND |
| 10 | ND | 0.0 | 0.0 | 0.0 | 0.0 | 1.5 | 0.0 | 0.0 | ND | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5.3 | 1.2 | 0.2 | 0.0 | 1.5 | 0.0 | 0.0 | 0.0 | 0.0 | ND |
| 11 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | ND | 0.0 | 0.0 | ND | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.0 | 0.0 | 0.0 | ND |
| 12 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 14.0 | ND | 0.0 | ND | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.4 | 0.6 | 0.0 | 0.0 | 0.0 | ND |
| 13 | 0.0 | ND | 0.0 | 0.0 | 0.0 | 3.3 | 1.4 | 0.0 | ND | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.2 | 0.7 | 2.0 | 0.0 | 0.0 | 0.4 | ND |
| 14 | 0.0 | ND | 0.0 | 0.0 | 0.0 | ND | 6.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 16.6 | 5.8 | 1.0 | 0.0 | 0.0 | 0.2 | ND |
| 15 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.8 | 0.0 | 5.5 | 0.0 | 3.7 | 1.3 | ND |
| 16 | 0.0 | 0.0 | 0.0 | ND | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 41.6 | 0.0 | 2.2 | 0.0 | ND |
| 17 | 0.0 | 0.0 | 0.0 | ND | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.2 | 3.9 | ND |
| 18 | ND | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 7.0 | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 23.3 | 0.0 | 0.2 | 0.0 | 2.0 | ND |
| 19 | ND | ND | ND | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.8 | 0.0 | 2.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.0 | ND |
| 20 | 0.0 | 0.0 | ND | 0.0 | 0.0 | 0.0 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 | 0.8 | 0.0 | 1.6 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | ND |
| 21 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 54.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 1.0 | ND | ND |
| 22 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | ND | 6.0 | 0.0 | 0.0 | 0.0 | ND | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 7.5 | 0.0 | 2.7 | 0.0 | 0.0 | ND | ND |
| 23 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | ND | 14.3 | 1.9 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 8.4 | 0.0 | 0.0 | 2.2 | 1.2 | ND | ND |
| 24 | 0.0 | 0.0 | 2.7 | 0.0 | 0.0 | 0.0 | 12.5 | ND | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 9.0 | 15.0 | 0.0 | 0.0 | 0.0 | ND | ND |
| 25 | 0.0 | 0.0 | 0.0 | 0.0 | 0.8 | 12.5 | 0.0 | ND | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.6 | 0.0 | ND | 0.0 | ND | ND |
| 26 | ND | 0.0 | ND | 0.0 | 3.2 | ND | 0.0 | ND | ND | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.7 | 0.7 | 0.0 | 0.0 | ND | ND |
| 27 | ND | 0.0 | ND | 0.0 | 0.0 | 22.5 | 0.0 | 0.0 | ND | 0.0 | 0.0 | 0.0 | 3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.3 | 7.9 | 0.6 | 0.0 | 1.7 | ND | ND |
| 28 | ND | 0.0 | 0.0 | 0.0 | 0.0 | 12.4 | 0.0 | 0.5 | ND | 0.0 | 0.0 | 1.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 18.1 | 0.0 | 3.4 | 0.0 | 0.2 | ND | ND |
| 29 | 0.0 | - | 0.0 | 0.0 | 0.0 | 3.5 | 0.0 | 7.9 | ND | 0.8 | 0.0 | 0.0 | 0.1 | - | 0.0 | 0.5 | 0.0 | 21.2 | 0.0 | ND | 0.0 | 0.0 | ND | ND |
| 30 | ND | - | 0.0 | 0.0 | 0.0 | 4.2 | 4.3 | 3.4 | ND | 0.0 | 0.0 | 0.0 | 0.0 | - | 0.0 | 0.2 | 0.0 | 1.2 | 2.2 | 0.0 | 0.0 | 1.6 | ND | ND |
| 31 | 0.0 | - | 0.0 | - | 0.0 | - | 0.0 | 5.5 | - | 0.0 | - | 0.0 | 0.0 | - | 0.0 | - | 0.0 | - | 0.0 | 0.8 | - | 0.2 | - | ND |

Note: Precipitation data in table is in millimetres.
ND= No data

**Table C-3: 2018-19 Daily Precipitation at ECCC Key lake Station (ID: 4063755 & 4063753)**

| DATE | 2018 | | | | | | | | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | 0.0 | 0.0 | 0.0 | 0.0 | 1.2 | 9.4 | 0.8 | 0.0 | 4.4 | 0.0 | 0.0 | 0.2 | 2.0 | 0.2 | 0.4 | 3.8 | 0.2 | 0.0 | 5.4 | 0.0 | 0.0 | 0.0 | 0.3 | ND |
| 2 | 0.0 | 0.0 | 0.2 | 0.0 | 2.0 | 6.4 | 0.0 | 0.0 | 0.4 | 2.2 | 0.0 | 0.0 | 1.2 | 0.7 | 0.0 | 0.5 | 0.0 | 7.9 | 4.7 | 0.0 | 0.0 | 0.0 | 0.1 | ND |
| 3 | 0.0 | 1.0 | 0.0 | 0.0 | 0.4 | 1.4 | 0.4 | 17.4 | 13.4 | 0.5 | 3.1 | 0.0 | 0.2 | 0.7 | 0.0 | 0.2 | 3.5 | 4.1 | 0.6 | 44.6 | 3.2 | 0.0 | 1.6 | ND |
| 4 | 0.0 | 0.2 | 0.0 | 0.4 | 0.4 | 3.6 | 5.8 | 0.0 | 0.2 | 0.0 | 0.7 | 0.4 | 0.2 | 0.0 | 0.0 | 0.7 | 1.6 | 6.0 | 0.9 | 1.4 | 1.2 | 0.1 | 0.0 | ND |
| 5 | 0.0 | 0.0 | 5.2 | 0.0 | 0.0 | 1.9 | 0.0 | 1.8 | 0.0 | 3.8 | 0.2 | 0.4 | 0.4 | 0.0 | 0.0 | 0.0 | 0.2 | 0.8 | 0.0 | 0.0 | 10.5 | 0.7 | 0.0 | ND |
| 6 | 4.2 | 0.2 | 0.6 | 0.0 | 0.0 | 0.2 | 2.0 | 4.0 | 0.0 | 0.2 | 0.6 | 0.0 | 1.6 | 0.0 | 0.2 | 0.0 | 0.2 | 0.2 | 0.0 | 2.4 | 0.2 | 3.7 | 0.1 | ND |
| 7 | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 6.2 | 0.0 | 1.2 | 0.2 | 0.8 | 0.0 | 4.6 | 0.0 | 0.0 | 1.6 | 1.2 | 25.6 | 0.0 | 0.0 | 2.8 | 0.7 | 0.1 | ND |
| 8 | 3.0 | 0.0 | 0.0 | 0.0 | 7.2 | 0.0 | 0.0 | 0.0 | 1.2 | 0.2 | 0.0 | 0.0 | 2.9 | 0.0 | 0.2 | 2.0 | 0.2 | 6.1 | 0.7 | 0.0 | 0.0 | 2.7 | 0.8 | ND |
| 9 | 3.4 | 1.8 | 1.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 11.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.2 | 5.2 | 2.9 | 0.0 | 0.3 | 0.0 | ND |
| 10 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 12.6 | 0.0 | 0.0 | 0.4 | 0.0 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 8.2 | 2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.6 | ND |
| 11 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.0 | 0.0 | 1.6 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | ND |
| 12 | 0.0 | 1.4 | ND | 0.0 | 0.4 | 1.4 | 0.0 | 0.0 | 6.4 | 0.0 | 0.2 | 0.2 | 0.0 | 1.3 | 1.5 | 0.2 | 0.4 | 0.0 | 0.0 | 0.6 | 0.9 | 0.0 | 0.1 | ND |
| 13 | 0.0 | 1.2 | ND | 0.0 | 0.0 | 0.0 | 1.0 | 0.0 | 1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.6 | 0.2 | 0.0 | 0.6 | 0.0 | 2.5 | 6.9 | 0.1 | 0.5 | 0.9 | ND |
| 14 | 0.0 | 0.0 | 0.0 | 3.4 | 0.2 | 0.0 | 36.6 | 0.0 | 0.0 | 0.2 | 0.7 | 0.0 | 9.2 | 0.0 | 0.2 | 0.3 | 0.2 | 9.8 | 13.0 | 5.4 | 0.1 | 0.2 | 0.0 | ND |
| 15 | 0.0 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 1.2 | 0.0 | 0.0 | 0.8 | 0.6 | 0.9 | 0.2 | 0.0 | 0.2 | 0.2 | 0.0 | 1.4 | 0.0 | 0.0 | 0.0 | 0.2 | 4.3 | ND |
| 16 | 0.0 | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 | 3.4 | 0.0 | 0.0 | 0.7 | 0.2 | 0.2 | 0.2 | 0.0 | 0.2 | 0.0 | 0.0 | 0.2 | 0.0 | 20.8 | 0.0 | 0.5 | 0.0 | ND |
| 17 | 0.0 | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 25.4 | 0.7 | 3.0 | 1.0 | ND |
| 18 | 0.4 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.5 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.0 | 1.6 | 3.2 | ND |
| 19 | 2.0 | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 6.6 | 0.0 | 0.3 | 0.0 | 0.0 | 0.2 | 0.7 | 0.0 | 1.7 | 0.0 | 0.0 | 0.0 | 1.8 | 0.0 | 0.1 | 0.0 | ND |
| 20 | 2.6 | 0.0 | 2.6 | 0.0 | 0.0 | 0.0 | 4.6 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.4 | 3.7 | ND | ND |
| 21 | 0.0 | 0.0 | 1.8 | 0.6 | 0.0 | 3.6 | 22.9 | 0.0 | 0.0 | 0.3 | 1.2 | 4.8 | 0.2 | 0.2 | 0.0 | 0.2 | 0.0 | 4.3 | 0.0 | 0.0 | 0.0 | 0.3 | ND | ND |
| 22 | 1.4 | 0.0 | 0.2 | 8.6 | 0.0 | 0.0 | 3.4 | 0.0 | 0.0 | 0.0 | 0.0 | 2.7 | 0.2 | 0.6 | 0.0 | 0.0 | 0.0 | 2.4 | 0.0 | 0.0 | 0.0 | 0.0 | ND | ND |
| 23 | 0.0 | 1.6 | 2.4 | 0.0 | 0.0 | 0.0 | 5.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.2 | 0.0 | 0.0 | 0.0 | 2.5 | 0.0 | 0.0 | 14.3 | 0.1 | ND | ND |
| 24 | 0.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 13.2 | 0.0 | 0.2 | 0.2 | 0.0 | 0.2 | 0.2 | 0.0 | 0.4 | 0.0 | 0.4 | 5.4 | 1.7 | 1.7 | 0.7 | ND | ND |
| 25 | 0.0 | 0.0 | 0.4 | 0.0 | 11.6 | 0.0 | 0.0 | 1.8 | 11.8 | 0.0 | 0.2 | 0.9 | 0.0 | 0.0 | 0.0 | 0.2 | 0.3 | 5.0 | 1.4 | 0.0 | 0.3 | 0.0 | ND | ND |
| 26 | 0.0 | 0.0 | 0.8 | 0.0 | 0.2 | 27.7 | 0.0 | 0.0 | 2.0 | 0.0 | 0.0 | 1.3 | 0.0 | 0.7 | 0.0 | 1.4 | 0.2 | ND | 0.0 | 4.7 | 1.7 | 0.5 | ND | ND |
| 27 | 0.0 | 2.0 | 0.0 | 0.0 | 0.0 | 1.2 | 0.0 | 0.0 | 0.0 | 0.8 | 0.0 | 1.0 | 0.2 | 1.1 | 0.2 | 0.2 | 0.2 | ND | 0.0 | 0.0 | 0.0 | 1.1 | ND | ND |
| 28 | 0.0 | 0.0 | 0.4 | 0.0 | 5.6 | 2.5 | 0.0 | 3.4 | ND | 0.2 | 0.0 | 0.8 | 0.2 | 1.0 | 2.6 | 0.0 | 0.0 | 0.0 | 0.2 | 1.1 | 4.5 | 0.0 | ND | ND |
| 29 | 12.4 | - | 0.0 | 0.0 | 0.0 | 7.4 | 2.0 | 3.4 | 0.0 | 0.0 | 1.5 | 0.2 | 0.2 | - | 0.2 | 0.2 | 0.0 | 22.0 | 0.0 | 0.0 | 0.1 | 0.0 | ND | ND |
| 30 | 8.8 | - | 0.0 | 0.2 | 0.0 | 11.6 | 2.4 | 4.1 | 0.2 | 0.4 | 0.2 | 0.0 | 0.7 | - | 0.2 | 6.1 | 0.0 | 3.4 | 2.1 | 1.3 | 0.0 | 0.0 | ND | ND |
| 31 | 0.0 | - | 0.0 | - | 0.0 | - | 2.6 | 7.7 | - | 0.2 | - | 0.0 | 1.9 | - | 0.7 | - | 0.2 | - | 0.4 | 0.3 | - | 0.4 | - | ND |

Note: Precipitation data in table is in millimetres. Station ID: 4063755 Jan 1, 2018 - Sep 29, 2018. Station ID: 4063753 Sep 30, 2018 - Nov 19, 2019.

ND= No data

**Table C-4: 2018-19 Daily Water Surface Elevation for CR-WB-MS-01**

| DATE | 2018 | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | ND | 526.687 | ND | ND | ND | ND | ND | ND | ND | ND | 526.734 | 526.724 | 526.692 | 526.773 | ND | ND | ND |
| 2 | ND | 526.690 | ND | ND | ND | ND | ND | ND | ND | ND | 526.736 | 526.706 | 526.679 | 526.763 | ND | ND | ND |
| 3 | ND | 526.686 | ND | ND | ND | ND | ND | ND | ND | ND | 526.755 | 526.731 | 526.709 | 526.759 | ND | ND | ND |
| 4 | ND | 526.686 | ND | ND | ND | ND | ND | ND | ND | ND | 526.765 | 526.726 | 526.699 | 526.769 | ND | ND | ND |
| 5 | ND | 526.676 | ND | ND | ND | ND | ND | ND | ND | ND | 526.749 | 526.731 | 526.723 | 526.738 | ND | ND | ND |
| 6 | ND | 526.676 | ND | ND | ND | ND | ND | ND | ND | ND | 526.754 | 526.724 | 526.735 | 526.767 | ND | ND | ND |
| 7 | ND | 526.658 | ND | ND | ND | ND | ND | ND | ND | ND | 526.736 | 526.724 | 526.714 | 526.774 | ND | ND | ND |
| 8 | 526.737 | 526.656 | ND | ND | ND | ND | ND | ND | ND | ND | 526.744 | 526.723 | 526.719 | 526.767 | ND | ND | ND |
| 9 | 526.744 | 526.674 | ND | ND | ND | ND | ND | ND | ND | ND | 526.736 | 526.719 | 526.720 | 526.739 | ND | ND | ND |
| 10 | 526.744 | 526.691 | ND | ND | ND | ND | ND | ND | ND | ND | 526.738 | 526.714 | 526.729 | 526.816 | ND | ND | ND |
| 11 | 526.743 | 526.688 | ND | ND | ND | ND | ND | ND | ND | ND | 526.734 | 526.717 | 526.726 | 526.781 | ND | ND | ND |
| 12 | 526.730 | 526.685 | ND | ND | ND | ND | ND | ND | ND | ND | 526.727 | 526.712 | 526.723 | 526.792 | ND | ND | ND |
| 13 | 526.721 | 526.683 | ND | ND | ND | ND | ND | ND | ND | ND | 526.723 | 526.705 | 526.722 | 526.780 | ND | ND | ND |
| 14 | 526.710 | 526.675 | ND | ND | ND | ND | ND | ND | ND | 526.785 | 526.732 | 526.717 | 526.721 | 526.773 | ND | ND | ND |
| 15 | 526.702 | 526.668 | ND | ND | ND | ND | ND | ND | ND | 526.789 | 526.739 | 526.704 | 526.722 | 526.781 | ND | ND | ND |
| 16 | 526.704 | 526.672 | ND | ND | ND | ND | ND | ND | ND | 526.762 | 526.735 | 526.712 | 526.720 | 526.783 | ND | ND | ND |
| 17 | 526.712 | 526.662 | ND | ND | ND | ND | ND | ND | ND | 526.773 | 526.735 | 526.711 | 526.738 | 526.803 | ND | ND | ND |
| 18 | 526.707 | 526.665 | ND | ND | ND | ND | ND | ND | ND | 526.771 | 526.748 | 526.714 | 526.771 | 526.776 | ND | ND | ND |
| 19 | 526.696 | 526.661 | ND | ND | ND | ND | ND | ND | ND | 526.769 | 526.714 | 526.688 | 526.781 | 526.776 | ND | ND | ND |
| 20 | 526.685 | 526.662 | ND | ND | ND | ND | ND | ND | ND | 526.768 | 526.734 | 526.686 | 526.784 | 526.773 | ND | ND | ND |
| 21 | 526.696 | 526.654 | ND | ND | ND | ND | ND | ND | ND | 526.767 | 526.771 | 526.704 | 526.789 | 526.776 | ND | ND | ND |
| 22 | 526.690 | 526.647 | ND | ND | ND | ND | ND | ND | ND | 526.757 | 526.737 | 526.698 | 526.763 | 526.766 | ND | ND | ND |
| 23 | 526.709 | 526.646 | ND | ND | ND | ND | ND | ND | ND | 526.775 | 526.726 | 526.699 | 526.764 | 526.769 | ND | ND | ND |
| 24 | 526.697 | 526.651 | ND | ND | ND | ND | ND | ND | ND | 526.753 | 526.732 | 526.698 | 526.765 | 526.772 | ND | ND | ND |
| 25 | 526.713 | 526.653 | ND | ND | ND | ND | ND | ND | ND | 526.761 | 526.726 | 526.698 | 526.760 | 526.784 | ND | ND | ND |
| 26 | 526.680 | 526.660 | ND | ND | ND | ND | ND | ND | ND | 526.736 | 526.729 | 526.693 | 526.767 | 526.781 | ND | ND | ND |
| 27 | 526.684 | 526.670 | ND | ND | ND | ND | ND | ND | ND | 526.752 | 526.725 | 526.705 | 526.760 | 526.772 | ND | ND | ND |
| 28 | 526.669 | 526.648 | ND | ND | ND | ND | ND | ND | ND | 526.746 | 526.726 | 526.701 | 526.772 | 526.759 | ND | ND | ND |
| 29 | 526.667 | 526.653 | ND | ND | ND | ND | - | ND | ND | 526.748 | 526.755 | 526.712 | 526.770 | 526.76638 | ND | ND | ND |
| 30 | 526.684 | 526.65367 | ND | ND | ND | ND | - | ND | ND | 526.745 | 526.71599 | 526.703 | 526.775 | ND | ND | ND | ND |
| 31 | 526.693 | - | ND | - | ND | ND | - | ND | - | 526.732 | - | 526.698 | 526.766 | - | ND | - | ND |

Note: elevations in table are in metres (arbitrary datum).

- = day not present in month; ND = no data.

**Table C-5: 2018-19 Daily Water Surface Elevation for CR-WB-MS-02**

| DATE | 2018 | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | ND | 498.600 | 498.571 | ND | ND | ND | ND | ND | ND | ND | 498.615 | 498.615 | 498.570 | 498.674 | 498.644 | ND | ND |
| 2 | ND | 498.609 | 498.567 | ND | ND | ND | ND | ND | ND | ND | 498.635 | 498.619 | 498.585 | 498.674 | 498.649 | ND | ND |
| 3 | ND | 498.601 | ND | ND | ND | ND | ND | ND | ND | ND | 498.640 | 498.609 | 498.608 | 498.674 | 498.641 | ND | ND |
| 4 | ND | 498.608 | ND | ND | ND | ND | ND | ND | ND | ND | 498.652 | 498.605 | 498.601 | 498.683 | 498.604 | ND | ND |
| 5 | 498.652 | 498.586 | ND | ND | ND | ND | ND | ND | ND | ND | 498.651 | 498.605 | 498.606 | 498.685 | ND | ND | ND |
| 6 | 498.664 | 498.593 | ND | ND | ND | ND | ND | ND | ND | ND | 498.645 | 498.601 | 498.603 | 498.684 | ND | ND | ND |
| 7 | 498.668 | 498.591 | ND | ND | ND | ND | ND | ND | ND | ND | 498.657 | 498.603 | 498.593 | 498.693 | ND | ND | ND |
| 8 | 498.662 | 498.592 | ND | ND | ND | ND | ND | ND | ND | ND | 498.637 | 498.594 | 498.597 | 498.673 | ND | ND | ND |
| 9 | 498.662 | 498.612 | ND | ND | ND | ND | ND | ND | ND | ND | 498.632 | 498.594 | 498.607 | 498.677 | ND | ND | ND |
| 10 | 498.655 | 498.609 | ND | ND | ND | ND | ND | ND | ND | ND | 498.631 | 498.592 | 498.596 | 498.677 | ND | ND | ND |
| 11 | 498.661 | 498.613 | ND | ND | ND | ND | ND | ND | ND | ND | 498.631 | 498.591 | 498.602 | 498.675 | ND | ND | ND |
| 12 | 498.638 | 498.604 | ND | ND | ND | ND | ND | ND | ND | ND | 498.637 | 498.588 | 498.605 | 498.682 | ND | ND | ND |
| 13 | 498.632 | 498.599 | ND | ND | ND | ND | ND | ND | ND | ND | 498.634 | 498.584 | 498.602 | 498.691 | ND | ND | ND |
| 14 | 498.631 | 498.592 | ND | ND | ND | ND | ND | ND | ND | ND | 498.636 | 498.594 | 498.606 | 498.677 | ND | ND | ND |
| 15 | 498.639 | 498.593 | ND | ND | ND | ND | ND | ND | ND | ND | 498.630 | 498.583 | 498.614 | 498.675 | ND | ND | ND |
| 16 | 498.620 | 498.583 | ND | ND | ND | ND | ND | ND | ND | 498.637 | 498.625 | 498.580 | 498.672 | 498.676 | ND | ND | ND |
| 17 | 498.621 | 498.590 | ND | ND | ND | ND | ND | ND | ND | 498.644 | 498.629 | 498.581 | 498.668 | 498.672 | ND | ND | ND |
| 18 | 498.624 | 498.597 | ND | ND | ND | ND | ND | ND | ND | 498.632 | 498.619 | 498.583 | 498.667 | 498.668 | ND | ND | ND |
| 19 | 498.613 | 498.581 | ND | ND | ND | ND | ND | ND | ND | 498.652 | 498.623 | 498.574 | 498.662 | 498.662 | ND | ND | ND |
| 20 | 498.607 | 498.581 | ND | ND | ND | ND | ND | ND | ND | 498.642 | 498.617 | 498.570 | 498.654 | 498.673 | ND | ND | ND |
| 21 | 498.615 | 498.574 | ND | ND | ND | ND | ND | ND | ND | 498.637 | 498.619 | 498.567 | 498.660 | 498.673 | ND | ND | ND |
| 22 | 498.613 | 498.571 | ND | ND | ND | ND | ND | ND | ND | 498.638 | 498.621 | 498.570 | 498.661 | 498.664 | ND | ND | ND |
| 23 | 498.614 | 498.560 | ND | ND | ND | ND | ND | ND | ND | 498.644 | 498.618 | 498.570 | 498.656 | 498.677 | ND | ND | ND |
| 24 | 498.596 | 498.575 | ND | ND | ND | ND | ND | ND | ND | 498.640 | 498.622 | 498.592 | 498.672 | 498.669 | ND | ND | ND |
| 25 | 498.591 | 498.566 | ND | ND | ND | ND | ND | ND | ND | 498.639 | 498.613 | 498.571 | 498.670 | 498.664 | ND | ND | ND |
| 26 | 498.592 | 498.574 | ND | ND | ND | ND | ND | ND | ND | 498.642 | 498.610 | 498.580 | 498.673 | 498.663 | ND | ND | ND |
| 27 | 498.592 | 498.587 | ND | ND | ND | ND | ND | ND | ND | 498.637 | 498.612 | 498.589 | 498.683 | 498.653 | ND | ND | ND |
| 28 | 498.593 | 498.571 | ND | ND | ND | ND | ND | ND | ND | 498.643 | 498.607 | 498.573 | 498.683 | 498.644 | ND | ND | ND |
| 29 | 498.600 | 498.583 | ND | ND | ND | ND | - | ND | ND | 498.642 | 498.612 | 498.566 | 498.667 | 498.641 | ND | ND | ND |
| 30 | 498.601 | 498.573 | ND | ND | ND | ND | - | ND | ND | 498.626 | 498.620 | 498.568 | 498.675 | 498.638 | ND | ND | ND |
| 31 | 498.616 | - | ND | - | ND | ND | - | ND | - | 498.629 | - | 498.563 | 498.665 | - | ND | - | ND |

Note: elevations in table are in metres (arbitrary datum).

- = day not present in month; ND = no data.

**Table C-6: 2018-19 Daily Water Surface Elevation for CR-WB-MS-03**

| DATE | 2018 | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | ND | 498.295 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 498.310 | 498.270 | 498.396 | ND | ND | ND |
| 2 | ND | 498.293 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 498.317 | 498.277 | 498.410 | ND | ND | ND |
| 3 | ND | 498.321 | ND | ND | ND | ND | ND | ND | ND | ND | 498.297 | 498.305 | 498.304 | 498.384 | ND | ND | ND |
| 4 | 498.345 | 498.304 | ND | ND | ND | ND | ND | ND | ND | ND | 498.315 | 498.300 | 498.302 | 498.396 | ND | ND | ND |
| 5 | 498.336 | 498.286 | ND | ND | ND | ND | ND | ND | ND | ND | 498.321 | 498.294 | 498.319 | 498.402 | ND | ND | ND |
| 6 | 498.354 | 498.289 | ND | ND | ND | ND | ND | ND | ND | ND | 498.323 | 498.295 | 498.303 | 498.415 | ND | ND | ND |
| 7 | 498.340 | 498.290 | ND | ND | ND | ND | ND | ND | ND | ND | 498.321 | 498.290 | 498.306 | 498.408 | ND | ND | ND |
| 8 | 498.341 | 498.285 | ND | ND | ND | ND | ND | ND | ND | ND | 498.354 | 498.291 | 498.307 | 498.411 | ND | ND | ND |
| 9 | 498.330 | 498.285 | ND | ND | ND | ND | ND | ND | ND | ND | 498.315 | 498.287 | 498.310 | 498.412 | ND | ND | ND |
| 10 | 498.344 | 498.314 | ND | ND | ND | ND | ND | ND | ND | ND | 498.303 | 498.288 | 498.352 | 498.413 | ND | ND | ND |
| 11 | 498.343 | 498.311 | ND | ND | ND | ND | ND | ND | ND | ND | 498.308 | 498.284 | 498.324 | 498.401 | ND | ND | ND |
| 12 | 498.330 | 498.305 | ND | ND | ND | ND | ND | ND | ND | ND | 498.303 | 498.280 | 498.317 | 498.396 | ND | ND | ND |
| 13 | 498.327 | 498.309 | ND | ND | ND | ND | ND | ND | ND | ND | 498.311 | 498.273 | 498.327 | 498.411 | ND | ND | ND |
| 14 | 498.257 | 498.300 | ND | ND | ND | ND | ND | ND | ND | ND | 498.312 | 498.281 | 498.315 | 498.406 | ND | ND | ND |
| 15 | 498.318 | 498.264 | ND | ND | ND | ND | ND | ND | ND | ND | 498.316 | 498.275 | 498.318 | 498.422 | ND | ND | ND |
| 16 | 498.318 | 498.289 | ND | ND | ND | ND | ND | ND | ND | ND | 498.309 | 498.280 | 498.321 | 498.404 | ND | ND | ND |
| 17 | 498.314 | 498.286 | ND | ND | ND | ND | ND | ND | ND | ND | 498.308 | 498.265 | 498.401 | 498.405 | ND | ND | ND |
| 18 | 498.319 | 498.297 | ND | ND | ND | ND | ND | ND | ND | ND | 498.312 | 498.275 | 498.384 | 498.402 | ND | ND | ND |
| 19 | 498.308 | 498.282 | ND | ND | ND | ND | ND | ND | ND | ND | 498.311 | 498.283 | 498.383 | 498.402 | ND | ND | ND |
| 20 | 498.311 | 498.275 | ND | ND | ND | ND | ND | ND | ND | ND | 498.307 | 498.277 | 498.376 | 498.393 | ND | ND | ND |
| 21 | 498.291 | 498.269 | ND | ND | ND | ND | ND | ND | ND | ND | 498.304 | 498.259 | 498.383 | 498.389 | ND | ND | ND |
| 22 | 498.284 | 498.258 | ND | ND | ND | ND | ND | ND | ND | ND | 498.304 | 498.270 | 498.350 | 498.392 | ND | ND | ND |
| 23 | 498.285 | 498.230 | ND | ND | ND | ND | ND | ND | ND | ND | 498.309 | 498.269 | 498.380 | 498.386 | ND | ND | ND |
| 24 | 498.287 | 498.216 | ND | ND | ND | ND | ND | ND | ND | ND | 498.304 | 498.269 | 498.406 | 498.416 | ND | ND | ND |
| 25 | 498.293 | 498.251 | ND | ND | ND | ND | ND | ND | ND | ND | 498.305 | 498.260 | 498.391 | 498.399 | ND | ND | ND |
| 26 | 498.287 | 498.252 | ND | ND | ND | ND | ND | ND | ND | ND | 498.306 | 498.283 | 498.389 | 498.392 | ND | ND | ND |
| 27 | 498.286 | 498.268 | ND | ND | ND | ND | ND | ND | ND | ND | 498.304 | 498.284 | 498.393 | 498.402 | ND | ND | ND |
| 28 | 498.297 | 498.238 | ND | ND | ND | ND | ND | ND | ND | ND | 498.302 | 498.288 | 498.398 | 498.395 | ND | ND | ND |
| 29 | 498.277 | 498.233 | ND | ND | ND | ND | - | ND | ND | ND | 498.298 | 498.279 | 498.410 | 498.385 | ND | ND | ND |
| 30 | 498.277 | 498.239 | ND | ND | ND | ND | - | ND | ND | ND | 498.307 | 498.275 | 498.402 | 498.371 | ND | ND | ND |
| 31 | 498.324 | - | ND | - | ND | ND | - | ND | - | ND | - | 498.259 | 498.393 | - | ND | - | ND |

Note: elevations in table are in metres (arbitrary datum).

- = day not present in month; ND = no data.

**Table C-7: 2018-19 Daily Water Surface Elevation for CR-WB-MS-04**

| DATE | 2018 | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | ND | 498.241 | 498.201 | ND | ND | ND | ND | ND | ND | ND | ND | 498.293 | 498.221 | 498.340 | 498.327 | ND | ND |
| 2 | ND | 498.252 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 498.254 | 498.229 | 498.344 | 498.326 | ND | ND |
| 3 | ND | 498.244 | ND | ND | ND | ND | ND | ND | ND | ND | 498.237 | 498.260 | 498.251 | 498.348 | ND | ND | ND |
| 4 | ND | 498.256 | ND | ND | ND | ND | ND | ND | ND | ND | 498.252 | 498.259 | 498.277 | 498.344 | ND | ND | ND |
| 5 | ND | 498.233 | ND | ND | ND | ND | ND | ND | ND | ND | 498.279 | 498.239 | 498.270 | 498.350 | ND | ND | ND |
| 6 | 498.285 | 498.229 | ND | ND | ND | ND | ND | ND | ND | ND | 498.269 | 498.244 | 498.267 | 498.362 | ND | ND | ND |
| 7 | 498.291 | 498.225 | ND | ND | ND | ND | ND | ND | ND | ND | 498.288 | 498.242 | 498.268 | 498.356 | ND | ND | ND |
| 8 | 498.289 | 498.226 | ND | ND | ND | ND | ND | ND | ND | ND | 498.267 | 498.236 | 498.263 | 498.370 | ND | ND | ND |
| 9 | 498.288 | 498.238 | ND | ND | ND | ND | ND | ND | ND | ND | 498.248 | 498.236 | 498.256 | 498.353 | ND | ND | ND |
| 10 | 498.288 | 498.236 | ND | ND | ND | ND | ND | ND | ND | ND | 498.261 | 498.237 | 498.276 | 498.350 | ND | ND | ND |
| 11 | 498.288 | 498.246 | ND | ND | ND | ND | ND | ND | ND | ND | 498.245 | 498.237 | 498.270 | 498.354 | ND | ND | ND |
| 12 | 498.255 | 498.254 | ND | ND | ND | ND | ND | ND | ND | ND | 498.257 | 498.234 | 498.271 | 498.354 | ND | ND | ND |
| 13 | 498.264 | 498.257 | ND | ND | ND | ND | ND | ND | ND | ND | 498.272 | 498.232 | 498.271 | 498.354 | ND | ND | ND |
| 14 | 498.278 | 498.235 | ND | ND | ND | ND | ND | ND | ND | ND | 498.263 | 498.233 | 498.269 | 498.354 | ND | ND | ND |
| 15 | 498.265 | 498.237 | ND | ND | ND | ND | ND | ND | ND | ND | 498.265 | 498.259 | 498.273 | 498.352 | ND | ND | ND |
| 16 | 498.242 | 498.227 | ND | ND | ND | ND | ND | ND | ND | ND | 498.252 | 498.229 | 498.264 | 498.345 | ND | ND | ND |
| 17 | 498.255 | 498.223 | ND | ND | ND | ND | ND | ND | ND | ND | 498.247 | 498.227 | 498.306 | 498.350 | ND | ND | ND |
| 18 | 498.249 | 498.224 | ND | ND | ND | ND | ND | ND | ND | ND | 498.263 | 498.228 | 498.322 | 498.342 | ND | ND | ND |
| 19 | 498.238 | 498.221 | ND | ND | ND | ND | ND | ND | ND | ND | 498.260 | 498.229 | 498.328 | 498.346 | ND | ND | ND |
| 20 | 498.230 | 498.219 | ND | ND | ND | ND | ND | ND | ND | ND | 498.257 | 498.217 | 498.332 | 498.343 | ND | ND | ND |
| 21 | 498.250 | 498.212 | ND | ND | ND | ND | ND | ND | ND | ND | 498.241 | 498.218 | 498.331 | 498.344 | ND | ND | ND |
| 22 | 498.241 | 498.205 | ND | ND | ND | ND | ND | ND | ND | ND | 498.253 | 498.224 | 498.327 | 498.341 | ND | ND | ND |
| 23 | 498.195 | 498.207 | ND | ND | ND | ND | ND | ND | ND | ND | 498.236 | 498.224 | 498.338 | 498.339 | ND | ND | ND |
| 24 | 498.205 | 498.217 | ND | ND | ND | ND | ND | ND | ND | ND | 498.246 | 498.224 | 498.329 | 498.348 | ND | ND | ND |
| 25 | 498.219 | 498.209 | ND | ND | ND | ND | ND | ND | ND | ND | 498.258 | 498.233 | 498.336 | 498.344 | ND | ND | ND |
| 26 | 498.220 | 498.212 | ND | ND | ND | ND | ND | ND | ND | ND | 498.242 | 498.214 | 498.338 | 498.344 | ND | ND | ND |
| 27 | 498.229 | 498.205 | ND | ND | ND | ND | ND | ND | ND | ND | 498.246 | 498.231 | 498.332 | 498.346 | ND | ND | ND |
| 28 | 498.215 | 498.201 | ND | ND | ND | ND | ND | ND | ND | ND | 498.243 | 498.245 | 498.342 | 498.309 | ND | ND | ND |
| 29 | 498.216 | 498.211 | ND | ND | ND | ND | - | ND | ND | ND | 498.247 | 498.218 | 498.350 | 498.327 | ND | ND | ND |
| 30 | 498.215 | 498.191 | ND | ND | ND | ND | - | ND | ND | ND | 498.251 | 498.227 | 498.345 | 498.322 | ND | ND | ND |
| 31 | 498.271 | - | ND | - | 2019 | ND | - | ND | - | ND | - | 498.225 | 498.342 | - | ND | - | ND |

Note: elevations in table are in metres (arbitrary datum).

- = day not present in month; ND = no data.

**Table C-8: 2018-19 Daily Water Surface Elevation for CR-WB-MS-05**

| DATE | 2018 | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | ND | 498.260 | 498.229 | ND | ND | ND | ND | ND | ND | ND | ND | 498.215 | 498.194 | 498.342 | 498.328 | ND | ND |
| 2 | ND | 498.286 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 498.222 | 498.204 | 498.339 | 498.336 | ND | ND |
| 3 | ND | 498.273 | ND | ND | ND | ND | ND | ND | ND | ND | 498.181 | 498.236 | 498.231 | 498.349 | ND | ND | ND |
| 4 | 498.306 | 498.288 | ND | ND | ND | ND | ND | ND | ND | ND | 498.199 | 498.231 | 498.266 | 498.347 | ND | ND | ND |
| 5 | 498.288 | 498.256 | ND | ND | ND | ND | ND | ND | ND | ND | 498.221 | 498.222 | 498.266 | 498.356 | ND | ND | ND |
| 6 | 498.284 | 498.263 | ND | ND | ND | ND | ND | ND | ND | ND | 498.223 | 498.219 | 498.262 | 498.369 | ND | ND | ND |
| 7 | 498.295 | 498.244 | ND | ND | ND | ND | ND | ND | ND | ND | 498.218 | 498.218 | 498.260 | 498.362 | ND | ND | ND |
| 8 | 498.309 | 498.245 | ND | ND | ND | ND | ND | ND | ND | ND | 498.199 | 498.216 | 498.255 | 498.362 | ND | ND | ND |
| 9 | 498.301 | 498.253 | ND | ND | ND | ND | ND | ND | ND | ND | 498.205 | 498.215 | 498.250 | 498.353 | ND | ND | ND |
| 10 | 498.301 | 498.268 | ND | ND | ND | ND | ND | ND | ND | ND | 498.205 | 498.213 | 498.264 | 498.350 | ND | ND | ND |
| 11 | 498.302 | 498.271 | ND | ND | ND | ND | ND | ND | ND | ND | 498.203 | 498.212 | 498.268 | 498.352 | ND | ND | ND |
| 12 | 498.295 | 498.276 | ND | ND | ND | ND | ND | ND | ND | ND | 498.202 | 498.209 | 498.264 | 498.346 | ND | ND | ND |
| 13 | 498.276 | 498.262 | ND | ND | ND | ND | ND | ND | ND | ND | 498.199 | 498.206 | 498.262 | 498.364 | ND | ND | ND |
| 14 | 498.267 | 498.261 | ND | ND | ND | ND | ND | ND | ND | ND | 498.210 | 498.205 | 498.261 | 498.357 | ND | ND | ND |
| 15 | 498.279 | 498.265 | ND | ND | ND | ND | ND | ND | ND | ND | 498.213 | 498.209 | 498.265 | 498.355 | ND | ND | ND |
| 16 | 498.272 | 498.257 | ND | ND | ND | ND | ND | ND | ND | ND | 498.214 | 498.204 | 498.258 | 498.350 | ND | ND | ND |
| 17 | 498.254 | 498.249 | ND | ND | ND | ND | ND | ND | ND | ND | 498.210 | 498.198 | 498.295 | 498.344 | ND | ND | ND |
| 18 | 498.267 | 498.249 | ND | ND | ND | ND | ND | ND | ND | ND | 498.220 | 498.205 | 498.330 | 498.344 | ND | ND | ND |
| 19 | 498.264 | 498.251 | ND | ND | ND | ND | ND | ND | ND | ND | 498.212 | 498.204 | 498.336 | 498.342 | ND | ND | ND |
| 20 | 498.255 | 498.248 | ND | ND | ND | ND | ND | ND | ND | ND | 498.213 | 498.188 | 498.334 | 498.338 | ND | ND | ND |
| 21 | 498.249 | 498.243 | ND | ND | ND | ND | ND | ND | ND | ND | 498.206 | 498.186 | 498.331 | 498.341 | ND | ND | ND |
| 22 | 498.241 | 498.232 | ND | ND | ND | ND | ND | ND | ND | ND | 498.202 | 498.186 | 498.342 | 498.338 | ND | ND | ND |
| 23 | 498.221 | 498.224 | ND | ND | ND | ND | ND | ND | ND | ND | 498.203 | 498.187 | 498.343 | 498.337 | ND | ND | ND |
| 24 | 498.209 | 498.229 | ND | ND | ND | ND | ND | ND | ND | ND | 498.202 | 498.190 | 498.333 | 498.349 | ND | ND | ND |
| 25 | 498.226 | 498.245 | ND | ND | ND | ND | ND | ND | ND | ND | 498.207 | 498.206 | 498.343 | 498.347 | ND | ND | ND |
| 26 | 498.230 | 498.239 | ND | ND | ND | ND | ND | ND | ND | ND | 498.208 | 498.186 | 498.339 | 498.343 | ND | ND | ND |
| 27 | 498.229 | 498.259 | ND | ND | ND | ND | ND | ND | ND | ND | 498.206 | 498.198 | 498.337 | 498.328 | ND | ND | ND |
| 28 | 498.219 | 498.237 | ND | ND | ND | ND | ND | ND | ND | ND | 498.208 | 498.209 | 498.347 | 498.321 | ND | ND | ND |
| 29 | 498.221 | 498.253 | ND | ND | ND | ND | - | ND | ND | ND | 498.206 | 498.194 | 498.348 | 498.329 | ND | ND | ND |
| 30 | 498.225 | 498.235 | ND | ND | ND | ND | - | ND | ND | ND | 498.213 | 498.195 | 498.350 | 498.325 | ND | ND | ND |
| 31 | 498.271 | - | ND | - | ND | ND | - | ND | - | ND | - | 498.196 | 498.347 | - | ND | - | ND |

Note: elevations in table are in metres (arbitrary datum).

- = day not present in month; ND = no data.

**Table C-9: 2018-19 Daily Water Surface Elevation for CR-WB-TI-01**

| DATE | 2018 | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | ND | 499.891 | 499.919 | ND | ND | ND | ND | ND | ND | ND | 499.942 | 499.904 | 499.848 | 500.000 | 500.028 | ND | ND |
| 2 | ND | 499.882 | 499.913 | ND | ND | ND | ND | ND | ND | ND | 499.964 | 499.887 | 499.856 | 499.997 | ND | ND | ND |
| 3 | ND | 499.890 | ND | ND | ND | ND | ND | ND | ND | ND | 499.949 | 499.906 | 499.876 | 500.000 | ND | ND | ND |
| 4 | ND | 499.897 | ND | ND | ND | ND | ND | ND | ND | ND | 499.962 | 499.907 | 499.900 | 500.001 | ND | ND | ND |
| 5 | ND | 499.892 | ND | ND | ND | ND | ND | ND | ND | ND | 499.953 | 499.907 | 499.899 | 500.016 | ND | ND | ND |
| 6 | ND | 499.888 | ND | ND | ND | ND | ND | ND | ND | ND | 499.957 | 499.901 | 499.899 | 500.016 | ND | ND | ND |
| 7 | 499.90 | 499.881 | ND | ND | ND | ND | ND | ND | ND | ND | 499.957 | 499.907 | 499.893 | 500.025 | ND | ND | ND |
| 8 | 499.91 | 499.892 | ND | ND | ND | ND | ND | ND | ND | ND | 499.953 | 499.899 | 499.905 | 500.029 | ND | ND | ND |
| 9 | 499.90 | 499.900 | ND | ND | ND | ND | ND | ND | ND | ND | 499.948 | 499.889 | 499.906 | 500.023 | ND | ND | ND |
| 10 | 499.91 | 499.915 | ND | ND | ND | ND | ND | ND | ND | ND | 499.953 | 499.890 | 499.902 | 500.033 | ND | ND | ND |
| 11 | 499.91 | 499.918 | ND | ND | ND | ND | ND | ND | ND | ND | 499.936 | 499.888 | 499.908 | 500.025 | ND | ND | ND |
| 12 | 499.89 | 499.917 | ND | ND | ND | ND | ND | ND | ND | ND | 499.944 | 499.892 | 499.919 | 500.030 | ND | ND | ND |
| 13 | 499.89 | 499.912 | ND | ND | ND | ND | ND | ND | ND | ND | 499.963 | 499.885 | 499.918 | 500.030 | ND | ND | ND |
| 14 | 499.88 | 499.910 | ND | ND | ND | ND | ND | ND | ND | 499.978 | 499.952 | 499.883 | 499.916 | 500.039 | ND | ND | ND |
| 15 | 499.88 | 499.904 | ND | ND | ND | ND | ND | ND | ND | 499.981 | 499.946 | 499.894 | 499.922 | 500.035 | ND | ND | ND |
| 16 | 499.87 | 499.909 | ND | ND | ND | ND | ND | ND | ND | 499.984 | 499.945 | 499.887 | 499.931 | 500.034 | ND | ND | ND |
| 17 | 499.87 | 499.902 | ND | ND | ND | ND | ND | ND | ND | 499.987 | 499.945 | 499.877 | 499.968 | 500.036 | ND | ND | ND |
| 18 | 499.87 | 499.902 | ND | ND | ND | ND | ND | ND | ND | 499.990 | 499.946 | 499.881 | 499.976 | 500.030 | ND | ND | ND |
| 19 | 499.86 | 499.898 | ND | ND | ND | ND | ND | ND | ND | 499.966 | 499.937 | 499.877 | 499.978 | 500.026 | ND | ND | ND |
| 20 | 499.86 | 499.905 | ND | ND | ND | ND | ND | ND | ND | 499.968 | 499.933 | 499.862 | 499.978 | 500.022 | ND | ND | ND |
| 21 | 499.86 | 499.901 | ND | ND | ND | ND | ND | ND | ND | 499.959 | 499.929 | 499.860 | 499.979 | 500.025 | ND | ND | ND |
| 22 | 499.86 | 499.899 | ND | ND | ND | ND | ND | ND | ND | 499.971 | 499.925 | 499.864 | 499.974 | 500.029 | ND | ND | ND |
| 23 | 499.88 | 499.900 | ND | ND | ND | ND | ND | ND | ND | 499.981 | 499.929 | 499.860 | 499.975 | 500.026 | ND | ND | ND |
| 24 | 499.86 | 499.911 | ND | ND | ND | ND | ND | ND | ND | 499.962 | 499.923 | 499.858 | 499.976 | 500.036 | ND | ND | ND |
| 25 | 499.87 | 499.905 | ND | ND | ND | ND | ND | ND | ND | 499.961 | 499.916 | 499.872 | 499.998 | 500.024 | ND | ND | ND |
| 26 | 499.87 | 499.911 | ND | ND | ND | ND | ND | ND | ND | 499.948 | 499.925 | 499.852 | 499.994 | 500.022 | ND | ND | ND |
| 27 | 499.87 | 499.914 | ND | ND | ND | ND | ND | ND | ND | 499.967 | 499.921 | 499.851 | 499.997 | 500.027 | ND | ND | ND |
| 28 | 499.86 | 499.909 | ND | ND | ND | ND | ND | ND | ND | 499.966 | 499.911 | 499.870 | 500.001 | 500.020 | ND | ND | ND |
| 29 | 499.87 | 499.916 | ND | ND | ND | ND | - | ND | ND | 499.973 | 499.910 | 499.849 | 500.002 | 500.020 | ND | ND | ND |
| 30 | 499.88 | 499.911 | ND | ND | ND | ND | - | ND | ND | 499.954 | 499.909 | 499.848 | 500.000 | 500.024 | ND | ND | ND |
| 31 | 499.90 | - | ND | - | ND | ND | - | ND | - | 499.935 | - | 499.846 | 499.999 | - | ND | - | ND |

Note: elevations in table are in metres (arbitrary datum).

- = day not present in month; ND = no data.

**Table C-10: 2018-19 Daily Water Surface Elevation for CR-WB-TI-02**

| DATE | 2018 | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | ND | 499.417 | 499.443 | ND | ND | ND | ND | ND | ND | ND | 499.262 | 499.282 | 499.263 | 499.430 | 499.420 | ND | ND |
| 2 | ND | 499.412 | 499.442 | ND | ND | ND | ND | ND | ND | ND | 499.273 | 499.268 | 499.273 | 499.425 | ND | ND | ND |
| 3 | ND | 499.415 | ND | ND | ND | ND | ND | ND | ND | ND | 499.282 | 499.280 | 499.298 | 499.426 | ND | ND | ND |
| 4 | ND | 499.416 | ND | ND | ND | ND | ND | ND | ND | ND | 499.272 | 499.279 | 499.341 | 499.425 | ND | ND | ND |
| 5 | ND | 499.421 | ND | ND | ND | ND | ND | ND | ND | ND | 499.289 | 499.275 | 499.335 | 499.436 | ND | ND | ND |
| 6 | ND | 499.407 | ND | ND | ND | ND | ND | ND | ND | ND | 499.283 | 499.281 | 499.340 | 499.447 | ND | ND | ND |
| 7 | 499.379 | 499.415 | ND | ND | ND | ND | ND | ND | ND | ND | 499.284 | 499.280 | 499.338 | 499.443 | ND | ND | ND |
| 8 | 499.385 | 499.409 | ND | ND | ND | ND | ND | ND | ND | ND | 499.282 | 499.278 | 499.337 | 499.447 | ND | ND | ND |
| 9 | 499.394 | 499.420 | ND | ND | ND | ND | ND | ND | ND | ND | 499.280 | 499.274 | 499.347 | 499.443 | ND | ND | ND |
| 10 | 499.394 | 499.439 | ND | ND | ND | ND | ND | ND | ND | ND | 499.293 | 499.273 | 499.362 | 499.439 | ND | ND | ND |
| 11 | 499.389 | 499.441 | ND | ND | ND | ND | ND | ND | ND | ND | 499.285 | 499.273 | 499.360 | 499.436 | ND | ND | ND |
| 12 | 499.378 | 499.444 | ND | ND | ND | ND | ND | ND | ND | ND | 499.289 | 499.270 | 499.368 | 499.433 | ND | ND | ND |
| 13 | 499.371 | 499.441 | ND | ND | ND | ND | ND | ND | ND | ND | 499.301 | 499.270 | 499.368 | 499.433 | ND | ND | ND |
| 14 | 499.395 | 499.438 | ND | ND | ND | ND | ND | ND | ND | 499.313 | 499.292 | 499.267 | 499.363 | 499.433 | ND | ND | ND |
| 15 | 499.376 | 499.435 | ND | ND | ND | ND | ND | ND | ND | 499.314 | 499.291 | 499.274 | 499.370 | 499.432 | ND | ND | ND |
| 16 | 499.363 | 499.435 | ND | ND | ND | ND | ND | ND | ND | 499.315 | 499.292 | 499.270 | 499.376 | 499.432 | ND | ND | ND |
| 17 | 499.364 | 499.439 | ND | ND | ND | ND | ND | ND | ND | 499.316 | 499.299 | 499.274 | 499.426 | 499.432 | ND | ND | ND |
| 18 | 499.373 | 499.439 | ND | ND | ND | ND | ND | ND | ND | 499.317 | 499.288 | 499.277 | 499.430 | 499.431 | ND | ND | ND |
| 19 | 499.365 | 499.435 | ND | ND | ND | ND | ND | ND | ND | 499.296 | 499.290 | 499.273 | 499.433 | 499.427 | ND | ND | ND |
| 20 | 499.359 | 499.436 | ND | ND | ND | ND | ND | ND | ND | 499.290 | 499.295 | 499.266 | 499.430 | 499.420 | ND | ND | ND |
| 21 | 499.378 | 499.430 | ND | ND | ND | ND | ND | ND | ND | 499.296 | 499.281 | 499.274 | 499.427 | 499.425 | ND | ND | ND |
| 22 | 499.370 | 499.428 | ND | ND | ND | ND | ND | ND | ND | 499.289 | 499.280 | 499.263 | 499.441 | 499.422 | ND | ND | ND |
| 23 | 499.367 | 499.427 | ND | ND | ND | ND | ND | ND | ND | 499.302 | 499.281 | 499.265 | 499.431 | 499.421 | ND | ND | ND |
| 24 | 499.359 | 499.437 | ND | ND | ND | ND | ND | ND | ND | 499.288 | 499.281 | 499.273 | 499.438 | 499.440 | ND | ND | ND |
| 25 | 499.372 | 499.436 | ND | ND | ND | ND | ND | ND | ND | 499.288 | 499.280 | 499.279 | 499.440 | 499.436 | ND | ND | ND |
| 26 | 499.376 | 499.435 | ND | ND | ND | ND | ND | ND | ND | 499.267 | 499.276 | 499.274 | 499.432 | 499.432 | ND | ND | ND |
| 27 | 499.378 | 499.446 | ND | ND | ND | ND | ND | ND | ND | 499.287 | 499.275 | 499.274 | 499.434 | 499.434 | ND | ND | ND |
| 28 | 499.383 | 499.438 | ND | ND | ND | ND | ND | ND | ND | 499.296 | 499.275 | 499.282 | 499.439 | 499.429 | ND | ND | ND |
| 29 | 499.387 | 499.446 | ND | ND | ND | ND | - | ND | ND | 499.301 | 499.274 | 499.264 | 499.439 | 499.420 | ND | ND | ND |
| 30 | 499.398 | 499.442 | ND | ND | ND | ND | - | ND | ND | 499.270 | 499.290 | 499.276 | 499.433 | 499.418 | ND | ND | ND |
| 31 | 499.412 | - | ND | - | ND | ND | - | ND | - | 499.263 | - | 499.264 | 499.431 | - | ND | - | ND |

Note: elevations in table are in metres (arbitrary datum).

- = day not present in month; ND = no data.

**Table C-11: 2018-19 Daily Water Surface Elevation for CR-WC-MS-01**

| DATE | 2018 | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | ND | 526.746 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 526.798 | 526.779 | 526.865 | ND | ND | ND |
| 2 | ND | 526.749 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 526.833 | 526.786 | 526.862 | ND | ND | ND |
| 3 | ND | 526.743 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 526.802 | 526.796 | 526.863 | ND | ND | ND |
| 4 | ND | 526.745 | ND | ND | ND | ND | ND | ND | ND | ND | 526.820 | 526.799 | 526.819 | 526.860 | ND | ND | ND |
| 5 | ND | 526.737 | ND | ND | ND | ND | ND | ND | ND | ND | 526.812 | 526.794 | 526.812 | 526.873 | ND | ND | ND |
| 6 | ND | 526.733 | ND | ND | ND | ND | ND | ND | ND | ND | 526.798 | 526.798 | 526.821 | 526.875 | ND | ND | ND |
| 7 | ND | 526.727 | ND | ND | ND | ND | ND | ND | ND | ND | 526.796 | 526.802 | 526.810 | 526.867 | ND | ND | ND |
| 8 | 526.815 | 526.723 | ND | ND | ND | ND | ND | ND | ND | ND | 526.807 | 526.794 | 526.805 | 526.869 | ND | ND | ND |
| 9 | 526.814 | 526.726 | ND | ND | ND | ND | ND | ND | ND | ND | 526.791 | 526.794 | 526.807 | 526.865 | ND | ND | ND |
| 10 | 526.812 | 526.739 | ND | ND | ND | ND | ND | ND | ND | ND | 526.796 | 526.792 | 526.823 | 526.864 | ND | ND | ND |
| 11 | 526.810 | 526.738 | ND | ND | ND | ND | ND | ND | ND | ND | 526.786 | 526.790 | 526.814 | 526.861 | ND | ND | ND |
| 12 | 526.799 | 526.741 | ND | ND | ND | ND | ND | ND | ND | ND | 526.773 | 526.793 | 526.811 | 526.856 | ND | ND | ND |
| 13 | 526.793 | 526.738 | ND | ND | ND | ND | ND | ND | ND | ND | 526.774 | 526.789 | 526.814 | 526.853 | ND | ND | ND |
| 14 | 526.788 | 526.733 | ND | ND | ND | ND | ND | ND | ND | ND | 526.776 | 526.788 | 526.812 | 526.853 | ND | ND | ND |
| 15 | 526.782 | 526.733 | ND | ND | ND | ND | ND | ND | ND | ND | 526.780 | 526.793 | 526.818 | 526.854 | ND | ND | ND |
| 16 | 526.771 | 526.734 | ND | ND | ND | ND | ND | ND | ND | ND | 526.783 | 526.789 | 526.814 | 526.850 | ND | ND | ND |
| 17 | 526.767 | 526.732 | ND | ND | ND | ND | ND | ND | ND | ND | 526.781 | 526.787 | 526.889 | 526.844 | ND | ND | ND |
| 18 | 526.768 | 526.725 | ND | ND | ND | ND | ND | ND | ND | ND | 526.786 | 526.785 | 526.886 | 526.840 | ND | ND | ND |
| 19 | 526.760 | 526.719 | ND | ND | ND | ND | ND | ND | ND | ND | 526.789 | 526.783 | 526.886 | 526.828 | ND | ND | ND |
| 20 | 526.758 | 526.714 | ND | ND | ND | ND | ND | ND | ND | ND | 526.799 | 526.780 | 526.885 | 526.822 | ND | ND | ND |
| 21 | 526.755 | 526.715 | ND | ND | ND | ND | ND | ND | ND | ND | 526.796 | 526.783 | 526.877 | 526.820 | ND | ND | ND |
| 22 | 526.752 | 526.717 | ND | ND | ND | ND | ND | ND | ND | ND | 526.803 | 526.782 | 526.871 | 526.815 | ND | ND | ND |
| 23 | 526.736 | 526.700 | ND | ND | ND | ND | ND | ND | ND | ND | 526.806 | 526.781 | 526.874 | 526.813 | ND | ND | ND |
| 24 | 526.734 | 526.701 | ND | ND | ND | ND | ND | ND | ND | ND | 526.812 | 526.780 | 526.868 | 526.833 | ND | ND | ND |
| 25 | 526.738 | 526.696 | ND | ND | ND | ND | ND | ND | ND | ND | 526.812 | 526.787 | 526.874 | 526.824 | ND | ND | ND |
| 26 | 526.739 | 526.700 | ND | ND | ND | ND | ND | ND | ND | ND | 526.811 | 526.787 | 526.871 | 526.824 | ND | ND | ND |
| 27 | 526.736 | 526.703 | ND | ND | ND | ND | ND | ND | ND | ND | 526.808 | 526.788 | 526.876 | 526.817 | ND | ND | ND |
| 28 | 526.733 | 526.702 | ND | ND | ND | ND | ND | ND | ND | ND | 526.800 | 526.792 | 526.879 | 526.814 | ND | ND | ND |
| 29 | 526.730 | 526.703 | ND | ND | ND | ND | - | ND | ND | ND | 526.800 | 526.781 | 526.879 | 526.813 | ND | ND | ND |
| 30 | 526.730 | 526.705 | ND | ND | ND | ND | - | ND | ND | ND | 526.806 | 526.780 | 526.871 | ND | ND | ND | ND |
| 31 | 526.745 | - | ND | - | ND | ND | - | ND | - | ND | - | 526.780 | 526.866 | - | ND | - | ND |

Note: elevations in table are in metres (arbitrary datum).

- = day not present in month; ND = no data.

**Table C-12: 2018-19 Mean Daily Discharge for CR-WC-MS-01**

| DATE | 2018 | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | ND | 0.199 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 0.253 | 0.224 | 0.368 | ND | ND | ND |
| 2 | ND | 0.203 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 0.309 | 0.234 | 0.364 | ND | ND | ND |
| 3 | ND | 0.194 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 0.259 | 0.250 | 0.365 | ND | ND | ND |
| 4 | ND | 0.198 | ND | ND | ND | ND | ND | ND | ND | ND | 0.280 | 0.254 | 0.286 | 0.359 | ND | ND | ND |
| 5 | ND | 0.187 | ND | ND | ND | ND | ND | ND | ND | ND | 0.275 | 0.246 | 0.274 | 0.384 | ND | ND | ND |
| 6 | ND | 0.182 | ND | ND | ND | ND | ND | ND | ND | ND | 0.252 | 0.253 | 0.288 | 0.388 | ND | ND | ND |
| 7 | ND | 0.174 | ND | ND | ND | ND | ND | ND | ND | ND | 0.249 | 0.258 | 0.271 | 0.373 | ND | ND | ND |
| 8 | 0.304 | 0.169 | ND | ND | ND | ND | ND | ND | ND | ND | 0.266 | 0.246 | 0.262 | 0.376 | ND | ND | ND |
| 9 | 0.302 | 0.173 | ND | ND | ND | ND | ND | ND | ND | ND | 0.241 | 0.246 | 0.266 | 0.369 | ND | ND | ND |
| 10 | 0.299 | 0.189 | ND | ND | ND | ND | ND | ND | ND | ND | 0.249 | 0.243 | 0.292 | 0.367 | ND | ND | ND |
| 11 | 0.296 | 0.189 | ND | ND | ND | ND | ND | ND | ND | ND | 0.234 | 0.241 | 0.278 | 0.361 | ND | ND | ND |
| 12 | 0.278 | 0.192 | ND | ND | ND | ND | ND | ND | ND | ND | 0.216 | 0.244 | 0.273 | 0.351 | ND | ND | ND |
| 13 | 0.268 | 0.188 | ND | ND | ND | ND | ND | ND | ND | ND | 0.217 | 0.239 | 0.278 | 0.346 | ND | ND | ND |
| 14 | 0.259 | 0.182 | ND | ND | ND | ND | ND | ND | ND | ND | 0.219 | 0.237 | 0.275 | 0.346 | ND | ND | ND |
| 15 | 0.251 | 0.181 | ND | ND | ND | ND | ND | ND | ND | ND | 0.226 | 0.245 | 0.285 | 0.348 | ND | ND | ND |
| 16 | 0.234 | 0.184 | ND | ND | ND | ND | ND | ND | ND | ND | 0.230 | 0.238 | 0.278 | 0.340 | ND | ND | ND |
| 17 | 0.227 | 0.180 | ND | ND | ND | ND | ND | ND | ND | ND | 0.226 | 0.236 | 0.416 | 0.329 | ND | ND | ND |
| 18 | 0.230 | 0.171 | ND | ND | ND | ND | ND | ND | ND | ND | 0.234 | 0.232 | 0.412 | 0.322 | ND | ND | ND |
| 19 | 0.218 | 0.165 | ND | ND | ND | ND | ND | ND | ND | ND | 0.238 | 0.230 | 0.411 | 0.301 | ND | ND | ND |
| 20 | 0.215 | 0.158 | ND | ND | ND | ND | ND | ND | ND | ND | 0.254 | 0.225 | 0.409 | 0.291 | ND | ND | ND |
| 21 | 0.211 | 0.160 | ND | ND | ND | ND | ND | ND | ND | ND | 0.249 | 0.230 | 0.393 | 0.287 | ND | ND | ND |
| 22 | 0.207 | 0.162 | ND | ND | ND | ND | ND | ND | ND | ND | 0.260 | 0.228 | 0.381 | 0.279 | ND | ND | ND |
| 23 | 0.186 | 0.143 | ND | ND | ND | ND | ND | ND | ND | ND | 0.264 | 0.226 | 0.387 | 0.276 | ND | ND | ND |
| 24 | 0.184 | 0.143 | ND | ND | ND | ND | ND | ND | ND | ND | 0.275 | 0.225 | 0.374 | 0.309 | ND | ND | ND |
| 25 | 0.189 | 0.138 | ND | ND | ND | ND | ND | ND | ND | ND | 0.275 | 0.235 | 0.386 | 0.293 | ND | ND | ND |
| 26 | 0.189 | 0.143 | ND | ND | ND | ND | ND | ND | ND | ND | 0.272 | 0.236 | 0.380 | 0.293 | ND | ND | ND |
| 27 | 0.186 | 0.146 | ND | ND | ND | ND | ND | ND | ND | ND | 0.268 | 0.237 | 0.391 | 0.282 | ND | ND | ND |
| 28 | 0.182 | 0.145 | ND | ND | ND | ND | ND | ND | ND | ND | 0.256 | 0.243 | 0.396 | 0.277 | ND | ND | ND |
| 29 | 0.178 | 0.146 | ND | ND | ND | ND | - | ND | ND | ND | 0.255 | 0.227 | 0.397 | 0.275 | ND | ND | ND |
| 30 | 0.177 | 0.149 | ND | ND | ND | ND | - | ND | ND | ND | 0.264 | 0.226 | 0.381 | ND | ND | ND | ND |
| 31 | 0.197 | - | ND | - | ND | ND | - | ND | - | ND | - | 0.225 | 0.371 | - | ND | - | ND |

Note: elevations in table are in metres (arbitrary datum).

- = day not present in month; ND = no data.

**Table C-13: 2018-19 Daily Water Surface Elevation for CR-WC-MS-02**

| DATE | 2018 | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | ND | 498.591 | 498.578 | 498.507 | 498.478 | 498.453 | 498.444 | 498.428 | 498.538 | 498.510 | 498.542 | 498.542 | 498.506 | 498.623 | 498.607 | ND | ND |
| 2 | ND | 498.601 | 498.567 | 498.498 | 498.482 | 498.474 | 498.441 | 498.427 | 498.515 | 498.543 | 498.544 | 498.596 | 498.511 | 498.626 | ND | ND | ND |
| 3 | ND | 498.590 | 498.562 | 498.514 | 498.510 | 498.485 | 498.441 | 498.430 | 498.486 | 498.541 | 498.547 | 498.560 | 498.534 | 498.631 | ND | ND | ND |
| 4 | 498.638 | 498.605 | 498.561 | 498.498 | 498.485 | 498.482 | 498.435 | 498.436 | 498.512 | 498.548 | 498.554 | 498.558 | 498.564 | 498.626 | ND | ND | ND |
| 5 | 498.617 | 498.593 | 498.543 | 498.480 | 498.462 | 498.466 | 498.431 | 498.438 | 498.488 | 498.548 | 498.565 | 498.546 | 498.555 | 498.641 | ND | ND | ND |
| 6 | 498.626 | 498.589 | 498.550 | 498.471 | 498.475 | 498.464 | 498.432 | 498.433 | 498.520 | 498.548 | 498.564 | 498.546 | 498.559 | 498.638 | ND | ND | ND |
| 7 | 498.616 | 498.569 | 498.546 | 498.471 | 498.457 | 498.466 | 498.433 | 498.438 | 498.531 | 498.547 | 498.557 | 498.541 | 498.550 | 498.634 | ND | ND | ND |
| 8 | 498.638 | 498.562 | 498.536 | 498.470 | 498.454 | 498.456 | 498.442 | 498.432 | 498.528 | 498.549 | 498.561 | 498.542 | 498.544 | 498.638 | ND | ND | ND |
| 9 | 498.637 | 498.564 | 498.543 | 498.464 | 498.495 | 498.449 | 498.444 | 498.433 | 498.531 | 498.552 | 498.555 | 498.548 | 498.543 | 498.634 | ND | ND | ND |
| 10 | 498.635 | 498.588 | 498.545 | 498.474 | 498.477 | 498.459 | 498.450 | 498.439 | 498.533 | 498.564 | 498.555 | 498.535 | 498.576 | 498.634 | ND | ND | ND |
| 11 | 498.645 | 498.590 | 498.554 | 498.472 | 498.489 | 498.464 | 498.458 | 498.454 | 498.540 | 498.556 | 498.546 | 498.531 | 498.549 | 498.628 | ND | ND | ND |
| 12 | 498.627 | 498.599 | 498.556 | 498.468 | 498.506 | 498.469 | 498.467 | 498.438 | 498.542 | 498.559 | 498.547 | 498.531 | 498.552 | 498.629 | ND | ND | ND |
| 13 | 498.615 | 498.589 | 498.546 | 498.477 | 498.501 | 498.475 | 498.459 | 498.425 | 498.542 | 498.560 | 498.550 | 498.524 | 498.555 | 498.629 | ND | ND | ND |
| 14 | 498.622 | 498.590 | 498.515 | 498.494 | 498.472 | 498.460 | 498.455 | 498.440 | 498.543 | 498.559 | 498.543 | 498.529 | 498.549 | 498.626 | ND | ND | ND |
| 15 | 498.605 | 498.601 | 498.555 | 498.467 | 498.489 | 498.456 | 498.457 | 498.450 | 498.545 | 498.555 | 498.550 | 498.527 | 498.554 | 498.630 | ND | ND | ND |
| 16 | 498.610 | 498.579 | 498.546 | 498.519 | 498.519 | 498.455 | 498.459 | 498.475 | 498.537 | 498.545 | 498.547 | 498.525 | 498.544 | 498.626 | ND | ND | ND |
| 17 | 498.601 | 498.574 | 498.550 | 498.471 | 498.498 | 498.452 | 498.459 | 498.490 | 498.549 | 498.552 | 498.562 | 498.521 | 498.607 | 498.630 | ND | ND | ND |
| 18 | 498.613 | 498.593 | 498.553 | 498.480 | 498.507 | 498.447 | 498.451 | 498.511 | 498.546 | 498.548 | 498.563 | 498.518 | 498.615 | 498.625 | ND | ND | ND |
| 19 | 498.598 | 498.579 | 498.558 | 498.484 | 498.483 | 498.443 | 498.467 | 498.531 | 498.552 | 498.554 | 498.566 | 498.523 | 498.623 | 498.618 | ND | ND | ND |
| 20 | 498.598 | 498.572 | 498.533 | 498.508 | 498.517 | 498.446 | 498.467 | 498.534 | 498.547 | 498.559 | 498.559 | 498.513 | 498.628 | 498.617 | ND | ND | ND |
| 21 | 498.589 | 498.572 | 498.555 | 498.525 | 498.492 | 498.458 | 498.450 | 498.534 | 498.554 | 498.561 | 498.558 | 498.515 | 498.623 | 498.618 | ND | ND | ND |
| 22 | 498.575 | 498.561 | 498.526 | 498.506 | 498.482 | 498.455 | 498.456 | 498.544 | 498.558 | 498.555 | 498.552 | 498.511 | 498.618 | 498.618 | ND | ND | ND |
| 23 | 498.545 | 498.561 | 498.536 | 498.489 | 498.466 | 498.452 | 498.449 | 498.537 | 498.567 | 498.557 | 498.549 | 498.508 | 498.624 | 498.612 | ND | ND | ND |
| 24 | 498.565 | 498.566 | 498.524 | 498.463 | 498.457 | 498.439 | 498.442 | 498.512 | 498.562 | 498.552 | 498.553 | 498.510 | 498.625 | 498.636 | ND | ND | ND |
| 25 | 498.575 | 498.565 | 498.528 | 498.464 | 498.449 | 498.438 | 498.436 | 498.532 | 498.556 | 498.554 | 498.553 | 498.499 | 498.626 | 498.627 | ND | ND | ND |
| 26 | 498.578 | 498.570 | 498.531 | 498.470 | 498.456 | 498.448 | 498.438 | 498.537 | 498.549 | 498.538 | 498.549 | 498.515 | 498.625 | 498.623 | ND | ND | ND |
| 27 | 498.581 | 498.578 | 498.526 | 498.479 | 498.444 | 498.459 | 498.458 | 498.535 | 498.537 | 498.566 | 498.542 | 498.528 | 498.629 | 498.616 | ND | ND | ND |
| 28 | 498.567 | 498.565 | 498.519 | 498.471 | 498.453 | 498.453 | 498.447 | 498.528 | 498.539 | 498.556 | 498.545 | 498.515 | 498.627 | 498.608 | ND | ND | ND |
| 29 | 498.565 | 498.580 | 498.516 | 498.499 | 498.446 | 498.438 | - | 498.525 | 498.539 | 498.560 | 498.533 | 498.511 | 498.642 | 498.610 | ND | ND | ND |
| 30 | 498.564 | 498.566 | 498.515 | 498.478 | 498.449 | 498.440 | - | 498.531 | 498.542 | 498.543 | 498.547 | 498.502 | 498.631 | 498.606 | ND | ND | ND |
| 31 | 498.588 | - | 498.514 | - | 498.445 | 498.445 | - | 498.526 | - | 498.534 | - | 498.512 | 498.627 | - | ND | - | ND |

Note: elevations in table are in metres (arbitrary datum).

- = day not present in month; ND = no data.

**Table C-14: 2018-19 Mean Daily Discharge for CR-WC-MS-02**

| DATE | 2018 | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | ND | 0.453 | 0.397 | 0.250 | 0.218 | 0.198 | 0.208 | 0.204 | 0.551 | 0.467 | 0.537 | 0.495 | 0.381 | 0.811 | 0.743 | ND | ND |
| 2 | ND | 0.506 | 0.369 | 0.231 | 0.227 | 0.243 | 0.202 | 0.202 | 0.471 | 0.583 | 0.541 | 0.698 | 0.396 | 0.825 | ND | ND | ND |
| 3 | ND | 0.446 | 0.355 | 0.268 | 0.294 | 0.268 | 0.204 | 0.210 | 0.384 | 0.576 | 0.548 | 0.556 | 0.468 | 0.848 | ND | ND | ND |
| 4 | 0.746 | 0.526 | 0.352 | 0.235 | 0.237 | 0.264 | 0.192 | 0.223 | 0.462 | 0.601 | 0.572 | 0.550 | 0.573 | 0.824 | ND | ND | ND |
| 5 | 0.627 | 0.455 | 0.307 | 0.197 | 0.190 | 0.228 | 0.187 | 0.228 | 0.388 | 0.602 | 0.611 | 0.509 | 0.540 | 0.895 | ND | ND | ND |
| 6 | 0.664 | 0.435 | 0.326 | 0.180 | 0.216 | 0.224 | 0.189 | 0.218 | 0.490 | 0.601 | 0.605 | 0.508 | 0.553 | 0.878 | ND | ND | ND |
| 7 | 0.629 | 0.371 | 0.316 | 0.181 | 0.182 | 0.231 | 0.193 | 0.229 | 0.529 | 0.598 | 0.579 | 0.491 | 0.522 | 0.862 | ND | ND | ND |
| 8 | 0.750 | 0.348 | 0.293 | 0.180 | 0.177 | 0.211 | 0.211 | 0.218 | 0.517 | 0.605 | 0.594 | 0.496 | 0.502 | 0.879 | ND | ND | ND |
| 9 | 0.735 | 0.353 | 0.312 | 0.169 | 0.266 | 0.196 | 0.217 | 0.220 | 0.530 | 0.618 | 0.571 | 0.514 | 0.500 | 0.860 | ND | ND | ND |
| 10 | 0.721 | 0.421 | 0.318 | 0.189 | 0.225 | 0.219 | 0.230 | 0.236 | 0.536 | 0.665 | 0.567 | 0.473 | 0.616 | 0.862 | ND | ND | ND |
| 11 | 0.809 | 0.424 | 0.344 | 0.186 | 0.252 | 0.231 | 0.250 | 0.272 | 0.561 | 0.635 | 0.533 | 0.458 | 0.520 | 0.833 | ND | ND | ND |
| 12 | 0.668 | 0.474 | 0.349 | 0.180 | 0.295 | 0.243 | 0.270 | 0.236 | 0.569 | 0.648 | 0.536 | 0.459 | 0.529 | 0.838 | ND | ND | ND |
| 13 | 0.609 | 0.417 | 0.324 | 0.198 | 0.284 | 0.256 | 0.253 | 0.209 | 0.571 | 0.652 | 0.546 | 0.438 | 0.540 | 0.839 | ND | ND | ND |
| 14 | 0.641 | 0.419 | 0.249 | 0.235 | 0.219 | 0.224 | 0.245 | 0.242 | 0.575 | 0.648 | 0.520 | 0.453 | 0.518 | 0.827 | ND | ND | ND |
| 15 | 0.559 | 0.483 | 0.352 | 0.182 | 0.257 | 0.216 | 0.251 | 0.265 | 0.583 | 0.631 | 0.542 | 0.446 | 0.536 | 0.842 | ND | ND | ND |
| 16 | 0.581 | 0.382 | 0.327 | 0.295 | 0.334 | 0.215 | 0.258 | 0.329 | 0.555 | 0.594 | 0.531 | 0.439 | 0.502 | 0.827 | ND | ND | ND |
| 17 | 0.537 | 0.368 | 0.339 | 0.191 | 0.281 | 0.211 | 0.259 | 0.372 | 0.598 | 0.617 | 0.585 | 0.427 | 0.742 | 0.845 | ND | ND | ND |
| 18 | 0.594 | 0.439 | 0.350 | 0.209 | 0.304 | 0.201 | 0.242 | 0.437 | 0.586 | 0.599 | 0.586 | 0.418 | 0.776 | 0.821 | ND | ND | ND |
| 19 | 0.522 | 0.385 | 0.366 | 0.218 | 0.248 | 0.194 | 0.279 | 0.504 | 0.609 | 0.619 | 0.595 | 0.432 | 0.810 | 0.789 | ND | ND | ND |
| 20 | 0.517 | 0.366 | 0.300 | 0.274 | 0.332 | 0.202 | 0.281 | 0.517 | 0.591 | 0.634 | 0.568 | 0.403 | 0.833 | 0.783 | ND | ND | ND |
| 21 | 0.476 | 0.368 | 0.360 | 0.318 | 0.271 | 0.226 | 0.241 | 0.519 | 0.617 | 0.641 | 0.562 | 0.409 | 0.814 | 0.788 | ND | ND | ND |
| 22 | 0.426 | 0.339 | 0.285 | 0.271 | 0.249 | 0.222 | 0.257 | 0.555 | 0.634 | 0.614 | 0.541 | 0.396 | 0.791 | 0.788 | ND | ND | ND |
| 23 | 0.337 | 0.338 | 0.311 | 0.235 | 0.215 | 0.217 | 0.242 | 0.530 | 0.670 | 0.619 | 0.530 | 0.387 | 0.815 | 0.762 | ND | ND | ND |
| 24 | 0.392 | 0.353 | 0.280 | 0.181 | 0.198 | 0.191 | 0.227 | 0.448 | 0.651 | 0.596 | 0.542 | 0.395 | 0.821 | 0.872 | ND | ND | ND |
| 25 | 0.420 | 0.351 | 0.294 | 0.184 | 0.182 | 0.191 | 0.216 | 0.516 | 0.628 | 0.600 | 0.539 | 0.362 | 0.823 | 0.829 | ND | ND | ND |
| 26 | 0.426 | 0.368 | 0.301 | 0.197 | 0.197 | 0.211 | 0.221 | 0.538 | 0.602 | 0.539 | 0.526 | 0.409 | 0.823 | 0.812 | ND | ND | ND |
| 27 | 0.433 | 0.393 | 0.290 | 0.217 | 0.175 | 0.235 | 0.267 | 0.532 | 0.556 | 0.639 | 0.501 | 0.448 | 0.838 | 0.781 | ND | ND | ND |
| 28 | 0.387 | 0.356 | 0.274 | 0.201 | 0.194 | 0.224 | 0.242 | 0.507 | 0.566 | 0.599 | 0.508 | 0.410 | 0.830 | 0.748 | ND | ND | ND |
| 29 | 0.379 | 0.402 | 0.268 | 0.262 | 0.181 | 0.193 | - | 0.499 | 0.566 | 0.611 | 0.468 | 0.398 | 0.897 | 0.753 | ND | ND | ND |
| 30 | 0.373 | 0.361 | 0.267 | 0.217 | 0.187 | 0.198 | - | 0.522 | 0.576 | 0.546 | 0.512 | 0.372 | 0.848 | 0.740 | ND | ND | ND |
| 31 | 0.446 | - | 0.267 | - | 0.181 | 0.210 | - | 0.505 | - | 0.512 | - | 0.399 | 0.828 | - | ND | - | ND |

Note: elevations in table are in metres (arbitrary datum).

- = day not present in month; ND = no data.

**Table C-15: 2018-19 Daily Water Surface Elevation for CR-WC-MS-03**

| DATE | 2018 | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | ND | 498.505 | 498.472 | 498.439 | 498.421 | 498.402 | 498.388 | 498.367 | 498.528 | 498.496 | 498.511 | 498.516 | 498.463 | 498.593 | ND | ND | ND |
| 2 | ND | 498.527 | 498.484 | 498.434 | 498.418 | 498.405 | 498.381 | 498.370 | 498.512 | 498.519 | 498.500 | 498.496 | 498.467 | 498.588 | ND | ND | ND |
| 3 | ND | 498.516 | 498.480 | 498.431 | 498.405 | 498.410 | 498.382 | 498.384 | 498.497 | 498.519 | 498.509 | 498.514 | 498.483 | 498.584 | ND | ND | ND |
| 4 | 498.590 | 498.543 | 498.471 | 498.443 | 498.416 | 498.406 | 498.382 | 498.384 | 498.515 | 498.525 | 498.545 | 498.499 | 498.519 | 498.587 | ND | ND | ND |
| 5 | 498.576 | 498.501 | 498.460 | 498.433 | 498.408 | 498.392 | 498.383 | 498.383 | 498.496 | 498.522 | 498.536 | 498.496 | 498.509 | 498.598 | ND | ND | ND |
| 6 | 498.555 | 498.516 | 498.467 | 498.442 | 498.409 | 498.398 | 498.384 | 498.380 | 498.509 | 498.522 | 498.533 | 498.493 | 498.521 | 498.606 | ND | ND | ND |
| 7 | 498.545 | 498.483 | 498.464 | 498.429 | 498.404 | 498.394 | 498.385 | 498.382 | 498.524 | 498.517 | 498.526 | 498.487 | 498.515 | 498.605 | ND | ND | ND |
| 8 | 498.579 | 498.496 | 498.455 | 498.423 | 498.399 | 498.396 | 498.365 | 498.373 | 498.521 | 498.514 | 498.544 | 498.489 | 498.501 | 498.612 | ND | ND | ND |
| 9 | 498.564 | 498.495 | 498.462 | 498.429 | 498.412 | 498.378 | 498.378 | 498.380 | 498.520 | 498.516 | 498.513 | 498.485 | 498.502 | 498.600 | ND | ND | ND |
| 10 | 498.560 | 498.518 | 498.458 | 498.434 | 498.403 | 498.398 | 498.384 | 498.382 | 498.520 | 498.515 | 498.509 | 498.480 | 498.521 | 498.598 | ND | ND | ND |
| 11 | 498.580 | 498.517 | 498.463 | 498.429 | 498.397 | 498.395 | 498.383 | 498.393 | 498.525 | 498.514 | 498.514 | 498.477 | 498.517 | 498.596 | ND | ND | ND |
| 12 | 498.567 | 498.535 | 498.477 | 498.425 | 498.414 | 498.407 | 498.391 | 498.387 | 498.525 | 498.538 | 498.510 | 498.474 | 498.505 | 498.588 | ND | ND | ND |
| 13 | 498.548 | 498.520 | 498.468 | 498.428 | 498.411 | 498.405 | 498.380 | 498.373 | 498.525 | 498.519 | 498.511 | 498.476 | 498.514 | 498.586 | ND | ND | ND |
| 14 | 498.521 | 498.518 | 498.449 | 498.438 | 498.403 | 498.396 | 498.366 | 498.381 | 498.518 | 498.532 | 498.527 | 498.475 | 498.508 | 498.600 | ND | ND | ND |
| 15 | 498.536 | 498.514 | 498.461 | 498.427 | 498.412 | 498.378 | 498.376 | 498.375 | 498.526 | 498.522 | 498.523 | 498.494 | 498.512 | 498.590 | ND | ND | ND |
| 16 | 498.544 | 498.505 | 498.459 | 498.415 | 498.422 | 498.395 | 498.379 | 498.387 | 498.514 | 498.523 | 498.519 | 498.474 | 498.510 | 498.583 | ND | ND | ND |
| 17 | 498.524 | 498.502 | 498.449 | 498.422 | 498.408 | 498.388 | 498.380 | 498.385 | 498.515 | 498.538 | 498.514 | 498.468 | 498.592 | 498.586 | ND | ND | ND |
| 18 | 498.542 | 498.493 | 498.461 | 498.425 | 498.407 | 498.372 | 498.366 | 498.427 | 498.515 | 498.533 | 498.511 | 498.472 | 498.572 | 498.583 | ND | ND | ND |
| 19 | 498.534 | 498.500 | 498.457 | 498.424 | 498.398 | 498.369 | 498.394 | 498.435 | 498.512 | 498.533 | 498.507 | 498.466 | 498.576 | 498.584 | ND | ND | ND |
| 20 | 498.523 | 498.493 | 498.452 | 498.423 | 498.405 | 498.394 | 498.388 | 498.445 | 498.513 | 498.537 | 498.510 | 498.465 | 498.585 | 498.581 | ND | ND | ND |
| 21 | 498.501 | 498.492 | 498.450 | 498.425 | 498.413 | 498.400 | 498.376 | 498.460 | 498.517 | 498.532 | 498.506 | 498.462 | 498.571 | 498.602 | ND | ND | ND |
| 22 | 498.493 | 498.483 | 498.435 | 498.427 | 498.410 | 498.395 | 498.388 | 498.480 | 498.519 | 498.534 | 498.508 | 498.460 | 498.567 | 498.577 | ND | ND | ND |
| 23 | 498.499 | 498.471 | 498.452 | 498.424 | 498.408 | 498.394 | 498.382 | 498.490 | 498.546 | 498.538 | 498.502 | 498.457 | 498.579 | 498.580 | ND | ND | ND |
| 24 | 498.498 | 498.472 | 498.440 | 498.421 | 498.403 | 498.375 | 498.369 | 498.474 | 498.531 | 498.537 | 498.509 | 498.460 | 498.565 | 498.596 | ND | ND | ND |
| 25 | 498.505 | 498.490 | 498.448 | 498.417 | 498.401 | 498.375 | 498.362 | 498.479 | 498.521 | 498.531 | 498.517 | 498.479 | 498.584 | 498.589 | ND | ND | ND |
| 26 | 498.505 | 498.479 | 498.453 | 498.416 | 498.409 | 498.394 | 498.379 | 498.494 | 498.524 | 498.512 | 498.501 | 498.470 | 498.581 | 498.596 | ND | ND | ND |
| 27 | 498.511 | 498.508 | 498.438 | 498.418 | 498.404 | 498.397 | 498.396 | 498.529 | 498.514 | 498.535 | 498.500 | 498.480 | 498.591 | 498.599 | ND | ND | ND |
| 28 | 498.490 | 498.484 | 498.444 | 498.418 | 498.413 | 498.389 | 498.384 | 498.519 | 498.513 | 498.527 | 498.500 | 498.476 | 498.592 | 498.584 | ND | ND | ND |
| 29 | 498.490 | 498.496 | 498.445 | 498.419 | 498.399 | 498.372 | - | 498.522 | 498.510 | 498.523 | 498.490 | 498.471 | 498.596 | 498.584 | ND | ND | ND |
| 30 | 498.492 | 498.497 | 498.442 | 498.418 | 498.393 | 498.381 | - | 498.529 | 498.517 | 498.512 | 498.500 | 498.463 | 498.592 | 498.568 | ND | ND | ND |
| 31 | 498.534 | - | 498.442 | - | 498.373 | 498.395 | - | 498.520 | - | 498.508 | - | 498.472 | 498.591 | - | ND | - | ND |

Note: elevations in table are in metres (arbitrary datum).

- = day not present in month; ND = no data.

**Table C-16: 2018-19 Mean Daily Discharge for CR-WC-MS-03**

| DATE | 2018 | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | ND | 0.986 | 0.900 | 0.814 | 0.772 | 0.669 | 0.592 | 0.504 | 1.013 | 1.105 | 1.275 | 1.022 | 0.878 | 1.251 | ND | ND | ND |
| 2 | ND | 1.046 | 0.933 | 0.803 | 0.762 | 0.679 | 0.569 | 0.512 | 0.973 | 1.187 | 1.233 | 0.969 | 0.886 | 1.234 | ND | ND | ND |
| 3 | ND | 1.016 | 0.923 | 0.797 | 0.712 | 0.694 | 0.571 | 0.552 | 0.933 | 1.203 | 1.257 | 1.017 | 0.931 | 1.221 | ND | ND | ND |
| 4 | 1.226 | 1.091 | 0.898 | 0.826 | 0.751 | 0.678 | 0.572 | 0.549 | 0.986 | 1.236 | 1.364 | 0.978 | 1.030 | 1.230 | ND | ND | ND |
| 5 | 1.185 | 0.976 | 0.869 | 0.801 | 0.719 | 0.631 | 0.574 | 0.547 | 0.935 | 1.243 | 1.329 | 0.970 | 1.004 | 1.267 | ND | ND | ND |
| 6 | 1.123 | 1.018 | 0.886 | 0.822 | 0.721 | 0.649 | 0.575 | 0.538 | 0.976 | 1.259 | 1.310 | 0.959 | 1.034 | 1.294 | ND | ND | ND |
| 7 | 1.094 | 0.926 | 0.879 | 0.791 | 0.703 | 0.634 | 0.576 | 0.543 | 1.019 | 1.259 | 1.278 | 0.943 | 1.018 | 1.291 | ND | ND | ND |
| 8 | 1.193 | 0.962 | 0.855 | 0.777 | 0.685 | 0.640 | 0.518 | 0.515 | 1.014 | 1.265 | 1.317 | 0.949 | 0.984 | 1.315 | ND | ND | ND |
| 9 | 1.149 | 0.961 | 0.874 | 0.791 | 0.729 | 0.584 | 0.553 | 0.535 | 1.013 | 1.286 | 1.214 | 0.937 | 0.985 | 1.273 | ND | ND | ND |
| 10 | 1.139 | 1.024 | 0.863 | 0.804 | 0.697 | 0.643 | 0.572 | 0.540 | 1.017 | 1.301 | 1.191 | 0.922 | 1.036 | 1.268 | ND | ND | ND |
| 11 | 1.197 | 1.021 | 0.875 | 0.790 | 0.674 | 0.635 | 0.567 | 0.570 | 1.035 | 1.312 | 1.196 | 0.915 | 1.025 | 1.260 | ND | ND | ND |
| 12 | 1.160 | 1.072 | 0.916 | 0.783 | 0.733 | 0.671 | 0.591 | 0.552 | 1.037 | 1.411 | 1.172 | 0.906 | 0.994 | 1.235 | ND | ND | ND |
| 13 | 1.103 | 1.030 | 0.889 | 0.788 | 0.720 | 0.664 | 0.557 | 0.510 | 1.039 | 1.364 | 1.168 | 0.912 | 1.016 | 1.228 | ND | ND | ND |
| 14 | 1.025 | 1.024 | 0.840 | 0.813 | 0.691 | 0.636 | 0.514 | 0.532 | 1.025 | 1.428 | 1.207 | 0.908 | 1.001 | 1.274 | ND | ND | ND |
| 15 | 1.070 | 1.014 | 0.871 | 0.787 | 0.724 | 0.577 | 0.545 | 0.514 | 1.049 | 1.408 | 1.185 | 0.964 | 1.012 | 1.239 | ND | ND | ND |
| 16 | 1.092 | 0.989 | 0.865 | 0.753 | 0.760 | 0.628 | 0.552 | 0.547 | 1.025 | 1.405 | 1.161 | 0.906 | 1.005 | 1.218 | ND | ND | ND |
| 17 | 1.035 | 0.983 | 0.840 | 0.775 | 0.704 | 0.606 | 0.552 | 0.546 | 1.037 | 1.451 | 1.137 | 0.890 | 1.247 | 1.227 | ND | ND | ND |
| 18 | 1.085 | 0.957 | 0.870 | 0.781 | 0.702 | 0.559 | 0.512 | 0.678 | 1.043 | 1.434 | 1.116 | 0.900 | 1.183 | 1.217 | ND | ND | ND |
| 19 | 1.063 | 0.976 | 0.862 | 0.779 | 0.670 | 0.549 | 0.591 | 0.713 | 1.045 | 1.428 | 1.096 | 0.885 | 1.197 | 1.220 | ND | ND | ND |
| 20 | 1.034 | 0.958 | 0.849 | 0.778 | 0.692 | 0.622 | 0.572 | 0.752 | 1.058 | 1.431 | 1.095 | 0.881 | 1.223 | 1.211 | ND | ND | ND |
| 21 | 0.972 | 0.954 | 0.843 | 0.781 | 0.719 | 0.639 | 0.537 | 0.797 | 1.077 | 1.409 | 1.075 | 0.874 | 1.179 | 1.279 | ND | ND | ND |
| 22 | 0.951 | 0.930 | 0.807 | 0.787 | 0.706 | 0.624 | 0.570 | 0.850 | 1.089 | 1.412 | 1.073 | 0.868 | 1.169 | 1.200 | ND | ND | ND |
| 23 | 0.968 | 0.897 | 0.848 | 0.780 | 0.699 | 0.618 | 0.553 | 0.878 | 1.179 | 1.415 | 1.045 | 0.860 | 1.203 | 1.208 | ND | ND | ND |
| 24 | 0.964 | 0.898 | 0.817 | 0.773 | 0.682 | 0.561 | 0.515 | 0.840 | 1.143 | 1.407 | 1.056 | 0.870 | 1.163 | 1.258 | ND | ND | ND |
| 25 | 0.985 | 0.948 | 0.839 | 0.760 | 0.673 | 0.560 | 0.494 | 0.857 | 1.123 | 1.385 | 1.068 | 0.920 | 1.222 | 1.237 | ND | ND | ND |
| 26 | 0.985 | 0.920 | 0.850 | 0.755 | 0.698 | 0.615 | 0.543 | 0.898 | 1.140 | 1.311 | 1.018 | 0.896 | 1.210 | 1.259 | ND | ND | ND |
| 27 | 1.001 | 1.001 | 0.814 | 0.762 | 0.679 | 0.623 | 0.589 | 1.000 | 1.121 | 1.384 | 1.006 | 0.924 | 1.243 | 1.268 | ND | ND | ND |
| 28 | 0.945 | 0.934 | 0.827 | 0.762 | 0.711 | 0.597 | 0.554 | 0.976 | 1.126 | 1.352 | 0.998 | 0.913 | 1.247 | 1.219 | ND | ND | ND |
| 29 | 0.943 | 0.968 | 0.831 | 0.764 | 0.661 | 0.547 | - | 0.986 | 1.127 | 1.334 | 0.961 | 0.899 | 1.260 | 1.221 | ND | ND | ND |
| 30 | 0.949 | 0.969 | 0.823 | 0.764 | 0.639 | 0.571 | - | 1.009 | 1.159 | 1.290 | 0.979 | 0.875 | 1.248 | 1.172 | ND | ND | ND |
| 31 | 1.067 | - | 0.822 | - | 0.579 | 0.615 | - | 0.988 | - | 1.270 | - | 0.900 | 1.243 | - | ND | - | ND |

Note: elevations in table are in metres (arbitrary datum).

- = day not present in month; ND = no data.

**Table C-17: 2018-19 Daily Water Surface Elevation for CR-WC-MS-04**

| DATE | 2018 | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | ND | 498.213 | 498.178 | 498.149 | 498.159 | 498.127 | 498.121 | 498.109 | 498.332 | 498.200 | 498.178 | 498.226 | 498.188 | 498.307 | 498.294 | ND | ND |
| 2 | ND | 498.224 | ND | 498.141 | 498.162 | 498.153 | 498.120 | 498.120 | 498.300 | 498.234 | 498.176 | 498.245 | 498.196 | 498.311 | 498.293 | ND | ND |
| 3 | ND | 498.216 | 498.179 | 498.158 | 498.127 | 498.175 | 498.124 | 498.139 | 498.276 | 498.229 | 498.204 | 498.241 | 498.218 | 498.315 | ND | ND | ND |
| 4 | ND | 498.228 | 498.165 | 498.121 | 498.149 | 498.172 | 498.111 | 498.159 | 498.292 | 498.235 | 498.221 | 498.242 | 498.244 | 498.311 | ND | ND | ND |
| 5 | ND | 498.205 | 498.134 | 498.139 | 498.136 | 498.142 | 498.112 | 498.167 | 498.263 | 498.231 | 498.232 | 498.216 | 498.237 | 498.317 | ND | ND | ND |
| 6 | 498.252 | 498.201 | 498.173 | 498.144 | 498.143 | 498.143 | 498.108 | 498.172 | 498.292 | 498.229 | 498.229 | 498.221 | 498.234 | 498.329 | ND | ND | ND |
| 7 | 498.259 | 498.198 | 498.169 | 498.149 | 498.125 | 498.146 | 498.109 | 498.188 | 498.296 | 498.230 | 498.226 | 498.219 | 498.235 | 498.323 | ND | ND | ND |
| 8 | 498.256 | 498.199 | 498.150 | 498.149 | 498.118 | 498.130 | 498.111 | 498.185 | 498.283 | 498.231 | 498.228 | 498.213 | 498.230 | 498.337 | ND | ND | ND |
| 9 | 498.255 | 498.211 | 498.156 | 498.148 | 498.154 | 498.123 | 498.114 | 498.198 | 498.280 | 498.236 | 498.211 | 498.213 | 498.223 | 498.320 | ND | ND | ND |
| 10 | 498.256 | 498.210 | 498.158 | 498.160 | 498.136 | 498.138 | 498.125 | 498.223 | 498.273 | 498.237 | 498.228 | 498.214 | 498.243 | 498.317 | ND | ND | ND |
| 11 | 498.256 | 498.219 | 498.175 | 498.158 | 498.140 | 498.144 | 498.128 | 498.257 | 498.277 | 498.238 | 498.207 | 498.204 | 498.237 | 498.321 | ND | ND | ND |
| 12 | 498.223 | 498.227 | 498.176 | 498.154 | 498.155 | 498.156 | 498.139 | 498.264 | 498.275 | 498.250 | 498.223 | 498.201 | 498.238 | 498.321 | ND | ND | ND |
| 13 | 498.232 | 498.231 | 498.169 | 498.164 | 498.158 | 498.164 | 498.123 | 498.264 | 498.272 | 498.233 | 498.233 | 498.199 | 498.238 | 498.321 | ND | ND | ND |
| 14 | 498.247 | 498.209 | 498.138 | 498.170 | 498.152 | 498.140 | 498.113 | 498.277 | 498.267 | 498.234 | 498.229 | 498.200 | 498.236 | 498.321 | ND | ND | ND |
| 15 | 498.234 | 498.211 | 498.170 | 498.151 | 498.157 | 498.132 | 498.119 | 498.276 | 498.269 | 498.230 | 498.233 | 498.226 | 498.240 | 498.319 | ND | ND | ND |
| 16 | 498.211 | 498.201 | 498.172 | 498.120 | 498.120 | 498.134 | 498.126 | 498.305 | 498.254 | 498.212 | 498.233 | 498.196 | 498.231 | 498.312 | ND | ND | ND |
| 17 | 498.224 | 498.198 | 498.172 | 498.129 | 498.125 | 498.132 | 498.126 | 498.297 | 498.261 | 498.221 | 498.232 | 498.194 | 498.273 | 498.317 | ND | ND | ND |
| 18 | 498.219 | 498.199 | 498.176 | 498.135 | 498.147 | 498.125 | 498.119 | 498.325 | 498.256 | 498.219 | 498.234 | 498.195 | 498.289 | 498.309 | ND | ND | ND |
| 19 | 498.207 | 498.196 | 498.184 | 498.130 | 498.135 | 498.120 | 498.155 | 498.337 | 498.257 | 498.219 | 498.234 | 498.196 | 498.295 | 498.313 | ND | ND | ND |
| 20 | 498.200 | 498.194 | 498.159 | 498.146 | 498.157 | 498.129 | 498.150 | 498.341 | 498.262 | 498.223 | 498.228 | 498.184 | 498.299 | 498.310 | ND | ND | ND |
| 21 | 498.219 | 498.187 | 498.181 | 498.137 | 498.165 | 498.146 | 498.122 | 498.349 | 498.259 | 498.219 | 498.222 | 498.185 | 498.298 | 498.311 | ND | ND | ND |
| 22 | 498.211 | 498.180 | 498.160 | 498.153 | 498.154 | 498.146 | 498.147 | 498.364 | 498.267 | 498.221 | 498.221 | 498.191 | 498.294 | 498.308 | ND | ND | ND |
| 23 | 498.165 | 498.183 | 498.164 | 498.157 | 498.150 | 498.140 | 498.132 | 498.358 | 498.277 | 498.216 | 498.218 | 498.191 | 498.305 | 498.306 | ND | ND | ND |
| 24 | 498.175 | 498.193 | 498.164 | 498.138 | 498.141 | 498.120 | 498.121 | 498.335 | 498.269 | 498.201 | 498.216 | 498.191 | 498.296 | 498.315 | ND | ND | ND |
| 25 | 498.190 | 498.185 | 498.169 | 498.140 | 498.125 | 498.123 | 498.128 | 498.352 | 498.262 | 498.197 | 498.220 | 498.200 | 498.303 | 498.311 | ND | ND | ND |
| 26 | 498.191 | 498.188 | 498.161 | 498.148 | 498.138 | 498.143 | 498.137 | 498.355 | 498.256 | 498.182 | 498.213 | 498.181 | 498.305 | 498.311 | ND | ND | ND |
| 27 | 498.200 | 498.181 | 498.170 | 498.152 | 498.127 | 498.159 | 498.168 | 498.353 | 498.239 | 498.201 | 498.215 | 498.198 | 498.299 | 498.313 | ND | ND | ND |
| 28 | 498.186 | 498.177 | 498.159 | 498.149 | 498.137 | 498.130 | 498.140 | 498.343 | 498.238 | 498.197 | 498.220 | 498.212 | 498.309 | 498.276 | ND | ND | ND |
| 29 | 498.187 | 498.187 | 498.158 | 498.147 | 498.121 | 498.113 | - | 498.339 | 498.234 | 498.200 | 498.221 | 498.185 | 498.317 | 498.294 | ND | ND | ND |
| 30 | 498.186 | 498.167 | 498.157 | 498.156 | 498.121 | 498.119 | - | 498.340 | 498.232 | 498.190 | 498.225 | 498.194 | 498.312 | 498.289 | ND | ND | ND |
| 31 | 498.242 | - | 498.152 | - | 498.112 | 498.134 | - | 498.325 | - | 498.160 | - | 498.192 | 498.309 | - | ND | - | ND |

Note: elevations in table are in metres (arbitrary datum).

- = day not present in month; ND = no data.

**Table C-18: 2018-19 Mean Daily Discharge for CR-WC-MS-04**

| DATE | 2018 | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | ND | 1.793 | 1.702 | 1.625 | 1.651 | 1.569 | 1.554 | 1.522 | 2.114 | 1.760 | 1.701 | 1.829 | 1.729 | 2.044 | 1.849 | ND | ND |
| 2 | ND | 1.824 | ND | 1.604 | 1.660 | 1.637 | 1.552 | 1.551 | 2.026 | 1.851 | 1.697 | 1.879 | 1.750 | 2.053 | 1.846 | ND | ND |
| 3 | ND | 1.801 | 1.703 | 1.649 | 1.568 | 1.694 | 1.560 | 1.600 | 1.963 | 1.837 | 1.769 | 1.868 | 1.807 | 2.054 | ND | ND | ND |
| 4 | ND | 1.835 | 1.668 | 1.552 | 1.625 | 1.686 | 1.528 | 1.653 | 2.004 | 1.853 | 1.816 | 1.871 | 1.875 | 2.031 | ND | ND | ND |
| 5 | ND | 1.772 | 1.587 | 1.599 | 1.593 | 1.607 | 1.530 | 1.672 | 1.927 | 1.843 | 1.845 | 1.802 | 1.857 | 2.035 | ND | ND | ND |
| 6 | 1.897 | 1.763 | 1.688 | 1.614 | 1.610 | 1.611 | 1.520 | 1.685 | 2.005 | 1.838 | 1.837 | 1.816 | 1.849 | 2.056 | ND | ND | ND |
| 7 | 1.915 | 1.754 | 1.679 | 1.625 | 1.563 | 1.618 | 1.522 | 1.729 | 2.016 | 1.838 | 1.827 | 1.810 | 1.853 | 2.027 | ND | ND | ND |
| 8 | 1.909 | 1.758 | 1.628 | 1.626 | 1.546 | 1.576 | 1.526 | 1.720 | 1.981 | 1.842 | 1.833 | 1.793 | 1.839 | 2.055 | ND | ND | ND |
| 9 | 1.907 | 1.790 | 1.644 | 1.623 | 1.638 | 1.558 | 1.535 | 1.754 | 1.972 | 1.854 | 1.789 | 1.794 | 1.821 | 1.998 | ND | ND | ND |
| 10 | 1.909 | 1.785 | 1.650 | 1.655 | 1.591 | 1.597 | 1.563 | 1.822 | 1.954 | 1.858 | 1.833 | 1.796 | 1.872 | 1.977 | ND | ND | ND |
| 11 | 1.909 | 1.811 | 1.693 | 1.649 | 1.604 | 1.613 | 1.572 | 1.911 | 1.966 | 1.859 | 1.777 | 1.770 | 1.858 | 1.977 | ND | ND | ND |
| 12 | 1.821 | 1.832 | 1.697 | 1.638 | 1.641 | 1.643 | 1.599 | 1.929 | 1.959 | 1.892 | 1.822 | 1.761 | 1.860 | 1.963 | ND | ND | ND |
| 13 | 1.844 | 1.841 | 1.679 | 1.665 | 1.650 | 1.665 | 1.560 | 1.931 | 1.951 | 1.847 | 1.847 | 1.758 | 1.860 | 1.954 | ND | ND | ND |
| 14 | 1.884 | 1.784 | 1.597 | 1.682 | 1.634 | 1.603 | 1.532 | 1.964 | 1.939 | 1.849 | 1.837 | 1.760 | 1.854 | 1.942 | ND | ND | ND |
| 15 | 1.850 | 1.789 | 1.679 | 1.630 | 1.647 | 1.583 | 1.549 | 1.961 | 1.943 | 1.839 | 1.847 | 1.829 | 1.867 | 1.925 | ND | ND | ND |
| 16 | 1.789 | 1.763 | 1.686 | 1.551 | 1.551 | 1.586 | 1.566 | 2.039 | 1.903 | 1.791 | 1.847 | 1.748 | 1.841 | 1.897 | ND | ND | ND |
| 17 | 1.822 | 1.754 | 1.687 | 1.573 | 1.563 | 1.582 | 1.567 | 2.018 | 1.922 | 1.816 | 1.845 | 1.745 | 1.955 | 1.910 | ND | ND | ND |
| 18 | 1.809 | 1.757 | 1.697 | 1.589 | 1.622 | 1.565 | 1.549 | 2.094 | 1.907 | 1.810 | 1.848 | 1.748 | 1.998 | 1.890 | ND | ND | ND |
| 19 | 1.778 | 1.749 | 1.718 | 1.576 | 1.589 | 1.550 | 1.640 | 2.127 | 1.912 | 1.810 | 1.851 | 1.749 | 2.014 | 1.899 | ND | ND | ND |
| 20 | 1.759 | 1.743 | 1.651 | 1.619 | 1.646 | 1.573 | 1.630 | 2.137 | 1.924 | 1.821 | 1.833 | 1.718 | 2.023 | 1.891 | ND | ND | ND |
| 21 | 1.810 | 1.725 | 1.709 | 1.595 | 1.667 | 1.618 | 1.555 | 2.159 | 1.916 | 1.810 | 1.817 | 1.720 | 2.023 | 1.896 | ND | ND | ND |
| 22 | 1.789 | 1.708 | 1.655 | 1.635 | 1.639 | 1.618 | 1.621 | 2.202 | 1.938 | 1.816 | 1.816 | 1.736 | 2.010 | 1.886 | ND | ND | ND |
| 23 | 1.667 | 1.714 | 1.666 | 1.646 | 1.628 | 1.602 | 1.581 | 2.183 | 1.966 | 1.802 | 1.806 | 1.735 | 2.040 | 1.882 | ND | ND | ND |
| 24 | 1.695 | 1.740 | 1.666 | 1.597 | 1.605 | 1.551 | 1.555 | 2.121 | 1.942 | 1.763 | 1.803 | 1.736 | 2.015 | 1.906 | ND | ND | ND |
| 25 | 1.733 | 1.719 | 1.678 | 1.603 | 1.565 | 1.559 | 1.571 | 2.169 | 1.925 | 1.751 | 1.812 | 1.760 | 2.035 | 1.896 | ND | ND | ND |
| 26 | 1.736 | 1.729 | 1.658 | 1.624 | 1.598 | 1.610 | 1.595 | 2.177 | 1.909 | 1.712 | 1.793 | 1.711 | 2.041 | 1.896 | ND | ND | ND |
| 27 | 1.759 | 1.711 | 1.680 | 1.634 | 1.569 | 1.652 | 1.676 | 2.170 | 1.863 | 1.761 | 1.799 | 1.754 | 2.023 | 1.900 | ND | ND | ND |
| 28 | 1.723 | 1.700 | 1.652 | 1.625 | 1.595 | 1.577 | 1.602 | 2.143 | 1.860 | 1.750 | 1.812 | 1.790 | 2.050 | 1.802 | ND | ND | ND |
| 29 | 1.727 | 1.726 | 1.650 | 1.620 | 1.554 | 1.533 | - | 2.132 | 1.851 | 1.760 | 1.816 | 1.720 | 2.073 | 1.848 | ND | ND | ND |
| 30 | 1.722 | 1.673 | 1.646 | 1.645 | 1.552 | 1.549 | - | 2.134 | 1.844 | 1.733 | 1.826 | 1.744 | 2.059 | 1.836 | ND | ND | ND |
| 31 | 1.872 | - | 1.634 | - | 1.531 | 1.586 | - | 2.096 | - | 1.654 | - | 1.738 | 2.051 | - | ND | - | ND |

Note: elevations in table are in metres (arbitrary datum).

- = day not present in month; ND = no data.

**Table C-19: 2018-19 Daily Water Surface Elevation for CR-WC-MS-05**

| DATE | 2018 | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | ND | 498.159 | 498.124 | 498.065 | 498.083 | 498.050 | 498.054 | 498.012 | 498.088 | 498.132 | 498.076 | 498.128 | Nd | ND | ND | ND | ND |
| 2 | ND | 498.183 | 498.112 | 498.056 | 498.089 | 498.074 | 498.055 | 498.018 | 498.062 | 498.144 | 498.066 | 498.165 | ND | ND | ND | ND | ND |
| 3 | ND | 498.175 | 498.134 | 498.060 | 498.050 | 498.102 | 498.060 | 498.023 | 498.045 | 498.135 | 498.102 | 498.154 | ND | ND | ND | ND | ND |
| 4 | 498.201 | 498.179 | 498.123 | 498.045 | 498.072 | 498.106 | 498.050 | 498.030 | 498.072 | 498.142 | 498.111 | ND | ND | ND | ND | ND | ND |
| 5 | 498.183 | 498.160 | 498.108 | 498.046 | 498.052 | 498.081 | 498.052 | 498.024 | 498.062 | 498.134 | 498.142 | ND | ND | ND | ND | ND | ND |
| 6 | 498.179 | 498.164 | 498.108 | 498.057 | 498.064 | 498.081 | 498.048 | 498.016 | 498.098 | 498.130 | 498.126 | ND | ND | ND | ND | ND | ND |
| 7 | 498.190 | 498.148 | 498.102 | 498.046 | 498.044 | 498.084 | 498.047 | 498.021 | 498.095 | 498.132 | 498.128 | ND | ND | ND | ND | ND | ND |
| 8 | 498.202 | 498.144 | 498.083 | 498.046 | 498.023 | 498.068 | 498.045 | 498.004 | 498.087 | 498.131 | 498.127 | ND | ND | ND | ND | ND | ND |
| 9 | 498.201 | 498.141 | 498.087 | 498.055 | 498.059 | 498.061 | 498.046 | 498.003 | 498.092 | 498.133 | 498.106 | ND | ND | ND | ND | ND | ND |
| 10 | 498.198 | 498.163 | 498.086 | 498.075 | 498.041 | 498.073 | 498.055 | 498.016 | 498.093 | 498.146 | 498.134 | ND | ND | ND | ND | ND | ND |
| 11 | 498.195 | 498.168 | 498.104 | 498.066 | 498.050 | 498.078 | 498.057 | 498.039 | 498.103 | 498.139 | 498.098 | ND | ND | ND | ND | ND | ND |
| 12 | 498.190 | 498.172 | 498.124 | 498.067 | 498.064 | 498.091 | 498.064 | 498.035 | 498.112 | 498.149 | 498.120 | ND | ND | ND | ND | ND | ND |
| 13 | 498.172 | 498.160 | 498.099 | 498.088 | 498.069 | 498.099 | 498.048 | 498.025 | 498.119 | 498.133 | 498.135 | ND | ND | ND | ND | ND | ND |
| 14 | 498.168 | 498.160 | 498.066 | 498.110 | 498.065 | 498.080 | 498.036 | 498.026 | 498.127 | 498.136 | 498.124 | ND | ND | ND | ND | ND | ND |
| 15 | 498.176 | 498.166 | 498.098 | 498.075 | 498.071 | 498.065 | 498.043 | 498.015 | 498.135 | 498.129 | 498.121 | ND | ND | ND | ND | ND | ND |
| 16 | 498.168 | 498.166 | 498.096 | 498.038 | 498.023 | 498.076 | 498.049 | 498.030 | 498.133 | 498.114 | 498.121 | ND | ND | ND | ND | ND | ND |
| 17 | 498.154 | 498.156 | 498.096 | 498.046 | 498.053 | 498.078 | 498.048 | 498.011 | 498.137 | 498.118 | 498.117 | ND | ND | ND | ND | ND | ND |
| 18 | 498.158 | 498.150 | 498.098 | 498.052 | 498.058 | 498.073 | 498.040 | 498.028 | 498.136 | 498.109 | 498.119 | ND | ND | ND | ND | ND | ND |
| 19 | 498.158 | 498.153 | 498.105 | 498.044 | 498.053 | 498.066 | 498.075 | 498.030 | 498.138 | 498.116 | 498.125 | ND | ND | ND | ND | ND | ND |
| 20 | 498.150 | 498.149 | 498.082 | 498.065 | 498.060 | 498.074 | 498.069 | 498.028 | 498.136 | 498.116 | 498.115 | ND | ND | ND | ND | ND | ND |
| 21 | 498.145 | 498.149 | 498.103 | 498.051 | 498.078 | 498.088 | 498.037 | 498.029 | 498.140 | 498.113 | 498.109 | ND | ND | ND | ND | ND | ND |
| 22 | 498.140 | 498.148 | 498.097 | 498.090 | 498.059 | 498.086 | 498.062 | 498.037 | 498.143 | 498.110 | 498.111 | ND | ND | ND | ND | ND | ND |
| 23 | 498.112 | 498.129 | 498.092 | 498.091 | 498.066 | 498.081 | 498.045 | 498.029 | 498.149 | 498.105 | 498.103 | ND | ND | ND | ND | ND | ND |
| 24 | 498.101 | 498.131 | 498.087 | 498.061 | 498.064 | 498.063 | 498.035 | 498.008 | 498.147 | 498.098 | 498.106 | ND | ND | ND | ND | ND | ND |
| 25 | 498.122 | 498.138 | 498.087 | 498.060 | 498.053 | 498.067 | 498.039 | 498.043 | 498.147 | 498.097 | 498.111 | ND | ND | ND | ND | ND | ND |
| 26 | 498.127 | 498.135 | 498.081 | 498.071 | 498.063 | 498.084 | 498.047 | 498.061 | 498.144 | 498.079 | 498.107 | ND | ND | ND | ND | ND | ND |
| 27 | 498.123 | 498.150 | 498.088 | 498.091 | 498.055 | 498.100 | 498.076 | 498.069 | 498.139 | 498.100 | 498.107 | ND | ND | ND | ND | ND | ND |
| 28 | 498.119 | 498.139 | 498.081 | 498.087 | 498.063 | 498.072 | 498.046 | 498.072 | 498.140 | 498.095 | 498.114 | ND | ND | ND | ND | ND | ND |
| 29 | 498.118 | 498.148 | 498.088 | 498.075 | 498.047 | 498.059 | - | 498.078 | 498.140 | 498.095 | 498.120 | ND | ND | ND | ND | ND | ND |
| 30 | 498.118 | 498.137 | 498.075 | 498.079 | 498.045 | 498.059 | - | 498.085 | 498.141 | 498.081 | 498.131 | ND | ND | ND | ND | ND | ND |
| 31 | 498.158 | - | 498.073 | - | 498.038 | 498.070 | - | 498.078 | - | 498.069 | - | ND | ND | - | ND | - | ND |

Note: elevations in table are in metres (arbitrary datum).

- = day not present in month; ND = no data.

**Table C-20: 2018-19 Mean Daily Discharge for CR-WC-MS-05**

| DATE | 2018 | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | ND | 3.153 | 3.072 | 2.801 | 2.885 | 2.729 | 2.751 | 2.540 | 2.912 | 3.107 | 2.855 | 3.091 | 2.805 | 3.589 | 3.490 | ND | ND |
| 2 | ND | 3.262 | 3.021 | 2.762 | 2.914 | 2.843 | 2.757 | 2.572 | 2.788 | 3.157 | 2.805 | 3.248 | 2.859 | 3.568 | 3.537 | ND | ND |
| 3 | ND | 3.230 | 3.114 | 2.777 | 2.731 | 2.975 | 2.778 | 2.597 | 2.708 | 3.120 | 2.973 | 3.201 | 2.996 | 3.629 | ND | ND | ND |
| 4 | 3.395 | 3.255 | 3.069 | 2.706 | 2.838 | 2.993 | 2.729 | 2.631 | 2.834 | 3.149 | 3.014 | 3.022 | 3.182 | 3.614 | ND | ND | ND |
| 5 | 3.076 | 3.177 | 2.999 | 2.712 | 2.742 | 2.876 | 2.741 | 2.601 | 2.790 | 3.116 | 3.152 | 2.979 | 3.184 | 3.669 | ND | ND | ND |
| 6 | 3.040 | 3.200 | 3.001 | 2.766 | 2.797 | 2.879 | 2.722 | 2.563 | 2.957 | 3.099 | 3.080 | 2.962 | 3.159 | 3.745 | ND | ND | ND |
| 7 | 3.162 | 3.137 | 2.975 | 2.712 | 2.703 | 2.893 | 2.717 | 2.588 | 2.944 | 3.106 | 3.090 | 2.954 | 3.150 | 3.701 | ND | ND | ND |
| 8 | 3.219 | 3.122 | 2.887 | 2.712 | 2.597 | 2.819 | 2.708 | 2.501 | 2.906 | 3.102 | 3.086 | 2.945 | 3.120 | 3.699 | ND | ND | ND |
| 9 | 3.218 | 3.117 | 2.907 | 2.754 | 2.772 | 2.782 | 2.711 | 2.495 | 2.927 | 3.110 | 2.994 | 2.935 | 3.092 | 3.646 | ND | ND | ND |
| 10 | 3.210 | 3.216 | 2.900 | 2.848 | 2.689 | 2.841 | 2.754 | 2.563 | 2.931 | 3.167 | 3.116 | 2.926 | 3.169 | 3.631 | ND | ND | ND |
| 11 | 3.204 | 3.241 | 2.984 | 2.809 | 2.729 | 2.864 | 2.764 | 2.678 | 2.978 | 3.136 | 2.956 | 2.921 | 3.189 | 3.640 | ND | ND | ND |
| 12 | 3.189 | 3.265 | 3.072 | 2.813 | 2.797 | 2.923 | 2.799 | 2.658 | 3.019 | 3.179 | 3.054 | 2.906 | 3.168 | 3.604 | ND | ND | ND |
| 13 | 3.117 | 3.218 | 2.961 | 2.910 | 2.823 | 2.959 | 2.720 | 2.609 | 3.051 | 3.111 | 3.121 | 2.888 | 3.152 | 3.708 | ND | ND | ND |
| 14 | 3.103 | 3.223 | 2.805 | 3.010 | 2.801 | 2.872 | 2.662 | 2.612 | 3.084 | 3.123 | 3.071 | 2.881 | 3.148 | 3.667 | ND | ND | ND |
| 15 | 3.144 | 3.250 | 2.956 | 2.851 | 2.831 | 2.804 | 2.696 | 2.556 | 3.118 | 3.094 | 3.060 | 2.899 | 3.171 | 3.655 | ND | ND | ND |
| 16 | 3.114 | 3.250 | 2.946 | 2.672 | 2.598 | 2.854 | 2.725 | 2.630 | 3.109 | 3.028 | 3.058 | 2.875 | 3.130 | 3.625 | ND | ND | ND |
| 17 | 3.056 | 3.211 | 2.947 | 2.711 | 2.744 | 2.862 | 2.720 | 2.537 | 3.130 | 3.047 | 3.041 | 2.839 | 3.332 | 3.593 | ND | ND | ND |
| 18 | 3.077 | 3.185 | 2.954 | 2.742 | 2.769 | 2.841 | 2.682 | 2.623 | 3.126 | 3.003 | 3.048 | 2.875 | 3.524 | 3.591 | ND | ND | ND |
| 19 | 3.085 | 3.196 | 2.989 | 2.702 | 2.747 | 2.809 | 2.848 | 2.631 | 3.132 | 3.035 | 3.076 | 2.871 | 3.559 | 3.577 | ND | ND | ND |
| 20 | 3.056 | 3.179 | 2.884 | 2.800 | 2.779 | 2.847 | 2.822 | 2.622 | 3.126 | 3.038 | 3.031 | 2.788 | 3.549 | 3.553 | ND | ND | ND |
| 21 | 3.037 | 3.182 | 2.977 | 2.738 | 2.862 | 2.909 | 2.668 | 2.626 | 3.141 | 3.023 | 3.004 | 2.776 | 3.532 | 3.572 | ND | ND | ND |
| 22 | 3.022 | 3.176 | 2.952 | 2.917 | 2.775 | 2.901 | 2.788 | 2.669 | 3.154 | 3.012 | 3.014 | 2.774 | 3.595 | 3.554 | ND | ND | ND |
| 23 | 2.898 | 3.093 | 2.928 | 2.925 | 2.809 | 2.877 | 2.707 | 2.626 | 3.180 | 2.986 | 2.980 | 2.778 | 3.597 | 3.545 | ND | ND | ND |
| 24 | 2.851 | 3.102 | 2.905 | 2.784 | 2.798 | 2.795 | 2.660 | 2.519 | 3.171 | 2.955 | 2.991 | 2.792 | 3.539 | 3.619 | ND | ND | ND |
| 25 | 2.955 | 3.131 | 2.904 | 2.778 | 2.744 | 2.810 | 2.679 | 2.695 | 3.170 | 2.950 | 3.012 | 2.873 | 3.595 | 3.607 | ND | ND | ND |
| 26 | 2.981 | 3.118 | 2.876 | 2.829 | 2.794 | 2.890 | 2.717 | 2.784 | 3.157 | 2.869 | 2.994 | 2.770 | 3.573 | 3.580 | ND | ND | ND |
| 27 | 2.968 | 3.183 | 2.911 | 2.922 | 2.757 | 2.962 | 2.853 | 2.822 | 3.137 | 2.964 | 2.995 | 2.834 | 3.562 | 3.494 | ND | ND | ND |
| 28 | 2.959 | 3.138 | 2.876 | 2.905 | 2.791 | 2.837 | 2.709 | 2.836 | 3.143 | 2.942 | 3.026 | 2.889 | 3.616 | 3.452 | ND | ND | ND |
| 29 | 2.956 | 3.175 | 2.908 | 2.851 | 2.717 | 2.772 | - | 2.862 | 3.143 | 2.944 | 3.053 | 2.810 | 3.624 | 3.497 | ND | ND | ND |
| 30 | 2.964 | 3.128 | 2.850 | 2.869 | 2.706 | 2.775 | - | 2.894 | 3.146 | 2.879 | 3.102 | 2.815 | 3.637 | 3.472 | ND | ND | ND |
| 31 | 3.144 | - | 2.840 | - | 2.670 | 2.825 | - | 2.866 | - | 2.822 | - | 2.818 | 3.619 | - | ND | - | ND |

Note: elevations in table are in metres (arbitrary datum).

- = day not present in month; ND = no data.

**Table C-21: 2018-19 Daily Water Surface Elevation for CR-WC-MS-06**

| DATE | 2018 | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | ND | 97.176 | 97.212 | ND | ND | ND | ND | ND | ND | ND | 97.095 | 97.139 | 97.117 | 97.548 | 97.582 | ND | ND |
| 2 | ND | 97.176 | 97.201 | ND | ND | ND | ND | ND | ND | ND | 97.092 | 97.144 | 97.126 | 97.547 | 97.577 | ND | ND |
| 3 | ND | 97.184 | ND | ND | ND | ND | ND | ND | ND | ND | 97.088 | 97.169 | 97.140 | 97.546 | 97.574 | ND | ND |
| 4 | 97.182 | 97.194 | ND | ND | ND | ND | ND | ND | ND | ND | 97.103 | 97.175 | 97.162 | 97.547 | 97.569 | ND | ND |
| 5 | 97.174 | 97.191 | ND | ND | ND | ND | ND | ND | ND | ND | 97.127 | 97.169 | 97.179 | 97.564 | ND | ND | ND |
| 6 | 97.186 | 97.177 | ND | ND | ND | ND | ND | ND | ND | ND | 97.144 | 97.159 | 97.199 | 97.572 | ND | ND | ND |
| 7 | 97.190 | 97.183 | ND | ND | ND | ND | ND | ND | ND | ND | 97.146 | 97.148 | 97.204 | 97.581 | ND | ND | ND |
| 8 | 97.199 | 97.192 | ND | ND | ND | ND | ND | ND | ND | ND | 97.139 | 97.142 | 97.205 | 97.591 | ND | ND | ND |
| 9 | 97.204 | 97.188 | ND | ND | ND | ND | ND | ND | ND | ND | 97.129 | 97.136 | 97.204 | 97.594 | ND | ND | ND |
| 10 | 97.201 | 97.214 | ND | ND | ND | ND | ND | ND | ND | ND | 97.122 | 97.132 | 97.224 | 97.591 | ND | ND | ND |
| 11 | 97.190 | 97.229 | ND | ND | ND | ND | ND | ND | ND | ND | 97.116 | 97.128 | 97.232 | 97.587 | ND | ND | ND |
| 12 | 97.175 | 97.218 | ND | ND | ND | ND | ND | ND | ND | ND | 97.109 | 97.126 | 97.233 | 97.584 | ND | ND | ND |
| 13 | 97.173 | 97.226 | ND | ND | ND | ND | ND | ND | ND | ND | 97.106 | 97.125 | 97.229 | 97.580 | ND | ND | ND |
| 14 | 97.178 | 97.217 | ND | ND | ND | ND | ND | ND | ND | ND | 97.126 | 97.124 | 97.223 | 97.582 | ND | ND | ND |
| 15 | 97.176 | 97.218 | ND | ND | ND | ND | ND | ND | ND | ND | 97.150 | 97.126 | 97.221 | 97.581 | ND | ND | ND |
| 16 | 97.159 | 97.216 | ND | ND | ND | ND | ND | ND | ND | ND | 97.152 | 97.124 | 97.219 | 97.579 | ND | ND | ND |
| 17 | 97.161 | 97.215 | ND | ND | ND | ND | ND | ND | ND | ND | 97.150 | 97.121 | 97.302 | 97.577 | ND | ND | ND |
| 18 | 97.166 | 97.222 | ND | ND | ND | ND | ND | ND | ND | 97.210 | 97.146 | 97.118 | 97.378 | 97.572 | ND | ND | ND |
| 19 | 97.151 | 97.212 | ND | ND | ND | ND | ND | ND | ND | 97.196 | 97.137 | 97.117 | 97.433 | 97.568 | ND | ND | ND |
| 20 | 97.145 | 97.212 | ND | ND | ND | ND | ND | ND | ND | 97.184 | 97.132 | 97.113 | 97.451 | 97.564 | ND | ND | ND |
| 21 | 97.165 | 97.198 | ND | ND | ND | ND | ND | ND | ND | 97.178 | 97.126 | 97.108 | 97.460 | 97.562 | ND | ND | ND |
| 22 | 97.162 | 97.193 | ND | ND | ND | ND | ND | ND | ND | 97.175 | 97.124 | 97.106 | 97.464 | 97.557 | ND | ND | ND |
| 23 | 97.141 | 97.205 | ND | ND | ND | ND | ND | ND | ND | 97.171 | 97.127 | 97.105 | 97.466 | 97.556 | ND | ND | ND |
| 24 | 97.136 | 97.217 | ND | ND | ND | ND | ND | ND | ND | 97.159 | 97.132 | 97.105 | 97.471 | 97.573 | ND | ND | ND |
| 25 | 97.137 | 97.198 | ND | ND | ND | ND | ND | ND | ND | 97.150 | 97.132 | 97.110 | 97.487 | 97.580 | ND | ND | ND |
| 26 | 97.137 | 97.213 | ND | ND | ND | ND | ND | ND | ND | 97.140 | 97.133 | 97.112 | 97.501 | 97.590 | ND | ND | ND |
| 27 | 97.132 | 97.203 | ND | ND | ND | ND | ND | ND | ND | 97.130 | 97.132 | 97.113 | 97.511 | 97.595 | ND | ND | ND |
| 28 | 97.140 | 97.194 | ND | ND | ND | ND | ND | ND | ND | 97.126 | 97.131 | 97.122 | 97.521 | 97.588 | ND | ND | ND |
| 29 | 97.147 | 97.202 | ND | ND | ND | ND | - | ND | ND | 97.121 | 97.129 | 97.120 | 97.532 | 97.586 | ND | ND | ND |
| 30 | 97.149 | 97.202 | ND | ND | ND | ND | - | ND | ND | 97.112 | 97.135 | 97.120 | 97.537 | 97.585 | ND | ND | ND |
| 31 | 97.167 | - | ND | - | ND | ND | - | ND | - | 97.100 | - | 97.119 | 97.542 | - | ND | - | ND |

Note: elevations in table are in metres (arbitrary datum).

- = day not present in month; ND = no data.

**Table C-22: 2018-19 Mean Daily Discharge for CR-WC-MS-06**

| DATE | 2018 | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | ND | 3.456 | 4.623 | ND | ND | ND | ND | ND | ND | ND | 2.366 | 3.395 | 1.643 | 4.920 | 6.314 | ND | ND |
| 2 | ND | 3.446 | 4.280 | ND | ND | ND | ND | ND | ND | ND | 2.299 | 3.520 | 1.703 | 4.898 | 6.081 | ND | ND |
| 3 | ND | 3.678 | ND | ND | ND | ND | ND | ND | ND | ND | 2.232 | 4.246 | 1.842 | 4.877 | 5.948 | ND | ND |
| 4 | 3.523 | 3.954 | ND | ND | ND | ND | ND | ND | ND | ND | 2.511 | 4.454 | 2.115 | 4.909 | 5.752 | ND | ND |
| 5 | 3.328 | 3.874 | ND | ND | ND | ND | ND | ND | ND | ND | 3.039 | 4.272 | 2.348 | 5.558 | ND | ND | ND |
| 6 | 3.642 | 3.479 | ND | ND | ND | ND | ND | ND | ND | ND | 3.447 | 3.968 | 2.640 | 5.872 | ND | ND | ND |
| 7 | 3.742 | 3.666 | ND | ND | ND | ND | ND | ND | ND | ND | 3.510 | 3.651 | 2.646 | 6.243 | ND | ND | ND |
| 8 | 3.999 | 3.904 | ND | ND | ND | ND | ND | ND | ND | ND | 3.323 | 3.496 | 2.581 | 6.700 | ND | ND | ND |
| 9 | 4.153 | 3.812 | ND | ND | ND | ND | ND | ND | ND | ND | 3.085 | 3.342 | 2.475 | 6.857 | ND | ND | ND |
| 10 | 4.074 | 4.595 | ND | ND | ND | ND | ND | ND | ND | ND | 2.934 | 3.243 | 2.796 | 6.728 | ND | ND | ND |
| 11 | 3.763 | 5.147 | ND | ND | ND | ND | ND | ND | ND | ND | 2.809 | 3.158 | 2.875 | 6.504 | ND | ND | ND |
| 12 | 3.361 | 4.753 | ND | ND | ND | ND | ND | ND | ND | ND | 2.656 | 3.113 | 2.794 | 6.399 | ND | ND | ND |
| 13 | 3.321 | 5.053 | ND | ND | ND | ND | ND | ND | ND | ND | 2.587 | 3.095 | 2.616 | 6.203 | ND | ND | ND |
| 14 | 3.451 | 4.716 | ND | ND | ND | ND | ND | ND | ND | ND | 3.036 | 3.053 | 2.430 | 6.318 | ND | ND | ND |
| 15 | 3.410 | 4.768 | ND | ND | ND | ND | ND | ND | ND | ND | 3.647 | 3.119 | 2.304 | 6.260 | ND | ND | ND |
| 16 | 2.985 | 4.703 | ND | ND | ND | ND | ND | ND | ND | ND | 3.705 | 3.028 | 2.191 | 6.168 | ND | ND | ND |
| 17 | 3.040 | 4.683 | ND | ND | ND | ND | ND | ND | ND | ND | 3.651 | 2.863 | 3.987 | 6.064 | ND | ND | ND |
| 18 | 3.163 | 4.932 | ND | ND | ND | ND | ND | ND | ND | 5.513 | 3.525 | 2.701 | 6.716 | 5.881 | ND | ND | ND |
| 19 | 2.821 | 4.559 | ND | ND | ND | ND | ND | ND | ND | 4.984 | 3.304 | 2.592 | 9.139 | 5.699 | ND | ND | ND |
| 20 | 2.701 | 4.587 | ND | ND | ND | ND | ND | ND | ND | 4.584 | 3.196 | 2.432 | 9.226 | 5.522 | ND | ND | ND |
| 21 | 3.155 | 4.120 | ND | ND | ND | ND | ND | ND | ND | 4.394 | 3.050 | 2.252 | 8.676 | 5.443 | ND | ND | ND |
| 22 | 3.082 | 3.986 | ND | ND | ND | ND | ND | ND | ND | 4.295 | 2.999 | 2.145 | 7.916 | 5.277 | ND | ND | ND |
| 23 | 2.613 | 4.368 | ND | ND | ND | ND | ND | ND | ND | 4.159 | 3.085 | 2.050 | 7.092 | 5.221 | ND | ND | ND |
| 24 | 2.526 | 4.763 | ND | ND | ND | ND | ND | ND | ND | 3.822 | 3.191 | 1.977 | 6.495 | 5.898 | ND | ND | ND |
| 25 | 2.542 | 4.147 | ND | ND | ND | ND | ND | ND | ND | 3.574 | 3.196 | 1.998 | 6.440 | 6.203 | ND | ND | ND |
| 26 | 2.539 | 4.644 | ND | ND | ND | ND | ND | ND | ND | 3.310 | 3.230 | 1.961 | 6.260 | 6.667 | ND | ND | ND |
| 27 | 2.455 | 4.297 | ND | ND | ND | ND | ND | ND | ND | 3.081 | 3.216 | 1.903 | 5.969 | 6.900 | ND | ND | ND |
| 28 | 2.607 | 4.039 | ND | ND | ND | ND | ND | ND | ND | 2.995 | 3.177 | 1.977 | 5.650 | 6.560 | ND | ND | ND |
| 29 | 2.762 | 4.295 | ND | ND | ND | ND | - | ND | ND | 2.877 | 3.130 | 1.871 | 5.385 | 6.468 | ND | ND | ND |
| 30 | 2.795 | 4.283 | ND | ND | ND | ND | - | ND | ND | 2.687 | 3.298 | 1.812 | 4.905 | 6.431 | ND | ND | ND |
| 31 | 3.211 | - | ND | - | ND | ND | - | ND | - | 2.456 | - | 1.729 | 4.730 | - | ND | - | ND |

Note: elevations in table are in metres (arbitrary datum).

- = day not present in month; ND = no data.

**Table C-23: 2018-19 Daily Water Surface Elevation for CR-WC-MS-08**

| DATE | 2018 | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | ND | 97.939 | 97.964 | 97.944 | 97.915 | 97.898 | 97.851 | 97.821 | 97.889 | 97.987 | ND | ND | ND | ND | ND | ND | ND |
| 2 | ND | 97.956 | 97.966 | 97.950 | 97.916 | 97.906 | 97.836 | 97.818 | 97.871 | 98.013 | ND | ND | ND | ND | ND | ND | ND |
| 3 | ND | 97.934 | 97.965 | 97.963 | 97.895 | 97.922 | 97.854 | 97.840 | 97.856 | 98.010 | ND | ND | ND | ND | ND | ND | ND |
| 4 | ND | 97.952 | 97.939 | 97.950 | 97.912 | 97.910 | 97.852 | 97.850 | 97.873 | 98.018 | ND | ND | ND | ND | ND | ND | ND |
| 5 | 97.991 | 97.935 | 97.937 | 97.941 | 97.897 | 97.884 | 97.849 | 97.858 | 97.864 | 98.017 | ND | ND | ND | ND | ND | ND | ND |
| 6 | 98.002 | 97.929 | 97.941 | 97.929 | 97.917 | 97.898 | 97.847 | 97.845 | 97.885 | 98.018 | ND | ND | ND | ND | ND | ND | ND |
| 7 | 97.990 | 97.939 | 97.936 | 97.926 | 97.904 | 97.872 | 97.845 | 97.859 | 97.891 | 98.016 | ND | ND | ND | ND | ND | ND | ND |
| 8 | 97.977 | 97.936 | 97.930 | 97.918 | 97.888 | 97.872 | 97.821 | 97.834 | 97.898 | 98.015 | ND | ND | ND | ND | ND | ND | ND |
| 9 | 97.984 | 97.929 | 97.941 | 97.927 | 97.912 | 97.858 | 97.830 | 97.835 | 97.903 | 98.019 | ND | ND | ND | ND | ND | ND | ND |
| 10 | 97.983 | 97.955 | 97.941 | 97.903 | 97.905 | 97.881 | 97.850 | 97.853 | 97.916 | 98.027 | ND | ND | ND | ND | ND | ND | ND |
| 11 | 97.975 | 97.954 | 97.951 | 97.905 | 97.910 | 97.895 | 97.850 | 97.881 | 97.920 | 98.032 | ND | ND | ND | ND | ND | ND | ND |
| 12 | 97.959 | 97.941 | 97.960 | 97.907 | 97.933 | 97.908 | 97.856 | 97.860 | 97.925 | 98.024 | ND | ND | ND | ND | ND | ND | ND |
| 13 | 97.954 | 97.946 | 97.952 | 97.902 | 97.925 | 97.890 | 97.842 | 97.850 | 97.923 | 98.031 | ND | ND | ND | ND | ND | ND | ND |
| 14 | 97.974 | 97.956 | 97.939 | 97.918 | 97.920 | 97.886 | 97.812 | 97.859 | 97.921 | 98.034 | ND | ND | ND | ND | ND | ND | ND |
| 15 | 97.960 | 97.958 | 97.956 | 97.893 | 97.918 | 97.855 | 97.826 | 97.848 | 97.929 | 98.019 | ND | ND | ND | ND | ND | ND | ND |
| 16 | 97.941 | 97.948 | 97.951 | 97.869 | 97.887 | 97.864 | 97.835 | 97.865 | 97.936 | ND | ND | ND | ND | ND | ND | ND | ND |
| 17 | 97.944 | 97.948 | 97.956 | 97.881 | 97.907 | 97.857 | 97.838 | 97.849 | 97.960 | ND | ND | ND | ND | ND | ND | ND | ND |
| 18 | 97.940 | 97.969 | 97.954 | 97.891 | 97.913 | 97.861 | 97.829 | 97.866 | 97.970 | ND | ND | ND | ND | ND | ND | ND | ND |
| 19 | 97.939 | 97.952 | 97.966 | 97.887 | 97.900 | 97.851 | 97.870 | 97.866 | 97.986 | ND | ND | ND | ND | ND | ND | ND | ND |
| 20 | 97.938 | 97.960 | 97.953 | 97.890 | 97.915 | 97.868 | 97.854 | 97.862 | 97.996 | ND | ND | ND | ND | ND | ND | ND | ND |
| 21 | 97.941 | 97.958 | 97.981 | 97.905 | 97.919 | 97.879 | 97.835 | 97.862 | 97.991 | ND | ND | ND | ND | ND | ND | ND | ND |
| 22 | 97.935 | 97.940 | 97.951 | 97.908 | 97.909 | 97.883 | 97.858 | 97.878 | 98.002 | ND | ND | ND | ND | ND | ND | ND | ND |
| 23 | 97.888 | 97.954 | 97.952 | 97.908 | 97.912 | 97.861 | 97.835 | 97.860 | 98.028 | ND | ND | ND | ND | ND | ND | ND | ND |
| 24 | 97.897 | 97.962 | 97.947 | 97.895 | 97.894 | 97.832 | 97.825 | 97.854 | 98.015 | ND | ND | ND | ND | ND | ND | ND | ND |
| 25 | 97.915 | 97.959 | 97.944 | 97.898 | 97.892 | 97.837 | 97.812 | 97.866 | 98.023 | ND | ND | ND | ND | ND | ND | ND | ND |
| 26 | 97.917 | 97.976 | 97.953 | 97.912 | 97.894 | 97.879 | 97.839 | 97.876 | 98.017 | ND | ND | ND | ND | ND | ND | ND | ND |
| 27 | 97.911 | 97.971 | 97.959 | 97.915 | 97.880 | 97.880 | 97.881 | 97.868 | 98.001 | ND | ND | ND | ND | ND | ND | ND | ND |
| 28 | 97.915 | 97.970 | 97.956 | 97.912 | 97.891 | 97.858 | 97.845 | 97.870 | 98.004 | ND | ND | ND | ND | ND | ND | ND | ND |
| 29 | 97.914 | 97.976 | 97.952 | 97.910 | 97.871 | 97.850 | - | 97.869 | 98.009 | ND | ND | ND | ND | ND | ND | ND | ND |
| 30 | 97.910 | 97.967 | 97.952 | 97.914 | 97.858 | 97.852 | - | 97.876 | 98.001 | ND | ND | ND | ND | ND | ND | ND | ND |
| 31 | 97.917 | - | 97.964 | - | 97.840 | 97.873 | - | 97.871 | - | ND | - | ND | ND | - | ND | - | ND |

Note: elevations in table are in metres (arbitrary datum).

- = day not present in month; ND = no data.

**Table C-24: 2018-19 Mean Daily Discharge for CR-WC-MS-08**

| DATE | 2018 | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | ND | 22.485 | 23.425 | 22.649 | 21.597 | 20.980 | 19.357 | 18.329 | 20.653 | 24.323 | ND | ND | ND | ND | ND | ND | ND |
| 2 | ND | 23.118 | 23.495 | 22.886 | 21.619 | 21.285 | 18.824 | 18.234 | 20.014 | 25.362 | ND | ND | ND | ND | ND | ND | ND |
| 3 | ND | 22.290 | 23.452 | 23.372 | 20.880 | 21.845 | 19.435 | 18.968 | 19.518 | 25.221 | ND | ND | ND | ND | ND | ND | ND |
| 4 | ND | 22.965 | 22.463 | 22.898 | 21.473 | 21.412 | 19.361 | 19.313 | 20.094 | 25.535 | ND | ND | ND | ND | ND | ND | ND |
| 5 | 24.476 | 22.340 | 22.410 | 22.537 | 20.930 | 20.501 | 19.288 | 19.586 | 19.789 | 25.515 | ND | ND | ND | ND | ND | ND | ND |
| 6 | 24.907 | 22.097 | 22.563 | 22.118 | 21.666 | 20.994 | 19.215 | 19.137 | 20.508 | 25.527 | ND | ND | ND | ND | ND | ND | ND |
| 7 | 24.411 | 22.462 | 22.355 | 21.989 | 21.206 | 20.066 | 19.143 | 19.607 | 20.731 | 25.478 | ND | ND | ND | ND | ND | ND | ND |
| 8 | 23.937 | 22.366 | 22.140 | 21.699 | 20.614 | 20.063 | 18.343 | 18.777 | 20.984 | 25.430 | ND | ND | ND | ND | ND | ND | ND |
| 9 | 24.191 | 22.089 | 22.541 | 22.033 | 21.477 | 19.584 | 18.624 | 18.811 | 21.167 | 25.567 | ND | ND | ND | ND | ND | ND | ND |
| 10 | 24.141 | 23.078 | 22.548 | 21.167 | 21.239 | 20.381 | 19.296 | 19.426 | 21.644 | 25.928 | ND | ND | ND | ND | ND | ND | ND |
| 11 | 23.840 | 23.056 | 22.916 | 21.221 | 21.423 | 20.873 | 19.320 | 20.385 | 21.765 | 26.095 | ND | ND | ND | ND | ND | ND | ND |
| 12 | 23.219 | 22.534 | 23.258 | 21.296 | 22.254 | 21.358 | 19.514 | 19.662 | 21.959 | 25.790 | ND | ND | ND | ND | ND | ND | ND |
| 13 | 23.027 | 22.734 | 22.981 | 21.116 | 21.948 | 20.692 | 19.039 | 19.306 | 21.900 | 26.078 | ND | ND | ND | ND | ND | ND | ND |
| 14 | 23.797 | 23.131 | 22.496 | 21.706 | 21.765 | 20.540 | 18.041 | 19.621 | 21.820 | 26.209 | ND | ND | ND | ND | ND | ND | ND |
| 15 | 23.280 | 23.201 | 23.113 | 20.802 | 21.692 | 19.463 | 18.508 | 19.225 | 22.110 | 25.579 | ND | ND | ND | ND | ND | ND | ND |
| 16 | 22.568 | 22.831 | 22.943 | 19.962 | 20.582 | 19.796 | 18.787 | 19.838 | 22.355 | ND | ND | ND | ND | ND | ND | ND | ND |
| 17 | 22.670 | 22.798 | 23.132 | 20.385 | 21.318 | 19.532 | 18.915 | 19.283 | 23.258 | ND | ND | ND | ND | ND | ND | ND | ND |
| 18 | 22.529 | 23.617 | 23.041 | 20.724 | 21.506 | 19.670 | 18.608 | 19.851 | 23.648 | ND | ND | ND | ND | ND | ND | ND | ND |
| 19 | 22.489 | 22.982 | 23.491 | 20.596 | 21.055 | 19.329 | 20.011 | 19.865 | 24.268 | ND | ND | ND | ND | ND | ND | ND | ND |
| 20 | 22.453 | 23.267 | 23.015 | 20.713 | 21.604 | 19.917 | 19.450 | 19.703 | 24.673 | ND | ND | ND | ND | ND | ND | ND | ND |
| 21 | 22.562 | 23.200 | 24.081 | 21.249 | 21.728 | 20.325 | 18.807 | 19.731 | 24.484 | ND | ND | ND | ND | ND | ND | ND | ND |
| 22 | 22.328 | 22.508 | 22.932 | 21.347 | 21.372 | 20.437 | 19.566 | 20.265 | 24.911 | ND | ND | ND | ND | ND | ND | ND | ND |
| 23 | 20.629 | 23.032 | 22.984 | 21.336 | 21.477 | 19.696 | 18.804 | 19.665 | 25.964 | ND | ND | ND | ND | ND | ND | ND | ND |
| 24 | 20.943 | 23.352 | 22.773 | 20.862 | 20.852 | 18.704 | 18.465 | 19.439 | 25.410 | ND | ND | ND | ND | ND | ND | ND | ND |
| 25 | 21.589 | 23.220 | 22.679 | 20.969 | 20.752 | 18.861 | 18.032 | 19.869 | 25.757 | ND | ND | ND | ND | ND | ND | ND | ND |
| 26 | 21.659 | 23.893 | 22.996 | 21.473 | 20.845 | 20.304 | 18.945 | 20.213 | 25.494 | ND | ND | ND | ND | ND | ND | ND | ND |
| 27 | 21.453 | 23.697 | 23.250 | 21.590 | 20.353 | 20.360 | 20.367 | 19.924 | 24.855 | ND | ND | ND | ND | ND | ND | ND | ND |
| 28 | 21.585 | 23.636 | 23.121 | 21.492 | 20.748 | 19.583 | 19.151 | 19.987 | 24.970 | ND | ND | ND | ND | ND | ND | ND | ND |
| 29 | 21.550 | 23.892 | 22.981 | 21.426 | 20.021 | 19.295 | - | 19.955 | 25.197 | ND | ND | ND | ND | ND | ND | ND | ND |
| 30 | 21.399 | 23.527 | 22.954 | 21.557 | 19.576 | 19.364 | - | 20.206 | 24.867 | ND | ND | ND | ND | ND | ND | ND | ND |
| 31 | 21.661 | - | 23.418 | - | 18.965 | 20.112 | - | 20.039 | - | ND | - | ND | ND | - | ND | - | ND |

Note: elevations in table are in metres (arbitrary datum).

- = day not present in month; ND = no data.

**Table C-25: 2018-19 Daily Water Surface Elevation for CR-WC-MS-09**

| DATE | 2018 | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | ND | 398.652 | 398.772 | ND | ND | ND | ND | ND | ND | ND | 398.715 | 398.708 | 398.621 | 399.266 | 399.090 | ND | ND |
| 2 | ND | 398.673 | 398.769 | ND | ND | ND | ND | ND | ND | ND | 398.708 | 398.740 | 398.615 | 399.262 | 399.083 | ND | ND |
| 3 | ND | 398.667 | 398.768 | ND | ND | ND | ND | ND | ND | ND | 398.711 | 398.746 | 398.646 | 399.250 | 399.070 | ND | ND |
| 4 | ND | 398.688 | 398.785 | ND | ND | ND | ND | ND | ND | ND | 398.730 | 398.743 | 398.690 | 399.220 | 399.059 | ND | ND |
| 5 | ND | 398.703 | ND | ND | ND | ND | ND | ND | ND | ND | 398.745 | 398.736 | 398.722 | 399.226 | ND | ND | ND |
| 6 | ND | 398.695 | ND | ND | ND | ND | ND | ND | ND | ND | 398.759 | 398.745 | 398.748 | 399.208 | ND | ND | ND |
| 7 | ND | 398.689 | ND | ND | ND | ND | ND | ND | ND | ND | 398.760 | 398.731 | 398.768 | 399.203 | ND | ND | ND |
| 8 | ND | 398.693 | ND | ND | ND | ND | ND | ND | ND | ND | 398.756 | 398.701 | 398.781 | 399.212 | ND | ND | ND |
| 9 | 398.736 | 398.676 | ND | ND | ND | ND | ND | ND | ND | ND | 398.767 | 398.699 | 398.784 | 399.214 | ND | ND | ND |
| 10 | 398.725 | 398.724 | ND | ND | ND | ND | ND | ND | ND | ND | 398.777 | 398.692 | 398.819 | 399.213 | ND | ND | ND |
| 11 | 398.716 | 398.735 | ND | ND | ND | ND | ND | ND | ND | ND | 398.768 | 398.685 | 398.813 | 399.208 | ND | ND | ND |
| 12 | 398.699 | 398.740 | ND | ND | ND | ND | ND | ND | ND | ND | 398.762 | 398.699 | 398.815 | 399.205 | ND | ND | ND |
| 13 | 398.692 | 398.753 | ND | ND | ND | ND | ND | ND | ND | ND | 398.749 | 398.663 | 398.825 | 399.211 | ND | ND | ND |
| 14 | 398.704 | 398.772 | ND | ND | ND | ND | ND | ND | ND | ND | 398.729 | 398.663 | 398.821 | 399.199 | ND | ND | ND |
| 15 | 398.682 | 398.781 | ND | ND | ND | ND | ND | ND | ND | 398.843 | 398.737 | 398.665 | 398.820 | 399.190 | ND | ND | ND |
| 16 | 398.668 | 398.768 | ND | ND | ND | ND | ND | ND | ND | 398.834 | 398.753 | 398.676 | 398.808 | 399.161 | ND | ND | ND |
| 17 | 398.670 | 398.764 | ND | ND | ND | ND | ND | ND | ND | 398.838 | 398.757 | 398.674 | 398.913 | 399.164 | ND | ND | ND |
| 18 | 398.651 | 398.776 | ND | ND | ND | ND | ND | ND | ND | 398.812 | 398.774 | 398.671 | 398.994 | 399.149 | ND | ND | ND |
| 19 | 398.659 | 398.768 | ND | ND | ND | ND | ND | ND | ND | 398.814 | 398.762 | 398.655 | 399.101 | 399.136 | ND | ND | ND |
| 20 | 398.647 | 398.763 | ND | ND | ND | ND | ND | ND | ND | 398.795 | 398.743 | 398.631 | 399.177 | 399.135 | ND | ND | ND |
| 21 | 398.650 | 398.768 | ND | ND | ND | ND | ND | ND | ND | 398.787 | 398.734 | 398.634 | 399.227 | 399.129 | ND | ND | ND |
| 22 | 398.648 | 398.756 | ND | ND | ND | ND | ND | ND | ND | 398.785 | 398.718 | 398.625 | 399.270 | 399.126 | ND | ND | ND |
| 23 | 398.626 | 398.756 | ND | ND | ND | ND | ND | ND | ND | 398.778 | 398.724 | 398.621 | 399.300 | 399.120 | ND | ND | ND |
| 24 | 398.611 | 398.755 | ND | ND | ND | ND | ND | ND | ND | 398.781 | 398.718 | 398.621 | 399.315 | 399.120 | ND | ND | ND |
| 25 | 398.633 | 398.750 | ND | ND | ND | ND | ND | ND | ND | 398.777 | 398.717 | 398.608 | 399.338 | 399.108 | ND | ND | ND |
| 26 | 398.635 | 398.753 | ND | ND | ND | ND | ND | ND | ND | 398.759 | 398.709 | 398.598 | 399.327 | 399.104 | ND | ND | ND |
| 27 | 398.621 | 398.755 | ND | ND | ND | ND | ND | ND | ND | 398.764 | 398.707 | 398.607 | 399.322 | 399.107 | ND | ND | ND |
| 28 | 398.625 | 398.762 | ND | ND | ND | ND | ND | ND | ND | 398.751 | 398.714 | 398.618 | 399.328 | 399.102 | ND | ND | ND |
| 29 | 398.617 | 398.764 | ND | ND | ND | ND | - | ND | ND | 398.750 | 398.704 | 398.645 | 399.318 | 399.104 | ND | ND | ND |
| 30 | 398.611 | 398.772 | ND | ND | ND | ND | - | ND | ND | 398.738 | 398.720 | 398.640 | 399.302 | 399.095 | ND | ND | ND |
| 31 | 398.598 | - | ND | - | ND | ND | - | ND | - | 398.710 | - | 398.633 | 399.277 | - | ND | - | ND |

Note: elevations in table are in metres (arbitrary datum).

- = day not present in month; ND = no data.

**Table C-26: 2018-19 Mean Daily Discharge for CR-WC-MS-09**

| DATE | 2018 | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | ND | 41.618 | 48.832 | ND | ND | ND | ND | ND | ND | ND | 45.330 | 44.893 | 39.907 | 87.098 | 71.767 | ND | ND |
| 2 | ND | 42.843 | 48.631 | ND | ND | ND | ND | ND | ND | ND | 44.887 | 46.823 | 39.566 | 86.755 | 71.206 | ND | ND |
| 3 | ND | 42.520 | 48.599 | ND | ND | ND | ND | ND | ND | ND | 45.096 | 47.223 | 41.307 | 85.567 | 70.100 | ND | ND |
| 4 | ND | 43.722 | 49.632 | ND | ND | ND | ND | ND | ND | ND | 46.249 | 47.044 | 43.857 | 82.899 | 69.253 | ND | ND |
| 5 | ND | 44.601 | ND | ND | ND | ND | ND | ND | ND | ND | 47.161 | 46.578 | 45.709 | 83.403 | ND | ND | ND |
| 6 | ND | 44.104 | ND | ND | ND | ND | ND | ND | ND | ND | 47.998 | 47.155 | 47.309 | 81.818 | ND | ND | ND |
| 7 | ND | 43.775 | ND | ND | ND | ND | ND | ND | ND | ND | 48.092 | 46.309 | 48.580 | 81.391 | ND | ND | ND |
| 8 | ND | 43.987 | ND | ND | ND | ND | ND | ND | ND | ND | 47.799 | 44.477 | 49.371 | 82.147 | ND | ND | ND |
| 9 | 46.584 | 43.040 | ND | ND | ND | ND | ND | ND | ND | ND | 48.486 | 44.341 | 49.581 | 82.308 | ND | ND | ND |
| 10 | 45.903 | 45.854 | ND | ND | ND | ND | ND | ND | ND | ND | 49.161 | 43.975 | 51.858 | 82.228 | ND | ND | ND |
| 11 | 45.348 | 46.541 | ND | ND | ND | ND | ND | ND | ND | ND | 48.568 | 43.553 | 51.439 | 81.844 | ND | ND | ND |
| 12 | 44.370 | 46.811 | ND | ND | ND | ND | ND | ND | ND | ND | 48.185 | 44.382 | 51.589 | 81.587 | ND | ND | ND |
| 13 | 43.928 | 47.631 | ND | ND | ND | ND | ND | ND | ND | ND | 47.365 | 42.268 | 52.240 | 82.058 | ND | ND | ND |
| 14 | 44.655 | 48.794 | ND | ND | ND | ND | ND | ND | ND | ND | 46.145 | 42.285 | 51.989 | 81.011 | ND | ND | ND |
| 15 | 43.389 | 49.371 | ND | ND | ND | ND | ND | ND | ND | 53.443 | 46.663 | 42.377 | 51.904 | 80.191 | ND | ND | ND |
| 16 | 42.572 | 48.574 | ND | ND | ND | ND | ND | ND | ND | 52.856 | 47.606 | 43.005 | 51.132 | 77.740 | ND | ND | ND |
| 17 | 42.653 | 48.348 | ND | ND | ND | ND | ND | ND | ND | 53.109 | 47.873 | 42.872 | 58.265 | 77.955 | ND | ND | ND |
| 18 | 41.584 | 49.085 | ND | ND | ND | ND | ND | ND | ND | 51.419 | 48.921 | 42.745 | 64.235 | 76.687 | ND | ND | ND |
| 19 | 42.010 | 48.543 | ND | ND | ND | ND | ND | ND | ND | 51.524 | 48.167 | 41.805 | 72.668 | 75.559 | ND | ND | ND |
| 20 | 41.363 | 48.254 | ND | ND | ND | ND | ND | ND | ND | 50.311 | 47.019 | 40.444 | 79.081 | 75.466 | ND | ND | ND |
| 21 | 41.550 | 48.543 | ND | ND | ND | ND | ND | ND | ND | 49.791 | 46.450 | 40.650 | 83.484 | 75.012 | ND | ND | ND |
| 22 | 41.403 | 47.805 | ND | ND | ND | ND | ND | ND | ND | 49.625 | 45.504 | 40.144 | 87.423 | 74.768 | ND | ND | ND |
| 23 | 40.161 | 47.830 | ND | ND | ND | ND | ND | ND | ND | 49.199 | 45.878 | 39.884 | 90.244 | 74.258 | ND | ND | ND |
| 24 | 39.336 | 47.761 | ND | ND | ND | ND | ND | ND | ND | 49.364 | 45.498 | 39.890 | 91.743 | 74.217 | ND | ND | ND |
| 25 | 40.578 | 47.427 | ND | ND | ND | ND | ND | ND | ND | 49.117 | 45.444 | 39.216 | 93.931 | 73.196 | ND | ND | ND |
| 26 | 40.689 | 47.606 | ND | ND | ND | ND | ND | ND | ND | 48.017 | 44.971 | 38.625 | 92.901 | 72.931 | ND | ND | ND |
| 27 | 39.912 | 47.737 | ND | ND | ND | ND | ND | ND | ND | 48.304 | 44.816 | 39.112 | 92.427 | 73.187 | ND | ND | ND |
| 28 | 40.111 | 48.185 | ND | ND | ND | ND | ND | ND | ND | 47.513 | 45.276 | 39.747 | 92.978 | 72.734 | ND | ND | ND |
| 29 | 39.670 | 48.329 | ND | ND | ND | ND | - | ND | ND | 47.470 | 44.661 | 41.267 | 92.013 | 72.940 | ND | ND | ND |
| 30 | 39.379 | 48.813 | ND | ND | ND | ND | - | ND | ND | 46.719 | 45.607 | 40.958 | 90.510 | 72.200 | ND | ND | ND |
| 31 | 38.635 | - | ND | - | ND | ND | - | ND | - | 45.012 | - | 40.555 | 88.123 | - | ND | - | ND |

Note: elevations in table are in metres (arbitrary datum).

- = day not present in month; ND = no data.

**Table C-27: 2018-19 Daily Water Surface Elevation for CR-WC-TI-01**

| DATE | 2018 | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | ND | 499.336 | 499.274 | ND | ND | ND | ND | ND | ND | ND | 499.318 | ND | ND | ND | ND | ND | ND |
| 2 | ND | 499.332 | 499.277 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 3 | ND | 499.329 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 4 | 499.370 | 499.330 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 5 | 499.443 | 499.328 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 6 | 499.383 | 499.320 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 7 | 499.388 | 499.328 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 8 | 499.367 | 499.341 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 9 | 499.369 | 499.334 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 10 | 499.376 | 499.377 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 11 | 499.369 | 499.342 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 12 | 499.391 | 499.376 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 13 | 499.377 | 499.369 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 14 | 499.357 | 499.338 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 15 | 499.351 | 499.325 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 16 | 499.339 | 499.354 | ND | ND | ND | ND | ND | ND | ND | 499.348 | ND | ND | ND | ND | ND | ND | ND |
| 17 | 499.354 | 499.349 | ND | ND | ND | ND | ND | ND | ND | 499.479 | ND | ND | ND | ND | ND | ND | ND |
| 18 | 499.346 | 499.323 | ND | ND | ND | ND | ND | ND | ND | 499.560 | ND | ND | ND | ND | ND | ND | ND |
| 19 | 499.325 | 499.317 | ND | ND | ND | ND | ND | ND | ND | 499.621 | ND | ND | ND | ND | ND | ND | ND |
| 20 | 499.325 | 499.316 | ND | ND | ND | ND | ND | ND | ND | 499.627 | ND | ND | ND | ND | ND | ND | ND |
| 21 | 499.338 | 499.314 | ND | ND | ND | ND | ND | ND | ND | 499.683 | ND | ND | ND | ND | ND | ND | ND |
| 22 | 499.336 | 499.332 | ND | ND | ND | ND | ND | ND | ND | 499.680 | ND | ND | ND | ND | ND | ND | ND |
| 23 | 499.384 | 499.311 | ND | ND | ND | ND | ND | ND | ND | 499.759 | ND | ND | ND | ND | ND | ND | ND |
| 24 | 499.348 | 499.317 | ND | ND | ND | ND | ND | ND | ND | 499.766 | ND | ND | ND | ND | ND | ND | ND |
| 25 | 499.333 | 499.293 | ND | ND | ND | ND | ND | ND | ND | 499.818 | ND | ND | ND | ND | ND | ND | ND |
| 26 | 499.318 | 499.315 | ND | ND | ND | ND | ND | ND | ND | 499.816 | ND | ND | ND | ND | ND | ND | ND |
| 27 | 499.376 | 499.299 | ND | ND | ND | ND | ND | ND | ND | 499.862 | ND | ND | ND | ND | ND | ND | ND |
| 28 | 499.332 | 499.304 | ND | ND | ND | ND | ND | ND | ND | 499.879 | ND | ND | ND | ND | ND | ND | ND |
| 29 | 499.313 | 499.296 | ND | ND | ND | ND | - | ND | ND | 499.879 | ND | ND | ND | ND | ND | ND | ND |
| 30 | 499.321 | 499.302 | ND | ND | ND | ND | - | ND | ND | 499.865 | ND | ND | ND | ND | ND | ND | ND |
| 31 | 499.351 | - | ND | - | ND | ND | - | ND | - | 499.858 | - | ND | ND | - | ND | - | ND |

Note: elevations in table are in metres (arbitrary datum).

- = day not present in month; ND = no data.

**Table C-28: 2018-19 Mean Daily Discharge for CR-WC-TI-01**

| DATE | 2018 | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | ND | 0.043 | 0.036 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 2 | ND | 0.043 | 0.037 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 3 | ND | 0.043 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 4 | 0.029 | 0.044 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 5 | 0.045 | 0.044 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 6 | 0.034 | 0.043 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 7 | 0.036 | 0.045 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 8 | 0.032 | 0.048 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 9 | 0.033 | 0.048 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 10 | 0.035 | 0.055 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 11 | 0.035 | 0.049 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 12 | 0.040 | 0.055 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 13 | 0.038 | 0.054 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 14 | 0.034 | 0.049 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 15 | 0.034 | 0.047 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 16 | 0.032 | 0.051 | ND | ND | ND | ND | ND | ND | ND | 0.039 | ND | ND | ND | ND | ND | ND | ND |
| 17 | 0.036 | 0.051 | ND | ND | ND | ND | ND | ND | ND | 0.039 | ND | ND | ND | ND | ND | ND | ND |
| 18 | 0.035 | 0.046 | ND | ND | ND | ND | ND | ND | ND | 0.043 | ND | ND | ND | ND | ND | ND | ND |
| 19 | 0.031 | 0.045 | ND | ND | ND | ND | ND | ND | ND | 0.045 | ND | ND | ND | ND | ND | ND | ND |
| 20 | 0.032 | 0.045 | ND | ND | ND | ND | ND | ND | ND | 0.045 | ND | ND | ND | ND | ND | ND | ND |
| 21 | 0.035 | 0.044 | ND | ND | ND | ND | ND | ND | ND | 0.048 | ND | ND | ND | ND | ND | ND | ND |
| 22 | 0.036 | 0.047 | ND | ND | ND | ND | ND | ND | ND | 0.047 | ND | ND | ND | ND | ND | ND | ND |
| 23 | 0.046 | 0.044 | ND | ND | ND | ND | ND | ND | ND | 0.049 | ND | ND | ND | ND | ND | ND | ND |
| 24 | 0.040 | 0.045 | ND | ND | ND | ND | ND | ND | ND | 0.048 | ND | ND | ND | ND | ND | ND | ND |
| 25 | 0.037 | 0.040 | ND | ND | ND | ND | ND | ND | ND | 0.050 | ND | ND | ND | ND | ND | ND | ND |
| 26 | 0.035 | 0.044 | ND | ND | ND | ND | ND | ND | ND | 0.048 | ND | ND | ND | ND | ND | ND | ND |
| 27 | 0.047 | 0.041 | ND | ND | ND | ND | ND | ND | ND | 0.050 | ND | ND | ND | ND | ND | ND | ND |
| 28 | 0.039 | 0.042 | ND | ND | ND | ND | ND | ND | ND | 0.049 | ND | ND | ND | ND | ND | ND | ND |
| 29 | 0.036 | 0.041 | ND | ND | ND | ND | - | ND | ND | 0.048 | ND | ND | ND | ND | ND | ND | ND |
| 30 | 0.039 | 0.042 | ND | ND | ND | ND | - | ND | ND | 0.044 | ND | ND | ND | ND | ND | ND | ND |
| 31 | 0.045 | - | ND | - | ND | ND | - | ND | - | 0.041 | - | ND | ND | - | ND | - | ND |

Note: elevations in table are in metres (arbitrary datum).

- = day not present in month; ND = no data.

**Table C-29: 2018-19 Daily Water Surface Elevation for CR-WC-TI-02**

| DATE | 2018 | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | ND | 498.240 | 498.219 | 498.151 | 498.154 | 498.104 | 498.117 | 498.089 | 498.177 | 498.148 | 498.123 | 498.203 | 498.179 | 498.336 | 498.312 | ND | ND |
| 2 | ND | 498.242 | 498.215 | 498.144 | 498.162 | 498.140 | 498.117 | 498.089 | 498.155 | 498.181 | 498.142 | 498.205 | 498.189 | 498.335 | 498.311 | ND | ND |
| 3 | ND | 498.252 | 498.227 | 498.154 | 498.116 | 498.163 | 498.121 | 498.096 | 498.123 | 498.180 | 498.160 | 498.218 | 498.217 | 498.339 | ND | ND | ND |
| 4 | ND | 498.235 | 498.226 | 498.135 | 498.132 | 498.159 | 498.106 | 498.105 | 498.158 | 498.178 | 498.179 | 498.214 | 498.256 | 498.339 | ND | ND | ND |
| 5 | ND | 498.242 | 498.186 | 498.124 | 498.115 | 498.126 | 498.106 | 498.102 | 498.138 | 498.194 | 498.197 | 498.205 | 498.254 | 498.344 | ND | ND | ND |
| 6 | 498.256 | 498.239 | 498.182 | 498.135 | 498.116 | 498.126 | 498.102 | 498.099 | 498.182 | 498.189 | 498.200 | 498.202 | 498.252 | 498.360 | ND | ND | ND |
| 7 | 498.262 | 498.235 | 498.181 | 498.130 | 498.098 | 498.133 | 498.103 | 498.101 | 498.192 | 498.186 | 498.192 | 498.205 | 498.246 | 498.352 | ND | ND | ND |
| 8 | 498.261 | 498.231 | 498.162 | 498.128 | 498.089 | 498.119 | 498.104 | 498.092 | 498.187 | 498.189 | 498.172 | 498.202 | 498.239 | 498.354 | ND | ND | ND |
| 9 | 498.282 | 498.212 | 498.167 | 498.134 | 498.127 | 498.107 | 498.109 | 498.101 | 498.185 | 498.184 | 498.179 | 498.201 | 498.237 | 498.343 | ND | ND | ND |
| 10 | 498.276 | 498.245 | 498.173 | 498.149 | 498.111 | 498.121 | 498.115 | 498.112 | 498.178 | 498.194 | 498.176 | 498.198 | 498.252 | 498.341 | ND | ND | ND |
| 11 | 498.261 | 498.249 | 498.197 | 498.138 | 498.115 | 498.130 | 498.116 | 498.135 | 498.201 | 498.198 | 498.180 | 498.196 | 498.254 | 498.343 | ND | ND | ND |
| 12 | 498.258 | 498.247 | 498.191 | 498.139 | 498.127 | 498.138 | 498.133 | 498.127 | 498.191 | 498.207 | 498.183 | 498.196 | 498.250 | 498.342 | ND | ND | ND |
| 13 | 498.256 | 498.248 | 498.178 | 498.149 | 498.140 | 498.149 | 498.119 | 498.121 | 498.172 | 498.191 | 498.181 | 498.197 | 498.250 | 498.344 | ND | ND | ND |
| 14 | 498.258 | 498.247 | 498.161 | 498.166 | 498.136 | 498.125 | 498.113 | 498.121 | 498.161 | 498.192 | 498.193 | 498.193 | 498.248 | 498.343 | ND | ND | ND |
| 15 | 498.247 | 498.250 | 498.195 | 498.136 | 498.138 | 498.122 | 498.119 | 498.111 | 498.160 | 498.184 | 498.191 | 498.197 | 498.252 | 498.344 | ND | ND | ND |
| 16 | 498.241 | 498.253 | 498.174 | 498.101 | 498.106 | 498.118 | 498.125 | 498.138 | 498.154 | 498.164 | 498.193 | 498.194 | 498.249 | 498.335 | ND | ND | ND |
| 17 | 498.239 | 498.246 | 498.190 | 498.124 | 498.104 | 498.115 | 498.124 | 498.121 | 498.158 | 498.175 | 498.196 | 498.192 | 498.287 | 498.331 | ND | ND | ND |
| 18 | 498.227 | 498.242 | 498.194 | 498.127 | 498.133 | 498.107 | 498.112 | 498.148 | 498.150 | 498.175 | 498.197 | 498.192 | 498.318 | 498.331 | ND | ND | ND |
| 19 | 498.230 | 498.239 | 498.174 | 498.112 | 498.118 | 498.101 | 498.149 | 498.153 | 498.164 | 498.175 | 498.197 | 498.195 | 498.324 | 498.330 | ND | ND | ND |
| 20 | 498.222 | 498.233 | 498.175 | 498.133 | 498.141 | 498.107 | 498.146 | 498.154 | 498.157 | 498.171 | 498.197 | 498.183 | 498.323 | 498.329 | ND | ND | ND |
| 21 | 498.235 | 498.238 | 498.191 | 498.128 | 498.145 | 498.129 | 498.119 | 498.155 | 498.172 | 498.170 | 498.190 | 498.177 | 498.322 | 498.329 | ND | ND | ND |
| 22 | 498.237 | 498.243 | 498.171 | 498.152 | 498.140 | 498.129 | 498.140 | 498.170 | 498.175 | 498.166 | 498.186 | 498.178 | 498.325 | 498.323 | ND | ND | ND |
| 23 | 498.207 | 498.231 | 498.183 | 498.142 | 498.134 | 498.130 | 498.125 | 498.166 | 498.178 | 498.158 | 498.183 | 498.182 | 498.336 | 498.322 | ND | ND | ND |
| 24 | 498.193 | 498.235 | 498.173 | 498.116 | 498.125 | 498.107 | 498.112 | 498.147 | 498.182 | 498.149 | 498.181 | 498.181 | 498.334 | 498.337 | ND | ND | ND |
| 25 | 498.202 | 498.220 | 498.173 | 498.116 | 498.113 | 498.109 | 498.113 | 498.172 | 498.179 | 498.143 | 498.191 | 498.197 | 498.337 | 498.332 | ND | ND | ND |
| 26 | 498.210 | 498.213 | 498.165 | 498.125 | 498.123 | 498.128 | 498.121 | 498.183 | 498.178 | 498.128 | 498.189 | 498.188 | 498.335 | 498.327 | ND | ND | ND |
| 27 | 498.198 | 498.216 | 498.170 | 498.133 | 498.115 | 498.153 | 498.146 | 498.188 | 498.172 | 498.152 | 498.191 | 498.184 | 498.336 | 498.319 | ND | ND | ND |
| 28 | 498.215 | 498.230 | 498.160 | 498.128 | 498.123 | 498.118 | 498.118 | 498.185 | 498.165 | 498.156 | 498.196 | 498.189 | 498.339 | 498.310 | ND | ND | ND |
| 29 | 498.210 | 498.219 | 498.166 | 498.133 | 498.108 | 498.095 | - | 498.182 | 498.169 | 498.143 | 498.193 | 498.178 | 498.344 | 498.313 | ND | ND | ND |
| 30 | 498.216 | 498.236 | 498.157 | 498.146 | 498.107 | 498.102 | - | 498.182 | 498.167 | 498.134 | 498.200 | 498.180 | 498.344 | 498.309 | ND | ND | ND |
| 31 | 498.218 | - | 498.153 | - | 498.094 | 498.120 | - | 498.177 | - | 498.110 | - | 498.180 | 498.341 | - | ND | - | ND |

Note: elevations in table are in metres (arbitrary datum).

- = day not present in month; ND = no data.

**Table C-30: 2018-19 Mean Daily Discharge for CR-WC-TI-02**

| DATE | 2018 | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | ND | 0.561 | 0.650 | 0.465 | 0.439 | 0.371 | 0.372 | 0.333 | 0.531 | 0.458 | 0.400 | 0.604 | 0.537 | 1.090 | 0.985 | ND | ND |
| 2 | ND | 0.573 | 0.638 | 0.449 | 0.449 | 0.410 | 0.371 | 0.332 | 0.475 | 0.542 | 0.443 | 0.609 | 0.562 | 1.083 | 0.983 | ND | ND |
| 3 | ND | 0.610 | 0.676 | 0.472 | 0.394 | 0.437 | 0.375 | 0.344 | 0.460 | 0.539 | 0.488 | 0.648 | 0.645 | 1.102 | ND | ND | ND |
| 4 | ND | 0.562 | 0.675 | 0.427 | 0.412 | 0.431 | 0.359 | 0.362 | 0.486 | 0.533 | 0.537 | 0.636 | 0.773 | 1.099 | ND | ND | ND |
| 5 | ND | 0.586 | 0.557 | 0.403 | 0.393 | 0.392 | 0.359 | 0.356 | 0.473 | 0.578 | 0.585 | 0.610 | 0.765 | 1.123 | ND | ND | ND |
| 6 | 0.502 | 0.582 | 0.544 | 0.426 | 0.394 | 0.392 | 0.355 | 0.351 | 0.506 | 0.565 | 0.596 | 0.602 | 0.758 | 1.197 | ND | ND | ND |
| 7 | 0.535 | 0.576 | 0.542 | 0.415 | 0.375 | 0.399 | 0.355 | 0.354 | 0.516 | 0.554 | 0.572 | 0.608 | 0.739 | 1.161 | ND | ND | ND |
| 8 | 0.534 | 0.571 | 0.491 | 0.418 | 0.365 | 0.384 | 0.355 | 0.336 | 0.513 | 0.563 | 0.517 | 0.602 | 0.716 | 1.170 | ND | ND | ND |
| 9 | 0.654 | 0.523 | 0.506 | 0.424 | 0.404 | 0.371 | 0.360 | 0.355 | 0.513 | 0.548 | 0.536 | 0.598 | 0.709 | 1.118 | ND | ND | ND |
| 10 | 0.625 | 0.622 | 0.521 | 0.442 | 0.387 | 0.386 | 0.366 | 0.376 | 0.507 | 0.577 | 0.528 | 0.590 | 0.759 | 1.109 | ND | ND | ND |
| 11 | 0.547 | 0.638 | 0.586 | 0.428 | 0.391 | 0.394 | 0.367 | 0.427 | 0.528 | 0.588 | 0.538 | 0.585 | 0.767 | 1.117 | ND | ND | ND |
| 12 | 0.536 | 0.637 | 0.569 | 0.428 | 0.403 | 0.403 | 0.385 | 0.409 | 0.520 | 0.614 | 0.547 | 0.583 | 0.752 | 1.113 | ND | ND | ND |
| 13 | 0.531 | 0.647 | 0.535 | 0.441 | 0.418 | 0.416 | 0.369 | 0.396 | 0.506 | 0.568 | 0.540 | 0.586 | 0.753 | 1.123 | ND | ND | ND |
| 14 | 0.542 | 0.646 | 0.491 | 0.461 | 0.412 | 0.388 | 0.362 | 0.396 | 0.490 | 0.571 | 0.574 | 0.575 | 0.744 | 1.118 | ND | ND | ND |
| 15 | 0.501 | 0.661 | 0.581 | 0.423 | 0.414 | 0.384 | 0.369 | 0.375 | 0.487 | 0.550 | 0.570 | 0.585 | 0.760 | 1.124 | ND | ND | ND |
| 16 | 0.492 | 0.679 | 0.524 | 0.387 | 0.379 | 0.380 | 0.374 | 0.434 | 0.471 | 0.497 | 0.575 | 0.577 | 0.747 | 1.083 | ND | ND | ND |
| 17 | 0.492 | 0.660 | 0.566 | 0.410 | 0.377 | 0.376 | 0.373 | 0.396 | 0.481 | 0.524 | 0.584 | 0.573 | 0.885 | 1.067 | ND | ND | ND |
| 18 | 0.465 | 0.652 | 0.578 | 0.413 | 0.408 | 0.367 | 0.360 | 0.458 | 0.463 | 0.526 | 0.585 | 0.572 | 1.011 | 1.066 | ND | ND | ND |
| 19 | 0.477 | 0.649 | 0.523 | 0.396 | 0.391 | 0.360 | 0.401 | 0.469 | 0.496 | 0.526 | 0.586 | 0.581 | 1.036 | 1.061 | ND | ND | ND |
| 20 | 0.462 | 0.635 | 0.525 | 0.419 | 0.416 | 0.366 | 0.397 | 0.472 | 0.480 | 0.514 | 0.585 | 0.546 | 1.031 | 1.055 | ND | ND | ND |
| 21 | 0.497 | 0.658 | 0.568 | 0.412 | 0.420 | 0.390 | 0.366 | 0.476 | 0.517 | 0.512 | 0.567 | 0.532 | 1.029 | 1.056 | ND | ND | ND |
| 22 | 0.507 | 0.677 | 0.515 | 0.440 | 0.414 | 0.389 | 0.390 | 0.512 | 0.526 | 0.503 | 0.555 | 0.533 | 1.038 | 1.033 | ND | ND | ND |
| 23 | 0.437 | 0.645 | 0.547 | 0.428 | 0.407 | 0.389 | 0.372 | 0.503 | 0.534 | 0.483 | 0.548 | 0.544 | 1.086 | 1.029 | ND | ND | ND |
| 24 | 0.409 | 0.662 | 0.522 | 0.398 | 0.396 | 0.365 | 0.357 | 0.455 | 0.543 | 0.461 | 0.543 | 0.541 | 1.080 | 1.093 | ND | ND | ND |
| 25 | 0.434 | 0.622 | 0.522 | 0.398 | 0.383 | 0.366 | 0.358 | 0.517 | 0.536 | 0.445 | 0.569 | 0.587 | 1.090 | 1.071 | ND | ND | ND |
| 26 | 0.457 | 0.607 | 0.500 | 0.408 | 0.394 | 0.386 | 0.366 | 0.547 | 0.535 | 0.411 | 0.565 | 0.560 | 1.082 | 1.047 | ND | ND | ND |
| 27 | 0.433 | 0.622 | 0.513 | 0.416 | 0.385 | 0.416 | 0.394 | 0.561 | 0.517 | 0.466 | 0.570 | 0.550 | 1.088 | 1.014 | ND | ND | ND |
| 28 | 0.478 | 0.669 | 0.487 | 0.409 | 0.393 | 0.374 | 0.363 | 0.553 | 0.500 | 0.477 | 0.583 | 0.564 | 1.101 | 0.976 | ND | ND | ND |
| 29 | 0.471 | 0.640 | 0.503 | 0.415 | 0.376 | 0.350 | - | 0.544 | 0.509 | 0.445 | 0.574 | 0.533 | 1.124 | 0.990 | ND | ND | ND |
| 30 | 0.488 | 0.701 | 0.479 | 0.430 | 0.374 | 0.357 | - | 0.544 | 0.504 | 0.424 | 0.595 | 0.539 | 1.125 | 0.974 | ND | ND | ND |
| 31 | 0.499 | - | 0.470 | - | 0.361 | 0.376 | - | 0.532 | - | 0.372 | - | 0.538 | 1.112 | - | ND | - | ND |

Note: elevations in table are in metres (arbitrary datum).

- = day not present in month; ND = no data.

**Table C-31: 2018-19 Daily Water Surface Elevation for CR-WC-TI-03**

| DATE | 2018 | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | ND | 498.326 | 498.298 | 498.259 | 498.265 | 498.243 | 498.204 | 498.166 | 498.235 | 498.254 | 498.239 | 498.300 | 498.285 | 498.439 | 498.409 | ND | ND |
| 2 | ND | 498.339 | 498.313 | 498.253 | 498.271 | 498.258 | 498.197 | 498.174 | 498.233 | 498.279 | 498.231 | 498.327 | 498.298 | 498.432 | 498.413 | ND | ND |
| 3 | ND | 498.329 | 498.316 | 498.255 | 498.249 | 498.270 | 498.202 | 498.186 | 498.217 | 498.278 | 498.247 | 498.314 | 498.324 | 498.440 | ND | ND | ND |
| 4 | ND | 498.338 | 498.308 | 498.246 | 498.262 | 498.268 | 498.190 | 498.192 | 498.264 | 498.280 | 498.268 | 498.307 | 498.377 | 498.439 | ND | ND | ND |
| 5 | ND | 498.317 | 498.289 | 498.265 | 498.257 | 498.253 | 498.192 | 498.191 | 498.263 | 498.277 | 498.289 | 498.296 | 498.365 | 498.442 | ND | ND | ND |
| 6 | 498.327 | 498.318 | 498.287 | 498.289 | 498.257 | 498.253 | 498.191 | 498.185 | 498.266 | 498.275 | 498.289 | 498.287 | 498.373 | 498.469 | ND | ND | ND |
| 7 | 498.333 | 498.309 | 498.284 | 498.274 | 498.248 | 498.254 | 498.192 | 498.187 | 498.277 | 498.276 | 498.285 | 498.289 | 498.366 | 498.452 | ND | ND | ND |
| 8 | 498.351 | 498.309 | 498.266 | 498.255 | 498.242 | 498.246 | 498.195 | 498.179 | 498.279 | 498.275 | 498.293 | 498.293 | 498.354 | 498.458 | ND | ND | ND |
| 9 | 498.348 | 498.313 | 498.270 | 498.251 | 498.259 | 498.237 | 498.198 | 498.189 | 498.282 | 498.274 | 498.269 | 498.293 | 498.352 | 498.446 | ND | ND | ND |
| 10 | 498.346 | 498.333 | 498.273 | 498.261 | 498.251 | 498.240 | 498.203 | 498.197 | 498.285 | 498.284 | 498.261 | 498.289 | 498.378 | 498.444 | ND | ND | ND |
| 11 | 498.346 | 498.334 | 498.286 | 498.260 | 498.252 | 498.243 | 498.206 | 498.221 | 498.288 | 498.283 | 498.268 | 498.289 | 498.369 | 498.442 | ND | ND | ND |
| 12 | 498.338 | 498.337 | 498.286 | 498.258 | 498.258 | 498.245 | 498.221 | 498.215 | 498.291 | 498.291 | 498.267 | 498.286 | 498.364 | 498.438 | ND | ND | ND |
| 13 | 498.326 | 498.330 | 498.282 | 498.264 | 498.263 | 498.248 | 498.202 | 498.210 | 498.288 | 498.291 | 498.268 | 498.291 | 498.362 | 498.444 | ND | ND | ND |
| 14 | 498.337 | 498.324 | 498.260 | 498.263 | 498.260 | 498.235 | 498.194 | 498.214 | 498.289 | 498.284 | 498.277 | 498.287 | 498.359 | 498.443 | ND | ND | ND |
| 15 | 498.337 | 498.327 | 498.287 | 498.260 | 498.261 | 498.229 | 498.202 | 498.201 | 498.290 | 498.276 | 498.279 | 498.307 | 498.368 | 498.445 | ND | ND | ND |
| 16 | 498.322 | 498.320 | 498.280 | 498.242 | 498.225 | 498.226 | 498.208 | 498.220 | 498.284 | 498.264 | 498.278 | 498.288 | 498.357 | 498.436 | ND | ND | ND |
| 17 | 498.325 | 498.315 | 498.280 | 498.246 | 498.240 | 498.224 | 498.205 | 498.199 | 498.287 | 498.272 | 498.277 | 498.286 | 498.436 | 498.436 | ND | ND | ND |
| 18 | 498.321 | 498.315 | 498.286 | 498.250 | 498.255 | 498.218 | 498.193 | 498.218 | 498.283 | 498.270 | 498.270 | 498.286 | 498.438 | 498.434 | ND | ND | ND |
| 19 | 498.313 | 498.314 | 498.289 | 498.248 | 498.248 | 498.214 | 498.231 | 498.216 | 498.289 | 498.270 | 498.280 | 498.297 | 498.438 | 498.432 | ND | ND | ND |
| 20 | 498.311 | 498.316 | 498.274 | 498.258 | 498.259 | 498.211 | 498.226 | 498.211 | 498.285 | 498.270 | 498.281 | 498.286 | 498.439 | 498.424 | ND | ND | ND |
| 21 | 498.321 | 498.309 | 498.287 | 498.253 | 498.260 | 498.229 | 498.196 | 498.209 | 498.290 | 498.268 | 498.277 | 498.279 | 498.425 | 498.438 | ND | ND | ND |
| 22 | 498.323 | 498.302 | 498.276 | 498.260 | 498.254 | 498.224 | 498.217 | 498.217 | 498.292 | 498.268 | 498.272 | 498.280 | 498.410 | 498.427 | ND | ND | ND |
| 23 | 498.283 | 498.296 | 498.276 | 498.263 | 498.252 | 498.222 | 498.203 | 498.211 | 498.295 | 498.258 | 498.270 | 498.278 | 498.443 | 498.426 | ND | ND | ND |
| 24 | 498.275 | 498.300 | 498.269 | 498.252 | 498.251 | 498.199 | 498.190 | 498.179 | 498.296 | 498.255 | 498.272 | 498.276 | 498.424 | 498.453 | ND | ND | ND |
| 25 | 498.300 | 498.305 | 498.273 | 498.253 | 498.246 | 498.203 | 498.193 | 498.200 | 498.292 | 498.251 | 498.281 | 498.295 | 498.439 | 498.446 | ND | ND | ND |
| 26 | 498.298 | 498.314 | 498.270 | 498.257 | 498.252 | 498.223 | 498.201 | 498.210 | 498.289 | 498.236 | 498.279 | 498.285 | 498.437 | 498.434 | ND | ND | ND |
| 27 | 498.295 | 498.316 | 498.270 | 498.258 | 498.249 | 498.244 | 498.224 | 498.209 | 498.281 | 498.258 | 498.279 | 498.300 | 498.440 | 498.434 | ND | ND | ND |
| 28 | 498.296 | 498.307 | 498.267 | 498.256 | 498.255 | 498.209 | 498.193 | 498.208 | 498.278 | 498.260 | 498.283 | 498.313 | 498.438 | 498.422 | ND | ND | ND |
| 29 | 498.294 | 498.316 | 498.264 | 498.256 | 498.249 | 498.192 | - | 498.211 | 498.278 | 498.256 | 498.270 | 498.285 | 498.452 | 498.422 | ND | ND | ND |
| 30 | 498.301 | 498.302 | 498.265 | 498.262 | 498.250 | 498.200 | - | 498.220 | 498.275 | 498.249 | 498.293 | 498.287 | 498.445 | 498.412 | ND | ND | ND |
| 31 | 498.336 | - | 498.261 | - | 498.242 | 498.213 | - | 498.222 | - | 498.229 | - | 498.288 | 498.441 | - | ND | - | ND |

Note: elevations in table are in metres (arbitrary datum).

- = day not present in month; ND = no data.

**Table C-32: 2018-19 Mean Daily Discharge for CR-WC-TI-03**

| DATE | 2018 | | | | | 2019 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 1 | ND | 0.376 | 0.363 | 0.317 | 0.324 | 0.299 | 0.257 | 0.220 | 0.290 | 0.312 | 0.294 | 0.366 | 0.348 | 0.560 | 0.515 | ND | ND |
| 2 | ND | 0.398 | 0.382 | 0.311 | 0.332 | 0.316 | 0.250 | 0.228 | 0.288 | 0.341 | 0.286 | 0.401 | 0.364 | 0.550 | 0.521 | ND | ND |
| 3 | ND | 0.390 | 0.387 | 0.313 | 0.306 | 0.330 | 0.255 | 0.239 | 0.271 | 0.340 | 0.303 | 0.384 | 0.396 | 0.561 | ND | ND | ND |
| 4 | ND | 0.407 | 0.377 | 0.302 | 0.321 | 0.328 | 0.243 | 0.245 | 0.323 | 0.342 | 0.328 | 0.375 | 0.469 | 0.561 | ND | ND | ND |
| 5 | ND | 0.385 | 0.353 | 0.324 | 0.315 | 0.311 | 0.245 | 0.244 | 0.322 | 0.339 | 0.353 | 0.361 | 0.452 | 0.565 | ND | ND | ND |
| 6 | 0.259 | 0.389 | 0.350 | 0.353 | 0.316 | 0.310 | 0.244 | 0.238 | 0.326 | 0.337 | 0.354 | 0.350 | 0.464 | 0.607 | ND | ND | ND |
| 7 | 0.270 | 0.377 | 0.347 | 0.334 | 0.304 | 0.311 | 0.245 | 0.240 | 0.338 | 0.337 | 0.348 | 0.353 | 0.454 | 0.580 | ND | ND | ND |
| 8 | 0.293 | 0.378 | 0.326 | 0.312 | 0.299 | 0.302 | 0.248 | 0.232 | 0.341 | 0.336 | 0.358 | 0.358 | 0.437 | 0.591 | ND | ND | ND |
| 9 | 0.294 | 0.382 | 0.330 | 0.308 | 0.318 | 0.292 | 0.251 | 0.242 | 0.345 | 0.335 | 0.329 | 0.358 | 0.433 | 0.571 | ND | ND | ND |
| 10 | 0.297 | 0.409 | 0.333 | 0.320 | 0.308 | 0.296 | 0.257 | 0.250 | 0.349 | 0.347 | 0.320 | 0.353 | 0.469 | 0.568 | ND | ND | ND |
| 11 | 0.301 | 0.409 | 0.349 | 0.319 | 0.310 | 0.300 | 0.259 | 0.275 | 0.352 | 0.346 | 0.328 | 0.353 | 0.458 | 0.565 | ND | ND | ND |
| 12 | 0.296 | 0.414 | 0.349 | 0.316 | 0.316 | 0.302 | 0.275 | 0.269 | 0.355 | 0.355 | 0.327 | 0.350 | 0.451 | 0.559 | ND | ND | ND |
| 13 | 0.288 | 0.405 | 0.344 | 0.323 | 0.323 | 0.305 | 0.255 | 0.264 | 0.351 | 0.356 | 0.328 | 0.355 | 0.447 | 0.568 | ND | ND | ND |
| 14 | 0.305 | 0.396 | 0.319 | 0.322 | 0.318 | 0.291 | 0.247 | 0.267 | 0.353 | 0.347 | 0.338 | 0.350 | 0.443 | 0.567 | ND | ND | ND |
| 15 | 0.309 | 0.400 | 0.350 | 0.318 | 0.319 | 0.284 | 0.255 | 0.254 | 0.355 | 0.338 | 0.341 | 0.375 | 0.456 | 0.569 | ND | ND | ND |
| 16 | 0.296 | 0.392 | 0.342 | 0.298 | 0.279 | 0.281 | 0.261 | 0.274 | 0.347 | 0.323 | 0.339 | 0.352 | 0.441 | 0.556 | ND | ND | ND |
| 17 | 0.304 | 0.385 | 0.342 | 0.302 | 0.296 | 0.279 | 0.259 | 0.252 | 0.351 | 0.333 | 0.338 | 0.349 | 0.556 | 0.556 | ND | ND | ND |
| 18 | 0.304 | 0.386 | 0.349 | 0.307 | 0.313 | 0.273 | 0.246 | 0.272 | 0.346 | 0.331 | 0.330 | 0.350 | 0.560 | 0.553 | ND | ND | ND |
| 19 | 0.300 | 0.384 | 0.353 | 0.305 | 0.305 | 0.268 | 0.286 | 0.269 | 0.353 | 0.330 | 0.341 | 0.362 | 0.559 | 0.550 | ND | ND | ND |
| 20 | 0.301 | 0.386 | 0.335 | 0.316 | 0.317 | 0.264 | 0.281 | 0.264 | 0.348 | 0.330 | 0.343 | 0.350 | 0.561 | 0.537 | ND | ND | ND |
| 21 | 0.318 | 0.378 | 0.350 | 0.311 | 0.319 | 0.284 | 0.249 | 0.262 | 0.355 | 0.328 | 0.338 | 0.341 | 0.539 | 0.558 | ND | ND | ND |
| 22 | 0.324 | 0.369 | 0.337 | 0.319 | 0.312 | 0.278 | 0.271 | 0.271 | 0.357 | 0.328 | 0.333 | 0.342 | 0.516 | 0.542 | ND | ND | ND |
| 23 | 0.284 | 0.361 | 0.337 | 0.322 | 0.309 | 0.276 | 0.257 | 0.265 | 0.360 | 0.316 | 0.330 | 0.340 | 0.566 | 0.540 | ND | ND | ND |
| 24 | 0.280 | 0.366 | 0.330 | 0.309 | 0.308 | 0.252 | 0.243 | 0.232 | 0.361 | 0.313 | 0.332 | 0.337 | 0.537 | 0.582 | ND | ND | ND |
| 25 | 0.312 | 0.372 | 0.334 | 0.310 | 0.302 | 0.257 | 0.246 | 0.253 | 0.357 | 0.308 | 0.343 | 0.360 | 0.561 | 0.571 | ND | ND | ND |
| 26 | 0.314 | 0.384 | 0.331 | 0.315 | 0.309 | 0.277 | 0.254 | 0.264 | 0.352 | 0.292 | 0.341 | 0.348 | 0.557 | 0.552 | ND | ND | ND |
| 27 | 0.315 | 0.387 | 0.331 | 0.316 | 0.307 | 0.300 | 0.278 | 0.263 | 0.343 | 0.317 | 0.341 | 0.366 | 0.561 | 0.553 | ND | ND | ND |
| 28 | 0.321 | 0.376 | 0.327 | 0.314 | 0.313 | 0.263 | 0.247 | 0.261 | 0.339 | 0.318 | 0.346 | 0.383 | 0.558 | 0.535 | ND | ND | ND |
| 29 | 0.323 | 0.386 | 0.323 | 0.314 | 0.306 | 0.245 | - | 0.265 | 0.340 | 0.314 | 0.330 | 0.348 | 0.580 | 0.535 | ND | ND | ND |
| 30 | 0.336 | 0.369 | 0.325 | 0.321 | 0.307 | 0.254 | - | 0.274 | 0.337 | 0.306 | 0.357 | 0.350 | 0.570 | 0.520 | ND | ND | ND |
| 31 | 0.384 | - | 0.320 | - | 0.298 | 0.267 | - | 0.277 | - | 0.284 | - | 0.351 | 0.563 | - | ND | - | ND |

Note: elevations in table are in metres (arbitrary datum).

- = day not present in month; ND = no data.

**APPENDIX E**

# Total Suspended Solids and Bed Load Laboratory Results

GOLDER

# GRAIN SIZE ANALYSIS

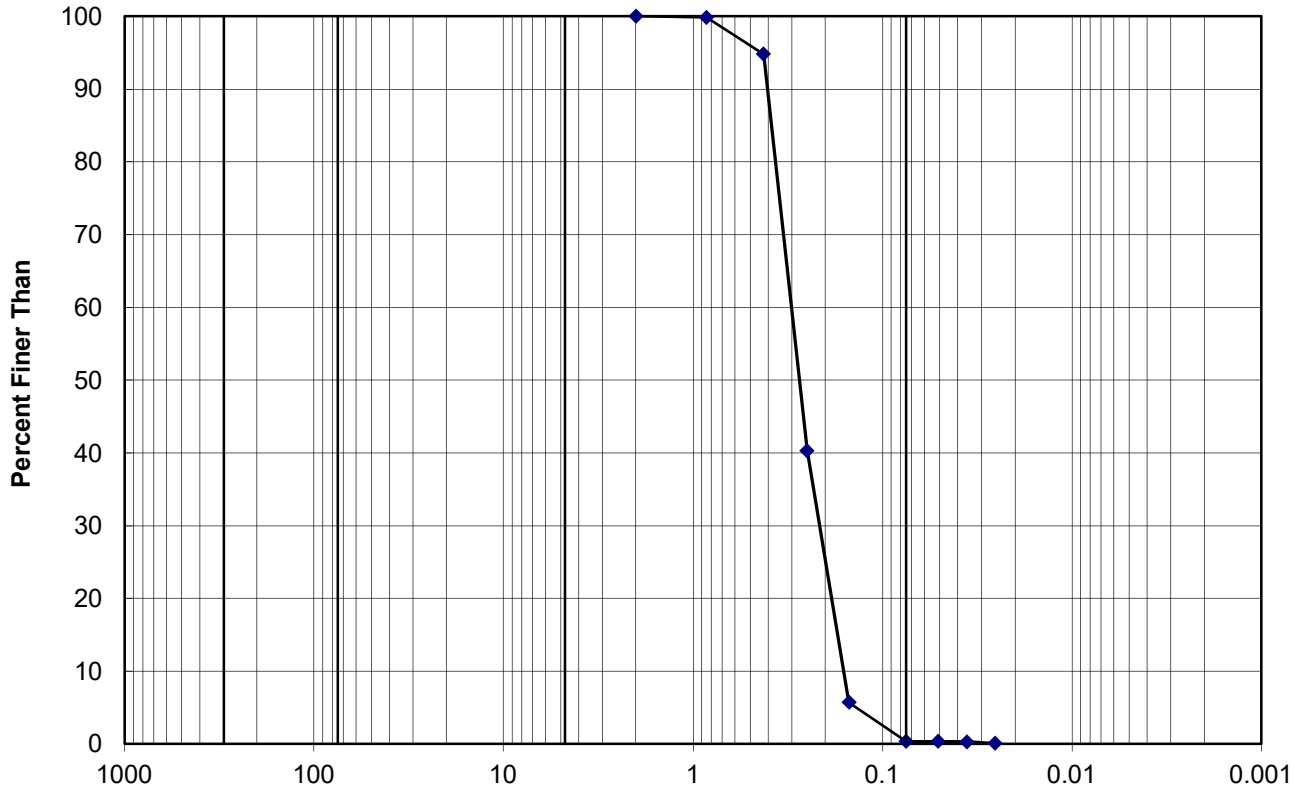
**(Mechanical & Hydrometer)**

Project #: 1899581
Short Title: NexGen / Rook I Project / Env Baselines
Tested by: T.B.

Phase: 3
Date: August 28, 2018

Sample #: SL6312
Source: Sampled below Patterson Lake.
Date Sample Received: August 5, 2018

***Graphical Analysis***




| BOULDERS | COBBLES | GRAVEL | | SAND | | | SILT / CLAY |
|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | |

***Grain Size Analysis Results:***

| Opening (mm) | Percent Passing (%) |
|---|---|
| 51 | 100 |
| 38 | 100 |
| 25 | 100 |
| 19 | 100 |
| 9.5 | 100 |
| 4.75 | 100 |
| 2.0 | 100 |
| 0.850 | 100 |
| 0.425 | 95 |
| 0.250 | 40 |
| 0.150 | 5.7 |
| 0.075 | 0.4 |
| 0.051 | 0.4 |
| 0.036 | 0.3 |
| 0.025 | 0.1 |

Comments:



1721 8th Street E.,
Saskatoon, Saskatchewan S7N 0T4

Reviewed by:_____

GOLDER

# GRAIN SIZE ANALYSIS

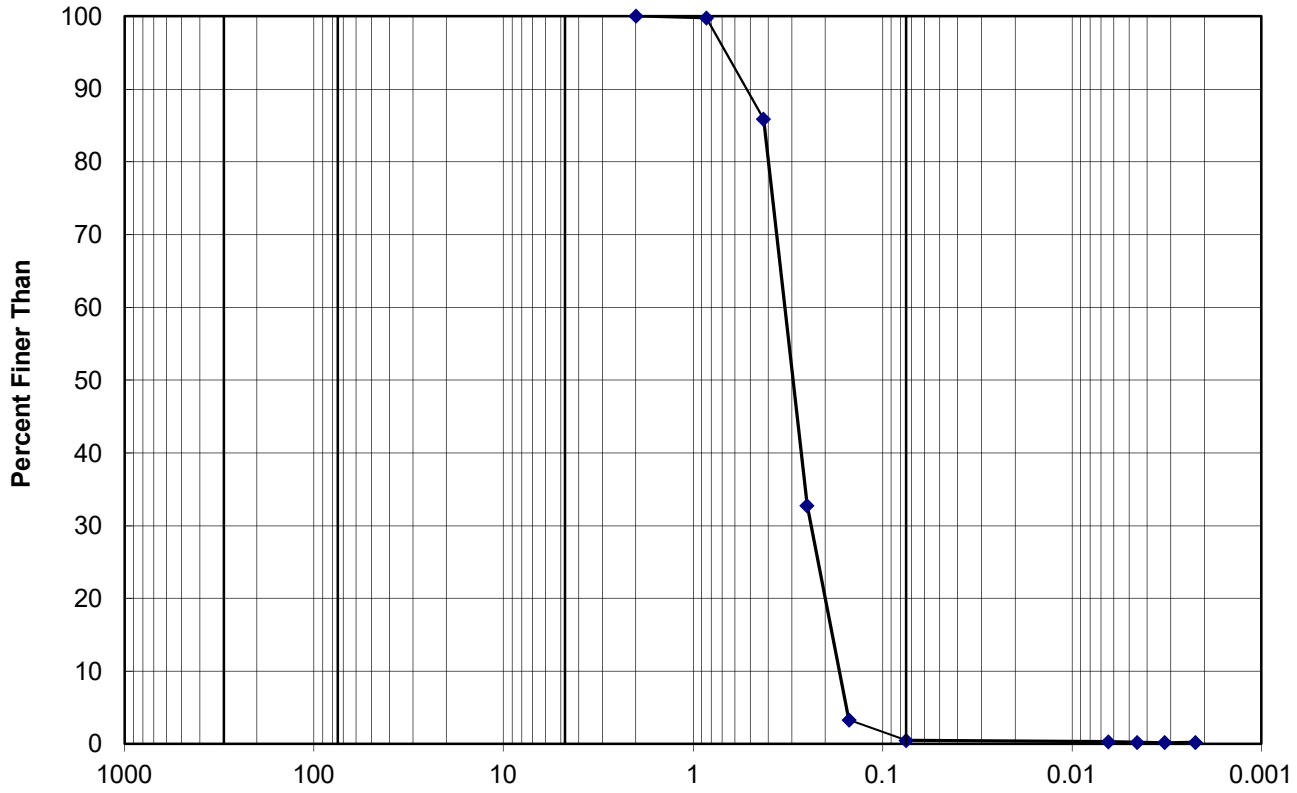
**(Mechanical & Hydrometer)**

Project #: 1899581
Short Title: NexGen / Rook I Project / Env Baselines
Tested by: T.B.

Phase: 3
Date: August 28, 2018

Sample #: SL6313
Source: Sampled below Beet Lake.
Date Sample Received: August 5, 2018

## *Graphical Analysis*




| BOULDERS | COBBLES | GRAVEL | | SAND | | | SILT / CLAY |
|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | |

## *Grain Size Analysis Results:*

| Opening (mm) | Percent Passing (%) |
|---|---|
| 51 | 100 |
| 38 | 100 |
| 25 | 100 |
| 19 | 100 |
| 9.5 | 100 |
| 4.75 | 100 |
| 2.0 | 100 |
| 0.850 | 100 |
| 0.425 | 86 |
| 0.250 | 33 |
| 0.150 | 3.3 |
| 0.075 | 0.5 |
| 0.006 | 0.3 |
| 0.005 | 0.2 |
| 0.003 | 0.2 |
| 0.002 | 0.2 |

Comments:



1721 8th Street E.,
Saskatoon, Saskatchewan S7N 0T4

Reviewed by:_____

GOLDER

# GRAIN SIZE ANALYSIS

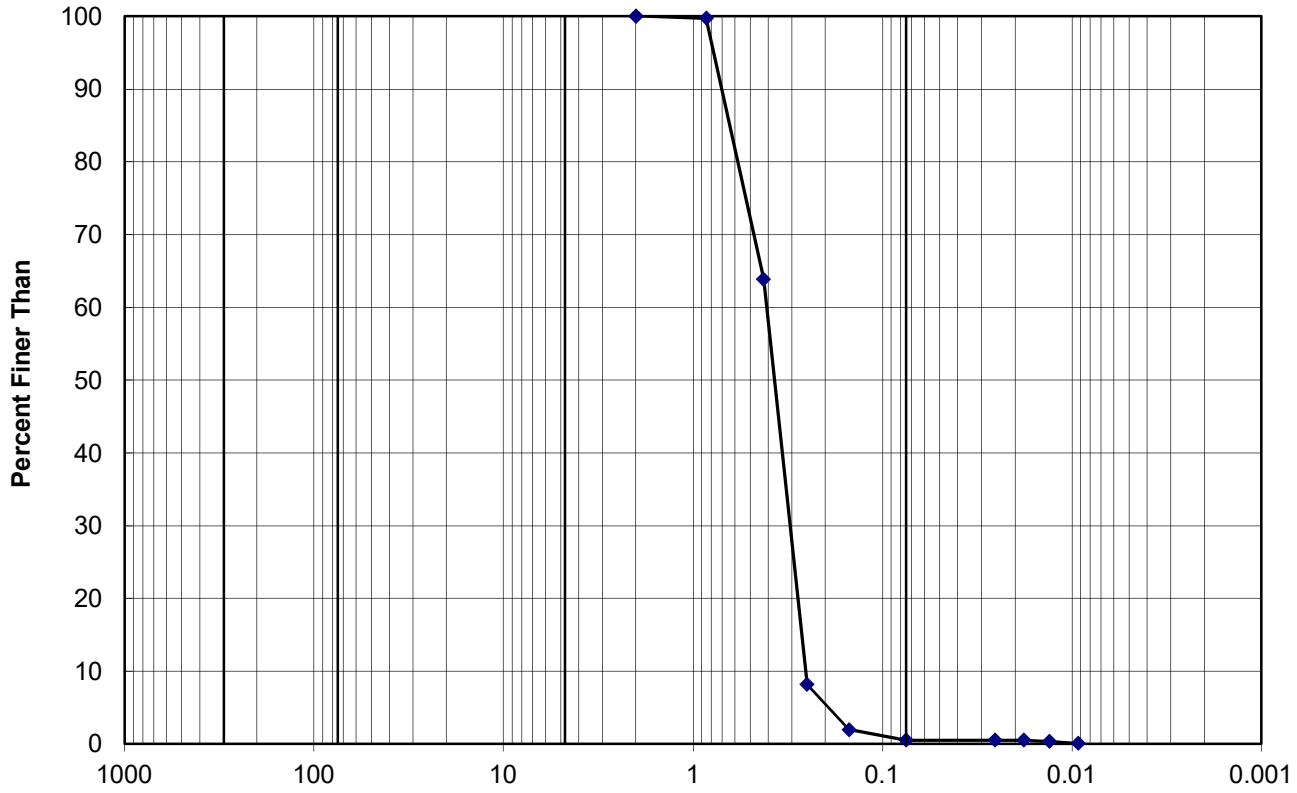
**(Mechanical & Hydrometer)**

Project #: 1899581
Short Title: NexGen / Rook I Project / Env Baselines
Tested by: T.B.

Phase: 3
Date: August 28, 2018

Sample #: SL6314
Source: Sampled below Naomi Lake.
Date Sample Received: August 5, 2018

## *Graphical Analysis*




| BOULDERS | COBBLES | GRAVEL | | SAND | | | SILT / CLAY |
|---|---|---|---|---|---|---|---|
| | | Coarse | Fine | Coarse | Medium | Fine | |

## *Grain Size Analysis Results:*

| Opening (mm) | Percent Passing (%) |
|---|---|
| 51 | 100 |
| 38 | 100 |
| 25 | 100 |
| 19 | 100 |
| 9.5 | 100 |
| 4.75 | 100 |
| 2.0 | 100 |
| 0.850 | 100 |
| 0.425 | 64 |
| 0.250 | 8.2 |
| 0.150 | 2.0 |
| 0.075 | 0.5 |
| 0.025 | 0.5 |
| 0.018 | 0.5 |
| 0.013 | 0.3 |
| 0.009 | 0.1 |
| 0.007 | 0.0 |

Comments:



1721 8th Street E.,
Saskatoon, Saskatchewan S7N 0T4

Reviewed by:_____

SASKATCHEWAN RESEARCH COUNCIL

Environmental Analytical Laboratories
143-111 Research Drive, Saskatoon, SK Canada S7N 3R2

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**Toll-free:** 1-800-240-8808
**E:** analytical@src.sk.ca

**www.src.sk.ca/analytical**

SRC Group # 2018-10049

Aug 21, 2018

Golder
1721 8th Street East
Saskatoon, SK S7H 0T4
Attn: Ross Phillips

Date Samples Received: Aug-15-2018 Client P.O.: 1899581/3/3006

---

All results have been reviewed and approved by a Qualified Person in accordance with the Saskatchewan Environmental Code, Corrective Action Plan Chapter, for the purposes of certifying a laboratory analysis

Results from Lab Sections 1 and 2 have been authorized by Keith Gipman, Supervisor
Results from Lab Section 3 have been authorized by Pat Moser, Supervisor
Results from Lab Sections 4 and 5 have been authorized by Vicky Snook, Supervisor
Results from Lab Section 6 have been authorized by Marion McConnell, Supervisor

---

* Test methods and data are validated by the laboratory's Quality Assurance Program.

* Routine methods follow recognized procedures from sources such as
    * Standard Methods for the Examination of Water and Wastewater APHA AWWA WEF
    * Environment Canada
    * US EPA
    * CANMET

* The results reported relate only to the test samples as provided by the client.

* Samples will be kept for 30 days after the final report is sent. Please contact the lab if you have any special requirements.

* Additional information is available upon request.

This is a final report.

SASKATCHEWAN RESEARCH COUNCIL

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**www.src.sk.ca/analytical**

SRC Group # 2018-10049

Aug 21, 2018

Golder

1721 8th Street East
Saskatoon, SK S7H 0T4
Attn: Ross Phillips

Date Samples Received: Aug-15-2018 Client P.O.: 1899581/3/3006

| | |
|---|---|
| **32091** | **08/04/2018 CLEARWATER RIVER BELOW PATTERSON LAKE *WATER*** |
| **32092** | **08/05/2018 CLEARWATER RIVER BELOW BEET LAKE *WATER*** |
| **32093** | **08/05/2018 CLEARWATER RIVER BELOW NAOMI LAKE *WATER*** |

| Analyte | Units | 32091 | 32092 | 32093 |
|---|---|---|---|---|
| **Lab Section 1 (Inorganics)** | | | | |
| Total suspended solids | mg/L | <1 | <1 | <1 |

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

SASKATCHEWAN RESEARCH COUNCIL

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**www.src.sk.ca/analytical**

SRC Group # 2018-12657

Oct 15, 2018

Golder
1721 8th Street East
Saskatoon, SK S7H 0T4
Attn: Ross Phillips

Date Samples Received: Oct-10-2018 Client P.O.: 1899581/2003/2003

---

All results have been reviewed and approved by a Qualified Person in accordance with the Saskatchewan Environmental Code, Corrective Action Plan Chapter, for the purposes of certifying a laboratory analysis

Results from Lab Sections 1 and 2 have been authorized by Keith Gipman, Supervisor
Results from Lab Section 3 have been authorized by Pat Moser, Supervisor
Results from Lab Sections 4 and 5 have been authorized by Vicky Snook, Supervisor
Results from Lab Section 6 have been authorized by Marion McConnell, Supervisor

---

* Test methods and data are validated by the laboratory's Quality Assurance Program.

* Routine methods follow recognized procedures from sources such as
    * Standard Methods for the Examination of Water and Wastewater APHA AWWA WEF
    * Environment Canada
    * US EPA
    * CANMET

* The results reported relate only to the test samples as provided by the client.

* Samples will be kept for 30 days after the final report is sent. Please contact the lab if you have any special requirements.

* Additional information is available upon request.

This is a final report.

SASKATCHEWAN RESEARCH COUNCIL

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**www.src.sk.ca/analytical**

SRC Group # 2018-12657

Oct 15, 2018

Golder

1721 8th Street East
Saskatoon, SK S7H 0T4
Attn: Ross Phillips

Date Samples Received: Oct-10-2018 Client P.O.: 1899581/2003/2003

| | |
|---|---|
| **41121** | **10/01/2018 17:00 CLEARWATER RIVER BELOW BEET LAKE *WATER*** |
| **41122** | **10/03/2018 09:00 CLEARWATER RIVER BELOW PATTERSON LAKE *WATER*** |
| **41123** | **10/01/2018 16:00 CLEARWATER RIVER BELOW NAOMI LAKE *WATER*** |

| Analyte | Units | 41121 | 41122 | 41123 |
|---|---|---|---|---|
| **Lab Section 1 (Inorganics)** | | | | |
| Total suspended solids | mg/L | <1 | <1 | <1 |

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

SASKATCHEWAN RESEARCH COUNCIL

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**www.src.sk.ca/analytical**

SRC Group # 2020-6763

Jun 27, 2020

Golder
1721 8th Street East
Saskatoon, SK S7H 0T4
Attn: Jacoby Donnelly

Date Samples Received: Jun-18-2020 Client P.O.: 20138965/1000/1003

---

All results have been reviewed and approved by a Qualified Person in accordance with the Saskatchewan Environmental Code, Corrective Action Plan Chapter, for the purposes of certifying a laboratory analysis

Results from Lab Section 1 authorized by Keith Gipman, Supervisor

---

* Test methods and data are validated by the laboratory's Quality Assurance Program.

* Routine methods follow recognized procedures from sources such as
    * Standard Methods for the Examination of Water and Wastewater APHA AWWA WEF
    * Environment Canada
    * US EPA
    * CANMET

* The results reported relate only to the test samples as provided by the client.

* Samples will be kept for 30 days after the final report is sent. Please contact the lab if you have any special requirements.

* Additional information is available upon request.

* Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

This is a final report.

SASKATCHEWAN RESEARCH COUNCIL

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**www.src.sk.ca/analytical**

SRC Group # 2020-6763

Jun 27, 2020

Golder

1721 8th Street East
Saskatoon, SK S7H 0T4
Attn: Jacoby Donnelly

Date Samples Received: Jun-18-2020 Client P.O.: 20138965/1000/1003

| | | |
|---|---|---|
| **30649** | **06/08/2020** | **CR-WC-MS-03 *WATER*** |
| **30650** | **06/06/2020** | **CR-WC-MS-04 *WATER*** |
| **30651** | **06/05/2020** | **CR-WC-MS-05 *WATER*** |

| Analyte | Units | 30649 | 30650 | 30651 |
|---|---|---|---|---|
| **Lab Section 1** | | | | |
| Total suspended solids | mg/L | <1 | 3±1 | 3±1 |

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 18.6 °C upon receipt.

SASKATCHEWAN RESEARCH COUNCIL

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**www.src.sk.ca/analytical**

SRC Group # 2020-6763

Jun 27, 2020

Golder

## Analyte Methods

| Name | Units | Method |
|---|---|---|
| Total suspended solids | mg/L | Chm-206 |

SASKATCHEWAN RESEARCH COUNCIL

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143-111 Research Drive, Saskatoon, SK Canada S7N 3R2

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**Toll-free:** 1-800-240-8808
**E:** analytical@src.sk.ca

**www.src.sk.ca/analytical**

SRC Group # 2020-7971

Jul 27, 2020

Golder
1721 8th Street East
Saskatoon, SK S7H 0T4
Attn: Jacoby Donnelly

Date Samples Received: Jul-15-2020 Client P.O.: 20138965

---

All results have been reviewed and approved by a Qualified Person in accordance with the Saskatchewan Environmental Code, Corrective Action Plan Chapter, for the purposes of certifying a laboratory analysis

Results from Lab Section 1 authorized by Keith Gipman, Supervisor

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* Test methods and data are validated by the laboratory's Quality Assurance Program.

* Routine methods follow recognized procedures from sources such as
    * Standard Methods for the Examination of Water and Wastewater APHA AWWA WEF
    * Environment Canada
    * US EPA
    * CANMET

* The results reported relate only to the test samples as provided by the client.

* Samples will be kept for 30 days after the final report is sent. Please contact the lab if you have any special requirements.

* Additional information is available upon request.

* Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

This is a final report.

SASKATCHEWAN RESEARCH COUNCIL

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SRC Group # 2020-7971

Jul 27, 2020

Golder

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Attn: Jacoby Donnelly

Date Samples Received: Jul-15-2020 Client P.O.: 20138965

| | | |
|---|---|---|
| **34159** | **07/14/2020** | **CR-WC-MS-03 *WATER*** |
| **34160** | **07/13/2020** | **CR-WC-MS-04 *WATER*** |
| **34161** | **07/10/2020** | **CR-WC-MS-05 *WATER*** |

| Analyte | Units | 34159 | 34160 | 34161 |
|---|---|---|---|---|
| **Lab Section 1** | | | | |
| Total suspended solids | mg/L | 1±1 | 2±1 | 2±1 |

The temperature of the cooler was 14.8 °C upon receipt.

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SRC Group # 2020-7971

Jul 27, 2020

Golder

## Analyte Methods

| Name | Units | Method |
|---|---|---|
| Total suspended solids | mg/L | Chm-206 |

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SRC Group # 2020-10042

Sep 04, 2020

Golder
1721 8th Street East
Saskatoon, SK S7H 0T4
Attn: Jacoby Donnelly

Date Samples Received: Aug-26-2020 Client P.O.: 20138965/1000/1005

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All results have been reviewed and approved by a Qualified Person in accordance with the Saskatchewan Environmental Code, Corrective Action Plan Chapter, for the purposes of certifying a laboratory analysis

Results from Lab Section 1 authorized by Keith Gipman, Supervisor

---

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* Routine methods follow recognized procedures from sources such as
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    * US EPA
    * CANMET

* The results reported relate only to the test samples as provided by the client.

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* Additional information is available upon request.

* Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

This is a final report.

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SRC Group # 2020-10042

Sep 04, 2020

Golder

1721 8th Street East
Saskatoon, SK S7H 0T4
Attn: Jacoby Donnelly

Date Samples Received: Aug-26-2020 Client P.O.: 20138965/1000/1005

| | | |
|---|---|---|
| **41338** | **08/25/2020 07:50** | **CR-WC-MS-03 *WATER*** |
| **41339** | **08/21/2020 10:36** | **CR-WC-MS-04 *WATER*** |
| **41340** | **08/20/2020 15:50** | **CR-WC-MS-05 *WATER*** |

| Analyte | Units | 41338 | 41339 | 41340 |
|---|---|---|---|---|
| **Lab Section 1** | | | | |
| Total suspended solids | mg/L | <1 | <1 | <1 |

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 16.7 °C upon receipt.

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SRC Group # 2020-10042

Sep 04, 2020

Golder

## Analyte Methods

| Name | Units | Method |
|---|---|---|
| Total suspended solids | mg/L | Chm-206 |

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SRC Group # 2020-11797

Oct 13, 2020

Golder
1721 8th Street East
Saskatoon, SK S7H 0T4
Attn: Jacoby Donnelly

Date Samples Received: Oct-01-2020 Client P.O.: 20138965/1000/1006

---

All results have been reviewed and approved by a Qualified Person in accordance with the Saskatchewan Environmental Code, Corrective Action Plan Chapter, for the purposes of certifying a laboratory analysis

Results from Lab Section 1 authorized by Keith Gipman, Supervisor

---

* Test methods and data are validated by the laboratory's Quality Assurance Program.

* Routine methods follow recognized procedures from sources such as
    * Standard Methods for the Examination of Water and Wastewater APHA AWWA WEF
    * Environment Canada
    * US EPA
    * CANMET

* The results reported relate only to the test samples as provided by the client.

* Samples will be kept for 30 days after the final report is sent. Please contact the lab if you have any special requirements.

* Additional information is available upon request.

* Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

This is a final report.

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SRC Group # 2020-11797

Oct 13, 2020

Golder

1721 8th Street East
Saskatoon, SK S7H 0T4
Attn: Jacoby Donnelly

Date Samples Received: Oct-01-2020 Client P.O.: 20138965/1000/1006

| | | |
|---|---|---|
| **50174** | **09/28/2020 10:18** | **CR-WC-MS-03 *WATER*** |
| **50175** | **09/26/2020 08:43** | **CR-WC-MS-04 *WATER*** |
| **50176** | **09/27/2020 09:40** | **CR-WC-MS-05 *WATER*** |

| Analyte | Units | 50174 | 50175 | 50176 |
|---|---|---|---|---|
| **Lab Section 1** | | | | |
| Total suspended solids | mg/L | <1 | <1 | 2±1 |

Symbol of "<" means "less than". This indicates that it was not detected at level stated above.

The temperature of the cooler was 22.8 °C upon receipt.

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SRC Group # 2020-11797

Oct 13, 2020

Golder

## Analyte Methods

| Name | Units | Method |
|---|---|---|
| Total suspended solids | mg/L | Chm-206 |