

**Appendix A- City of Brantford Water System 2018 Annual Summary Report**



**City of Brantford Water System  
2018 Annual Summary Report**

Date: March 19, 2019

## **A. Background**

This report has been prepared in accordance with the terms and requirements set out in the Safe Drinking Water Act (2002), as Section 11 – Annual Reports and Schedule 22 – Summary Reports of Ontario Regulation 170/03. It covers the period from January 1st to December 31st, 2018.

The 2018 Annual Summary Report will be available to the public without charge, beginning March 1<sup>st</sup>, 2019. A copy of this report can be obtained via the Internet ([www.brantford.ca](http://www.brantford.ca)) and at Brantford City Hall (519) 759-4150 Ext. 5400).

## **B. Description of Drinking Water System**

The City of Brantford Water System is owned and operated by the Corporation of the City of Brantford. The Drinking Water System is a Large Municipal Residential System consisting of a Class IV Water Treatment Plant (Holmedale Water Treatment Plant) and a Class III Distribution System (Drinking Water System Number: 220003564, Municipal Drinking Water License (MDWL) 063-101 Issue #: 6, Issued February 22, 2017, Drinking Water Works Permit (DWWP) #063-201 Issue #: 4, Issued: February 22, 2017).

The Holmedale Water Treatment Plant is located at 30 Grand River Avenue in Brantford, Ontario. The City's raw water supply is drawn from the Grand River, at the Holmedale Canal.

The plant is responsible for the overall management of the production and distribution of Brantford's drinking water. Specifically, this includes the treatment of Grand River water, the maintenance of the distribution and metering systems and meeting and/or exceeding water quality requirements. The water treatment plant is permitted to produce drinking water up to 100 Megalitres per day (ML/d) (Permit to Take Water #6434-AM3PEJ Issued: May 8, 2017, expires May 31, 2027.). The plant contains the following treatment process units: screening, coagulation, sand ballasted flocculation (John Meunier's Actiflo™), sedimentation, ozonation, biological filtration, UV disinfection, chlorination and chloramination.

Three reservoirs (in addition to an in-plant reservoir), one booster pumping station and an elevated tank are used in the distribution system to equalize water demand, to reduce pressure fluctuations and to provide reserves for firefighting, power outages and other emergencies. A Residue Management Facility (RMF) disposes of the waste generated during treatment in an environmentally sound manner. Treatment of waste consists of concentrating the waste by three gravity settler thickeners and dewatering by two belt filter presses. Dewatered waste (sludge) is disposed at the Brantford Landfill.

The City of Brantford Water System sells water to one drinking water system, which is the Town of Cainsville Distribution System (Drinking Water System #: 260002616, Class I) which is owned and managed by the County of Brant.

## **Fluoridation**

The City of Brantford was the first municipality in Canada and in North America to add fluoride to its drinking water which began on June 20, 1945. The City's drinking water is fluoridated to help prevent tooth decay of residents as directed by Brant County's Medical Officer of Health.

In April 2018, the City installed a new Hydrofluosilicic Acid (HFS) system. The installation required the old fluoride system to be offline during construction. The Brant County Health Unit (BCHU) mandated that the fluoride feed could only be off for 45 days. The new system was completed and commissioned within the required timelines. The system has numerous safe guards in place to prevent overdosing and limit contact with Water Treatment staff. Fluoride residuals on average for 2018 were within the required therapeutic range of 0.6 to 0.8 mg/L required under the Protocol of the Monitoring of Community Water Fluoride Levels, 2014.

## **Tutela Heights**

On January 1, 2017 the City assumed the Tutela Heights area from the County of Brant. An agreement between the City and County was approved by both municipal Councils in March 2017 (Report PW2017-005 Boundary Expansion Transition - Water Agreement for the Tutela Heights Area). This agreement required the County to own, supply, operate and maintain the Tutela Heights Water System until December 31, 2020. As a result, Brant County will be completing the regulatory reporting requirements for the Tutela Heights Water System and a copy of the report will be provided to the City.

## **C. List of Water Treatment Chemicals Used**

- Polyaluminum chloride (primary coagulant)
- Flopam AN 934 PWG (settling aid)
- Micro-sand (settling aid)
- Liquid oxygen (primary chemical for ozone generation)
- Chlorine gas (primary disinfectant)
- Ammonia gas (in combination with free chlorine for secondary disinfection)
- Hydrofluosilicic Acid (fluoridation)
- Sulfur dioxide (gas) (dechlorination)

## **D. Major Expenses Related to Drinking Water Quality**

• New Fluoride System	\$112,890
• RMF Sludge Mixer Replacement	\$71,800
• Primary Hydro Meter Installation	\$54,000
• Annual SCADA iFix Operating System Support	\$37,683
• Annual Preventative Maintenance – Ozone System	\$34,09
• Arc Flash Assessment	\$29,928
• Ozone Contact Chamber Clean Out	\$29,809
• Ozone System Control Boards Replacement	\$22,795
• Lead Filters for Private Residence	\$21,723
• High Lift Pumps – Drive Fan Replacements	\$20,450
• Filter Inspection & Training	\$15,900
• Annual Preventive Maintenance – Chlorination System	\$11,722
• Annual Equipment Calibrations	\$10,453

## **E. Summary of Reporting Adverse Test Results and Other Problems (Schedule 16)**

i. **Adverse Bacteriological or Combined Chlorine Residual Results and Corrective Actions Results**

In 2018, 1701 bacteriological samples were taken with 20 adverse results. All 20 results were from samples collected from two (2) watermain construction projects within the distribution system. One project was on King George Road and the other on Wellington Street.

## King George Road

A routine bacteriological sample was collected from inside a restaurant on King George Road on June 12th following an extended shut down on June 11th to install a new valve. The sample taken on June 12th tested positive for total coliforms.

Resamples were conducted according to O. Reg 170/03. The results of the testing showed that the water from the distribution system was negative for bacteria while the samples that were positive for bacteria were from the internal plumbing. Brant County Health Unit (BCHU) issued a Boil Water Advisory for the restaurant only.

The restaurant worked closely in consultation with the BCHU until satisfactory results were found in the internal plumbing. All of the results are outlined in Table 1.

Location	Date	Total Coliform (per 100ml)	E. Coli (per 100ml)	Background (per 100ml)	Free Chlorine (mg/L)	Total Chlorine (mg/L)	Comments
King George Rd. A	12-Jun	39	0	142	0.03	1.94	
Barnes Ave	12-Jun	0	0	0	0.07	1.99	
King George Rd. A	14-Jun	0	0	0	0.06	1.96	Resample
King George Tank	14-Jun	0	0	0	0.04	2.01	Upstream
Barnes Ave.	14-Jun	0	0	0	0.04	2.03	Downstream
King George Rd. A-1	14-Jun	123	0	165	0.04	2.07	Softener bypassed
King George Rd. A-Inlet	15-Jun	0	0	0	0.05	2.0	Removed meter
King George Rd. A	15-Jun	152	0	64	0.08	2.26	Resample
King George Tank	15-Jun	0	0	0	0.05	2.14	Upstream
King George Rd B	15-Jun	0	0	0	0.04	1.85	
Barnes Ave.	15-Jun	0	0	0	0.03	2.11	Downstream
King George Rd. A-2	16-Jun	0	0	0	0.04	2.10	Removed meter
King George Rd. A	16-Jun	3	0	9	0.04	2.18	Resample
King George Tank	16-Jun	0	0	0	0.07	1.84	Upstream
King George Rd B	16-Jun	0	0	0	0.07	2.13	
Barnes Ave.	16-Jun	0	0	0	0.05	2.13	Downstream

Table 1 - Adverse Bacteriological Results and Corrective Actions for King George Rd.

## **Wellington Street - September**

A newly installed water main on Wellington Street between Puleston St. and Second Ave. passed the City of Brantford requirements for watermain commissioning on September 5th and 6th. On September 11th, a routine bacteriological sample was collected following the connection between the existing water main and the new water main on Wellington Street. The sample tested positive with six (6) total coliforms. A resample was collected on September 13th, 2018 along with samples from locations upstream and downstream from the adverse location as per O.Reg 170/03. The resample was overgrown on the plate "NDOGN" (No Data-Total Coliform/E. Coli Plate Overgrown with Non-Target Bacteria) and therefore considered adverse. Additionally the upstream sample tested positive for total coliform. The Brant County Health Unit (BCHU) issued a Boil Water Advisory (BWA) on September 15th, 2018 for 10 homes that were affected. Bottled water was provided by the City of Brantford to the affected residences.

Sampling continued on September 17th and 18th as per O. Reg. 170/03. One sample tested positive for total coliforms from the September 17th samples and four (4) were positive for total coliforms from the samples collected on September 18th.

On September 19th the watermain between Puleston St. and Second Ave. was swabbed and chlorinated. Samples were collected on September 20th and 21st. Three (3) samples collected on September 20th, 2018 were positive for total coliform and two (2) samples collected on September 21st were positive for total coliform.

Due to the adverse results from the samples taken on the new water main on September 20th and 21st, additional testing was done upstream on Wellington Street between Stanley St. and Puleston St. including Twelfth Ave. Two (2) samples were positive for total coliform and the Boil Water Advisory was extended to include Wellington St. from Stanley St. to Puleston St.

The water main from Stanley St. to Puleston St. was swabbed and chlorinated on September 25th. Samples were collected on September 26th and 27th, all of the results were negative and the Boil Water Advisory was lifted on Wellington Street from Stanley St. to Puleston St.

A temporary water main was installed and tested on September 26th and 27th, for the watermain that services 10 homes on Wellington Street from Puleston St. to Third Ave. All of the parameters tested were within City of Brantford specifications. The water service lines were connected to the temporary water main while the water main was replaced between Puleston St. and Second Ave. All of the results are outlined in Table 2.

Location	Date	Total Coliforms (per 100ml)	E. Coli (per 100ml)	Background (per 100ml)	Free Chlorine (mg/L)	Total Chlorine (mg/L)	Comments
Wellington A	11-Sep-18	6	0	8	0.03	1.88	Adverse
Wellington A	13-Sep-18	NDOGN	NDOGN	NDOGN	0.04	2.03	Resample
Wellington B	13-Sep-18	0	0	68	0.04	1.99	Upstream
Wellington C	13-Sep-18	1	0	73	0.05	1.67	Downstream
Puleston A	13-Sep-18	0	0	0	0.04	2.01	Upstream
Wellington at Second Ave. Blowoff	15-Sep-18	0	0	1	0.07	1.99	Downstream
Wellington D	15-Sep-18	0	0	0	0.07	1.87	Downstream
Wellington C	15-Sep-18	0	0	0	0.05	1.82	Resample
Wellington A (Laundry)	15-Sep-18	0	0	0	0.04	1.86	Same address, different tap
Wellington A (Outside)	15-Sep-18	NDOGN	NDOGN	NDOGN	0.04	1.90	Resample
AR Chamber	15-Sep-18	0	0	0	0.05	2.02	Upstream
Wellington B	15-Sep-18	0	0	0	0.07	2.08	Upstream
Puleston A	15-Sep-18	0	0	0	0.06	2.08	Upstream
Wellington at Second Ave. Blowoff	16-Sep-18	0	0	0	0.06	2.00	Downstream
Wellington D	16-Sep-18	NDOGN	NDOGN	NDOGN	0.07	1.97	Downstream
Wellington C	16-Sep-18	0	0	0	0.05	1.90	Resample
Wellington A (Laundry)	16-Sep-18	0	0	1	0.06	1.98	Resample
Wellington A (Outside)	16-Sep-18	0	0	0	0.10	2.08	Resample
AR Chamber	16-Sep-18	0	0	0	0.15	2.07	Upstream
Wellington B	16-Sep-18	0	0	0	0.03	2.11	Upstream
Puleston A	16-Sep-18	0	0	0	0.05	2.06	Upstream
Wellington Hydrant at Third Ave.	17-Sep-18	0	0	65	0.03	2.02	Downstream
Wellington at Second Ave. Blowoff	17-Sep-18	0	0	0	0.12	2.00	Downstream
AR Chamber	17-Sep-18	13	0	13	0.13	2.00	Upstream
Wellington Hydrant at Fourth Ave.	17-Sep-18	0	0	109	0.41	2.15	Downstream
Wellington D	17-Sep-18	0	0	0	0.09	1.95	Downstream
Wellington Hydrant at Third Ave.	18-Sep-18	9	0	117	0.04	2.01	Resample
Wellington at Second Ave. Blowoff	18-Sep-18	0	0	58	0.07	2.05	Resample
AR Chamber	18-Sep-18	6	0	1	0.06	2.07	Resample
Wellington Hydrant at Fourth Ave.	18-Sep-18	4	0	200	0.07	2.06	Resample
Wellington D	18-Sep-18	1	0	7	0.02	2.01	Resample
Wellington BFP 0hr	20-Sep-18	10	0	6	0.09	2.04	Resample
AR Chamber 0hr	20-Sep-18	10	0	3	0.11	1.99	Resample

Location	Date	Total Coliforms (per 100ml)	E. Coli (per 100ml)	Background (per 100ml)	Free Chlorine (mg/L)	Total Chlorine (mg/L)	Comments
Mid Wellington Blowoff 0hr	20-Sep-18	1	0	0	0.05	1.91	Resample
Wellington at Second Ave Blowoff 0hr	20-Sep-18	0	0	0	0.05	1.98	Resample
Wellington St. BFP	21-Sep-18	12	0	5	0.06	2.07	Resample
AR Chamber	21-Sep-18	4	0	1	0.08	2.04	Resample
Mid Wellington Blowoff	21-Sep-18	0	0	1	0.04	2.01	Resample
Wellington at Second Ave. Blowoff	21-Sep-18	0	0	11	0.04	2.01	Resample
Twelfth Ave. A	21-Sep-18	0	0	0	0.09	1.93	Upstream
Twelfth Ave. B	21-Sep-18	0	0	0	0.04	1.92	Upstream
Wellington E Laundry Tap	21-Sep-18	0	0	0	0.11	1.99	Upstream
Wellington F	21-Sep-18	0	0	0	0.08	2.04	Upstream
Wellington St. G	21-Sep-18	0	0	0	0.09	1.93	Upstream
Wellington St. H	21-Sep-18	0	0	0	0.05	1.87	Upstream
Wellington St. I	21-Sep-18	1	0	1	0.04	2.00	Upstream
Wellington St. J	22-Sep-18	0	0	0	0.10	2.19	Upstream
Wellington St. F	22-Sep-18	0	0	0	0.08	2.20	Upstream
Wellington St. E	22-Sep-18	0	0	0	0.06	2.22	Upstream
Wellington St. H	22-Sep-18	0	0	0	0.05	1.83	Upstream
Wellington BFP	22-Sep-18	0	0	0	0.07	2.12	Upstream
Wellington K	22-Sep-18	0	0	0	0.05	2.18	Upstream
Wellington I	22-Sep-18	0	0	0	0.05	2.03	Upstream
Wellington West End 0hr	26-Sep-18	0	0	0	0.08	1.88	Temporary Main
Wellington at Fourth Ave. BFP 0hr	26-Sep-18	0	0	0	0.06	1.88	Temporary Main
Wellington East End 0hr	26-Sep-18	0	0	0	0.13	1.86	Temporary Main
Wellington BFP 0hr	26-Sep-18	0	0	0	0.13	1.91	0hr Re-Swab and Chlorinate Phase 1
BO @ 338 Wellington 0hr	26-Sep-18	0	0	0	0.08	1.74	0hr Re-Swab and Chlorinate Phase 1
Wellington @ Twelfth 0hr	26-Sep-18	0	0	0	0.07	2.33	0hr Re-Swab and Chlorinate Phase 1
Wellington West End 0hr	27-Sep-18	0	0	0	0.04	1.74	Temporary Main
Wellington at Fourth BFP 0hr	27-Sep-18	0	0	0	0.15	1.88	Temporary Main
Wellington East End 0hr	27-Sep-18	0	0	0	0.01	1.80	Temporary Main
Wellington BFP 0hr	27-Sep-18	0	0	0	0.07	1.84	0hr Re-Swab and Chlorinate Phase 1
Wellington @ 12th 0hr	27-Sep-18	0	0	0	0.09	2.21	0hr Re-Swab and Chlorinate Phase 1
BO @ 388 Wellington 0hr	27-Sep-18	0	0	0	0.04	1.62	0hr Re-Swab and Chlorinate Phase 1



**Table 2 - Adverse Bacteriological Results and Corrective Actions on Wellington Street - September**

\*NDOGN-No Data-Total Coliform/E. Coli Plate Overgrown with Non-Target Bacteria (Adverse)

**Wellington Street - October**

The water main on Wellington Street was replaced between Puleston St. and Second Ave. and testing for water quality occurred on October 22nd and 23rd. Three (3) samples were collected each day. One sample collected on October 22nd was positive for total coliform. The watermain was sampled again on October 0th and 25th. One of the samples collected at the backflow preventer was positive for total coliform. Samples were collected October 26th and 27th upstream from the backflow preventer on Wellington Street to verify water quality. One (1) sample collected on October 26th and two (2) samples collected on October 27th were positive for total coliform. On October 28th the BCHU issued a Boil Water Advisory on Wellington Street from Stanley to Puleston St.

The watermain on Wellington Street from Stanley St. to Puleston St. was tested again on October 29th, 30th and 31st. One (1) sample collected on October 29th was positive for total coliform. The samples taken on October 30th and 31st were all negative for bacteria and the boil water advisory was lifted by the BCHU.

The water main on Wellington Street from Puleston St. to Second Ave. was sampled on November 5th and 6th, all bacteriological samples were negative. The new water main was connected to existing watermain all bacteriological results were negative. All of the results are outlined in Table 3

Location	Date	Total Coliforms (per 100ml)	E. Coli (per 100ml)	Background (per 100ml)	Free Chlorine (mg/L)	Total Chlorine (mg/L)	Comments
Wellington BFP 0hr	22-Oct-18	0	0	0	0.10	2.00	New Water Main
Wellington at Fourth 0hr	22-Oct-18	0	0	0	0.08	2.09	New Water Main
406 Wellington 0hr	22-Oct-18	1	0	0	0.08	2.17	New Water Main
Wellington at Second Blowoff 0hr	22-Oct-18	0	0	0	0.03	2.36	New Water Main
Wellington BFP 24hr	23-Oct-18	0	0	0	0.04	2.21	New Water Main
Wellington at Fourth 24hr	23-Oct-18	0	0	0	0.03	1.96	New Water Main
406 Wellington 24hr	23-Oct-18	0	0	0	0.02	1.99	New Water Main
Wellington at Second Blowoff 24hr	23-Oct-18	0	0	0	0.07	1.91	New Water Main
Wellington 0hr BFP	24-Oct-18	16	0	0	0.06	2.08	New Water Main
Wellington 0hr Fourth	24-Oct-18	0	0	0	0.04	1.94	New Water Main
Wellington 0hr 406	24-Oct-18	0	0	0	0.04	1.94	New Water Main
Wellington at Second Blowoff 0h	24-Oct-18	0	0	0	0.03	1.96	New Water Main

Location	Date	Total Coliforms (per 100ml)	E. Coli (per 100ml)	Background (per 100ml)	Free Chlorine (mg/L)	Total Chlorine (mg/L)	Comments
Wellington 24h BFP	25-Oct-18	0	0	0	0.08	1.97	New Water Main
Wellington 24h Fourth	25-Oct-18	0	0	0	0.03	1.82	New Water Main
Wellington 24h 206	25-Oct-18	0	0	0	0.04	1.77	New Water Main
Wellington at Second Blowoff 24h	25-Oct-18	0	0	0	0.10	1.77	New Water Main
Wellington BFP 0hr	26-Oct-18	0	0	0	0.11	2.11	Resample
Wellington @ Twelfth hydrant 0hr	26-Oct-18	0	0	0	0.08	2.23	Upstream
Wellington Mid Hydrant 0hr	26-Oct-18	14	0	66	0.04	2.22	Upstream
Wellington BFP 24hr	27-Oct-18	0	0	0	0.05	2.13	Resample
Wellington @ Twelfth FH 24hr	27-Oct-18	7	0	0	0.10	2.28	Upstream
Wellington Mid Hydrant 24hr	27-Oct-18	74	0	18	0.08	2.23	Upstream
Wellington at Stanley Blowoff 0hr	29-Oct-18	0	0	0	0.05	2.56	Resampling an Adverse
Wellington at Twelfth Hydrant 0hr	29-Oct-18	0	0	0	0.05	2.54	Resampling an Adverse
Wellington at Twelfth Blowoff 0hr	29-Oct-18	0	0	0	0.01	2.48	Resampling an Adverse
Mid Wellington Blowoff 0hr	29-Oct-18	3	0	0	0.02	2.35	Resampling an Adverse
Mid Wellington Hydrant 0hr	29-Oct-18	0	0	0	0.02	2.49	Resampling an Adverse
Wellington End 0hr	29-Oct-18	0	0	0	0.03	2.49	Resampling an Adverse
Wellington at Stanley Blowoff 24hr	30-Oct-18	0	0	0	0.05	2.57	Resampling an Adverse
Wellington at Twelfth Hydrant 24hr	30-Oct-18	0	0	0	0.01	2.00	Resampling an Adverse
Wellington at Twelfth Blowoff 24hr	30-Oct-18	0	0	0	0.01	2.39	Resampling an Adverse
Mid Wellington Blowoff 24hr	30-Oct-18	0	0	0	0.04	2.11	Resampling an Adverse
Mid Wellington Hydrant 24hr	30-Oct-18	0	0	0	0.03	2.43	Resampling an Adverse
Wellington End 24hr	30-Oct-18	0	0	0	0.04	2.62	Resampling an Adverse
Wellington at Stanley Blowoff 0hr	31-Oct-18	0	0	0	0.02	2.22	Resampling an Adverse
Wellington at Twelfth Blowoff 0hr	31-Oct-18	0	0	0	0.09	2.33	Resampling an Adverse
Wellington at Twelfth Blowoff 0hr	31-Oct-18	0	0	0	0.05	2.14	Resampling an Adverse
Wellington End Blowoff	31-Oct-18	0	0	0	0.07	2.40	Resampling an Adverse
Wellington St 0hr 1	05-Nov-18	0	0	0	0.06	2.15	New Water Main
Wellington St 0hr 2	05-Nov-18	0	0	0	0.11	5.26	New Water Main
Wellington St 0hr 3	05-Nov-18	0	0	0	0.07	2.29	New Water Main
Wellington St 0hr 4	05-Nov-18	0	0	0	0.05	2.23	New Water Main
Wellington St 24hr 1	06-Nov-18	0	0	15	0.03	2.32	New Water Main
Wellington St 24hr 2	06-Nov-18	0	0	0	0.06	2.13	New Water Main
Wellington St 24hr 3	06-Nov-18	0	0	0	0.04	2.02	New Water Main

Location	Date	Total Coliforms (per 100ml)	E. Coli (per 100ml)	Background (per 100ml)	Free Chlorine (mg/L)	Total Chlorine (mg/L)	Comments
Wellington St 24hr 4	06-Nov-18	0	0	0	0.04	2.01	New Water Main
Puleston BO	08-Nov-18	0	0	0	0.04	2.39	Final connection
2 <sup>nd</sup> Ave BO	08-Nov-18	0	0	0	0.04	2.25	Final connection
Puleston BO	08-Nov-18	0	0	0	0.04	2.39	Final connection
Wellington St BO	09-Nov-18	0	0	0	0.04	2.21	Final connection

**Table 3 - Adverse Bacteriological Results and Corrective Actions on Wellington Street - October**

### Corrective Actions Taken

Since November, City staff has reviewed both Wellington Street as well as the King George Rd. incident to determine what corrective actions need to be taken. To summarize:

- The City's Water Distribution, Water Compliance and Design & Construction divisions reviewed in detail the City's Design and Construction Manual – Linear Municipal Infrastructure and made numerous revisions.
- Water Distribution and Water Compliance staff is developing a Final Connection Standard Operating Procedure (SOP). The SOP will outline that final watermain connections will be discussed and planned during site construction meeting. The goal is to leave sections of the watermain isolated from the rest of the distribution system to avoid the potential spread of contamination until bacteriological samples pass.
- Water Compliance staff developed and trained staff on a new bacteriological collection SOP. Samples will no longer be collected from private property.
- A sample station was installed on Wellington Street. Water Compliance staff have been monitoring water quality on a weekly basis.
- Staff is reviewing all 2019 watermain installation projects to determine whether sample stations can be added to the projects.

### ii. Adverse Chemical Results & Corrective Actions

#### Sodium

Samples collected from treated water & distribution system had an annual sodium average of 68.01 mg/L & 68.28 mg/L respectively. According to O.Reg 170/03, despite an aesthetic objective of 200 mg/l, any concentration above 20 mg/l is considered an adverse result. The City of Brantford Water System is required to report the results to the Ministry of Environment Conservation and Parks (MECP) and the BCHU once every 57 months. The sodium results were last reported to both agencies in November 2017.

Sodium concentration in our drinking water supply reflects the level found in the Grand River and cannot be removed by conventional treatment methods.

iii. **Non-Compliance Events With Provincial Regulations, Municipal Drinking Water License, Municipal Drinking Water Works Permit, And Other Official Documents**

**Loss of Data - Filter Effluent Turbidity**

On September 19 the turbidimeter for Filter #4 failed which lead to a loss of data for more than 15 consecutive minutes. When the issue was identified the Treatment Operator immediately took the filter offline. The other five filters online turbidity readings were 0.05 NTU well below the regulatory requirement of 1.00NTU. The turbidimeter was replaced; the filter was backwashed and returned to service. According to O.Reg 170/03, filter effluent turbidity reading is required to be collected every 15 minutes.

## **F. Holmedale Water Treatment Plant Flows**

i. **Drinking Water Flows**

According to the City of Brantford Water System's Municipal Drinking Water License Schedule C, the maximum daily volume of treated water that flows from the Holmedale Water Treatment Plant into the distribution system must not exceed 100 ML/d.

At the Holmedale Water Treatment Plant, the treated water flow is measured by continuous on-line flow meters and monitored and controlled via a SCADA computer system. The daily average flow for 2018 was 32.88 ML/d.

Figure 1 outlines the monthly average daily flow and maximum total daily flow of treated water for the Holmedale Water Treatment Plant in 2018. The monthly average daily flow was calculated by averaging the total daily flows for a given month. The monthly maximum daily flow corresponds to the highest daily average flow for that month.

Figure 1 indicates that the monthly average daily flow and maximum total daily flow never exceeded the rated capacity in 2018. The highest monthly average daily flow was 39.15 ML/d and the highest maximum daily flow was 44.66 ML/d both of which occurred in July.

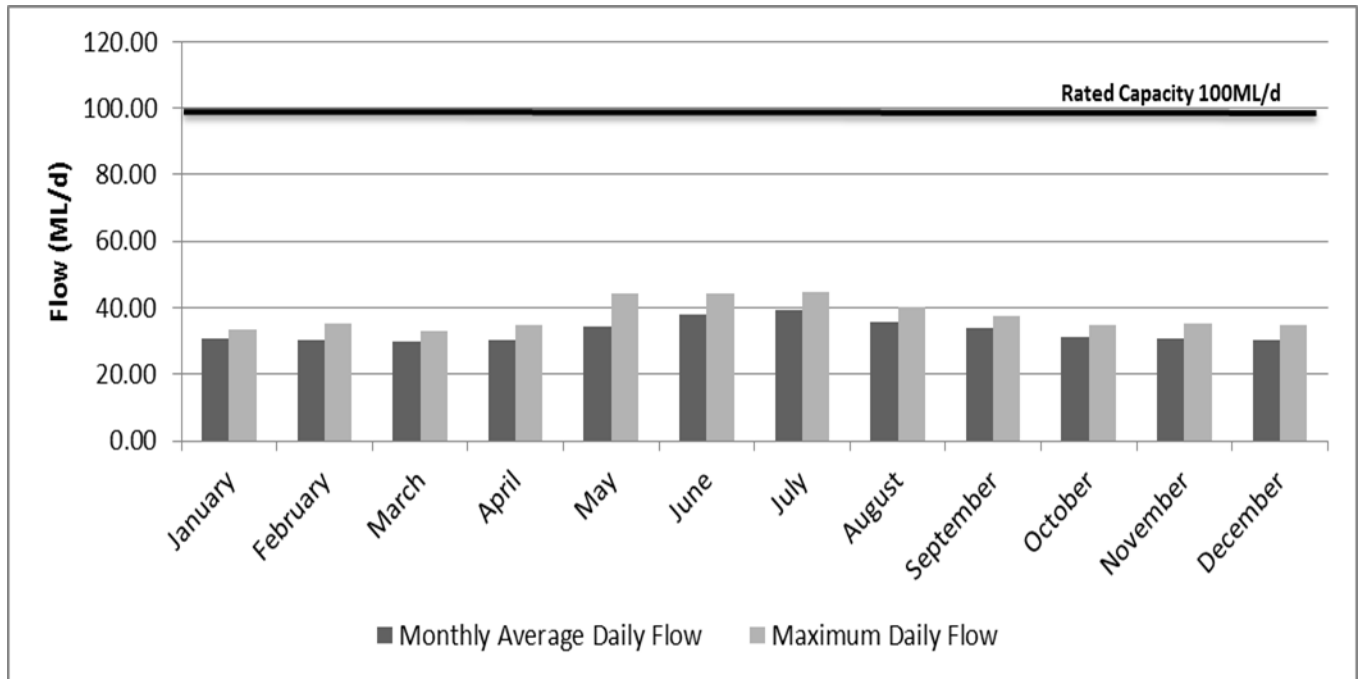


Figure 1 – 2018 Drinking Water Flows

ii. Grand River Flow Intake

The City of Brantford Water System’s Permit to Take Water (# 6434-AM3PEJ) for the Water Treatment Plant allows the City of Brantford to withdraw up to 260 ML/d of raw water from the Grand River on a daily basis at a peak flow not to exceed 181,000 L/min.

At the Holmedale Water Treatment Plant, the raw water flow is measured by continuous on-line flow meters and monitored and controlled via SCADA computer system. The daily average raw water flow for 2018 was 36.39 ML/d.

Figure 2 outlines the monthly average daily flow, maximum daily flow and % Grand River Flow of raw water for the Holmedale Water Treatment Plant in 2018. The monthly average daily flow was calculated by averaging the total daily flows for a given month. The monthly maximum daily flow corresponds to the highest daily average flow for that month. The City’s Permit to Take Water requires monitoring of any impacts the water taking has on the Grand River. To ensure there are no negative effects to the Grand River, the City monitors the % of Grand River Flow Taken. The % Grand River Flow Taken is calculated by dividing the daily average flow by the Grand River flow measured at the Grand River Conservation Authority (GRCA) Brant Park monitoring station.

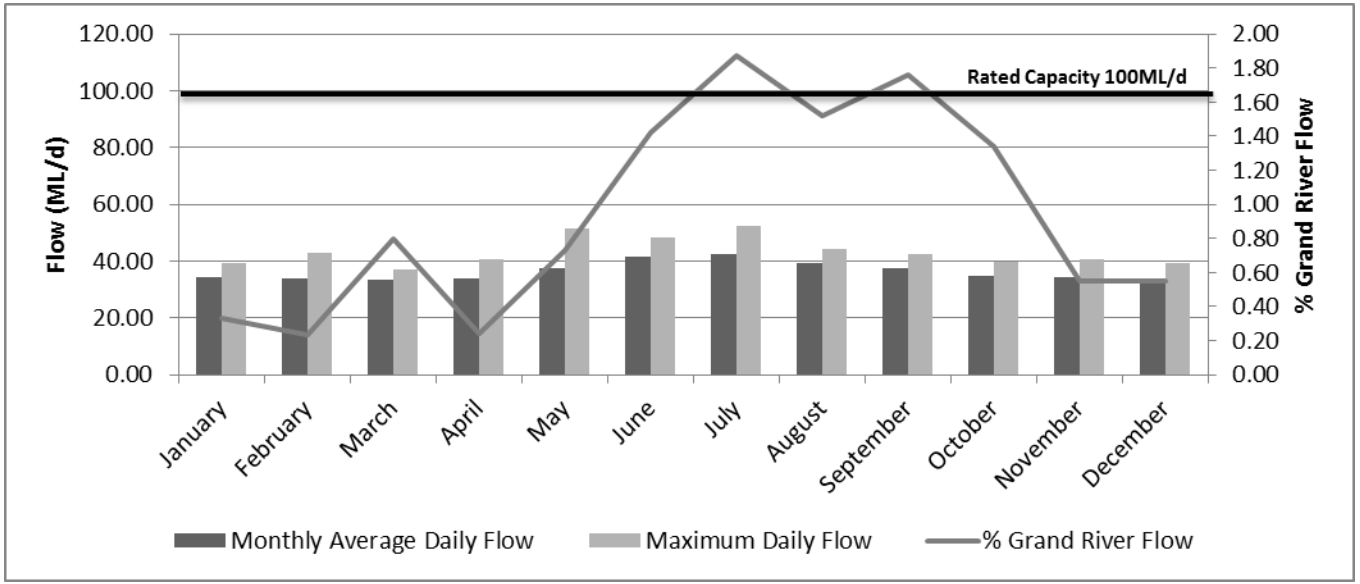


Figure 2 – 2018 Grand River Flow Intake

Figure 2 indicates that the highest monthly average daily flow was 42.57 ML/d and the highest maximum daily flow was 52.40 ML/d both of which occurred in July. The maximum daily flow did not exceed the daily flow requirement of 260ML/d as outlined in the City’s Permit to Take Water. The % of Grand River Flow taken from the Grand River peaked at 1.87 % in July. The peak in July can be attributed to a very dry and warm month. There were no reported complaints to the City of Brantford as a result of its water taking activities.

## **G. Summary of Test Results Required Under O.Reg 170/03**

### **i. Operational Testing Required Under Schedule 7**

Appendix 1 summarizes the Operational Testing required under Schedule 7, tests were conducted at the required frequency and all results were within compliance limits in 2018.

### **ii. Bacteriological Testing Required Under Schedule 10**

Appendix 2 summarizes the Bacteriological Testing required under Schedule 10; samples were conducted at the required frequency. Results above the regulatory requirements are summarized in Section E of this report.

### **iii. Summary of Inorganic Results Required Under Schedule 23**

Appendix 3 summarizes the Inorganic Results required under Schedule 23; samples were conducted at the required frequency and all results were within compliance limits in 2018. Four samples collected for nitrate on February 14 and November 29 from the Point of Entry (5.58 mg/L & 5.37 mg/L) and from the Distribution system (5.59 mg/L & 5.0 mg/L) were above ½ the maximum acceptable concentration of 5mg/L.

### **iv. Summary of Organic Results required under Schedule 0**

Appendix 4 summarizes the Organic Results required under Schedule 0; samples were conducted at the required frequency and all results were within compliance limits in 2018.

v. Summary of Additional Testing, Sampling or Reporting Required by an Order or Other Legal Instrument

**RMF – Total Suspended Solids (TSS)**

Under the City of Brantford Water System’s Municipal Drinking Water License, the annual average concentration of TSS discharged from the thickeners in the RMF must be below 25 mg/L. Table 3 outlines the Monthly Average TSS for 2018. Each month was well below the 25mg/L compliance limit with an annual average of 2.20 mg/L for 2018.

<b>Month</b>	<b>TSS (mg/L)</b>
January	3.20
February	2.60
March	3.90
April	2.60
May	2.30
June	2.50
July	1.80
August	2.00
September	1.00
October	1.40
November	1.10
December	2.00
<b>Annual Average</b>	<b>2.20</b>

Table 3 – 2018 RMF Total Suspended Solids



## Appendix 1 – City of Brantford Water System Operational Parameter Summary 2018

Location	Parameter	Unit	MAC	O.Reg 170/03 Limit	Minimum	Maximum	Average
Grand River	Turbidity	NTU		<1.00	5.63	22.39	11.0
Filter 1	Turbidity	NTU			0.032	0.063	0.047
Filter 2	Turbidity	NTU			0.034	0.067	0.052
Filter 3	Turbidity	NTU			0.042	0.074	0.057
Filter 4	Turbidity	NTU			0.034	0.073	0.053
Filter 5	Turbidity	NTU			0.032	0.062	0.047
Filter 6	Turbidity	NTU			0.037	0.074	0.055
Filter 7	Turbidity	NTU			0.036	0.059	0.049
Filter 8	Turbidity	NTU			0.036	0.064	0.050
CCC Effluent	Log Removal			>3.00	8.45	23.84	13.97
Brantford POE	Combined Chlorine	mg/L	3.00		2.58	2.64	2.61
Brantford POE	Turbidity	NTU			0.050	0.075	0.063
Brantford POE	Pressure	psi		>20	94.68	94.77	94.73
Brantford POE	Fluoride	mg/L	1.50		0.26	0.78	0.62

Location	Parameter	Unit	MAC	O.Reg 170/03 Limit	Minimum	Maximum	Average
Tollgate Reservoir	Total Chlorine	mg/L	3.00		2.01	2.61	2.38
Park Rd. Reservoir	Total Chlorine	mg/L			1.84	2.56	2.30
Northwest Reservoir	Total Chlorine	mg/L			2.12	2.63	2.43
Albion St. Booster	Pressure	psi		>20	88.57	90.78	89.66
Tollgate Reservoir	Pressure	psi			57.44	59.07	58.16
Park Rd. Reservoir	Pressure	psi			78.46	79.49	78.91
Northwest Reservoir	Pressure	psi			82.21	84.73	83.40
Bell Lane	Pressure	psi			47.97	48.91	48.65
Fifth Ave	Pressure	psi			100.19	101.22	100.90
Lawren Harris	Pressure	psi			62.02	64.46	63.39
St. Andrews	Pressure	psi			79.76	93.77	86.63
Empey St.	Pressure	psi			81.66	82.41	82.03

Definitions:

**POE** - Point of Entry to the Distribution System (Treated Water)

**CCC** - Chlorine Contact Chambers

**Log Removal** – a shorthand term for log<sub>10</sub> removal, used in reference to the physical-chemical treatment of water to remove, kill, or inactivate pathogenic organisms.

**Combined Chlorine** - The concentration of residual chlorine that is combined with ammonia (NH<sub>3</sub>), organic nitrogen, or both in water as chloramine, yet is still available to oxidize organic matter and act as a disinfectant. Combined chlorine can be accurately estimated as the difference between the measured total chlorine and measure or known free chlorine residual.

**MAC** –Maximum Acceptable Concentration

## Appendix 2 – City of Brantford Water System Bacteriological Summary 2018

		Raw Water								
		Total Coliform		E.Coli		Background		HPC		
		(colonies per 100ml)		(colonies per 100ml)		(colonies per 100ml)		(colonies per 1ml)		
	# of Samples	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	# of Samples	Minimum	Maximum
January	4	570	510000	20	500	2500	580000	4	790	5000
February	5	730	37000	14	900	4000	61000	5	1020	5000
March	4	150	1090	4	6	850	2600	4	730	2100
April	5	890	4300	2	120	600	7200	5	720	2700
May	4	400	2100	30	80	1000	8300	4	980	2800
June	4	630	5200	34	200	1900	5700	4	790	4200
July	5	200	7800	60	310	2600	9500	5	770	2700
August	4	150	1300	30	120	1200	9700	4	870	2000
September	4	900	2900	90	500	4900	9100	4	1330	3800
October	5	340	1800	20	70	1400	2600	5	1160	4500
November	4	960	36000	16	500	3500	280000	4	800	9000

		Treated Water								
		Total Coliform		E.Coli		Background		HPC		
		(colonies per 100ml)		(colonies per 100ml)		(colonies per 100ml)		(colonies per 1ml)		
	# of Samples	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	# of Samples	Minimum	Maximum
January	4	0	0	0	0	0	0	4	0	0
February	4	0	0	0	0	0	0	4	0	0
March	4	0	0	0	0	0	0	4	0	0
April	4	0	0	0	0	0	0	4	0	1
May	4	0	0	0	0	0	0	4	0	1
June	4	0	0	0	0	0	0	4	0	1
July	5	0	0	0	0	0	0	5	0	0
August	4	0	0	0	0	0	0	4	0	2
September	4	0	0	0	0	0	0	4	0	0
October	5	0	0	0	0	0	0	5	0	3
November	4	0	0	0	0	0	0	4	0	0
December	4	0	0	0	0	0	0	4	0	0

		Distribution System									
		Total Coliform		E.Coli		Background		HPC			
		(colonies per 100ml)		(colonies per 100ml)		(colonies per 100ml)		(colonies per 1ml)			
	# of Samples	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	# of Samples	% HPC	Minimum	Maximum
January	132	0	0	0	0	0	1	59	44.70%	0	6
February	110	0	0	0	0	0	1	63	57.27%	0	4
March	109	0	0	0	0	0	1	63	57.80%	0	28
April	141	0	0	0	0	0	0	81	57.45%	0	2
May	154	0	0	0	0	0	2	62	40.26%	0	3
June	134	0	152	0	0	0	165	54	40.30%	0	3
July	147	0	0	0	0	0	7	75	51.02%	0	37
August	134	0	0	0	0	0	2	61	45.52%	0	2
September	185	0	NDOGN	0	NDOGN	0	117	72	38.92%	0	32
October	178	0	74	0	0	0	>200	86	48.31%	0	3
November	116	0	0	0	0	0	1	57	49.14%	0	8
December	111	0	0	0	0	0	36	62	55.86%	0	3

\* - General bacteria population expressed as Background

\*\* HPC - Heterotrophic Plate Count - General bacteria population expressed as colony counts on a heterotrophic plate count

Regulatory Limits for Treated Water and Distribution System:

- Total Coliform - <1 colony /100ml
- E.coli - <1 colony /100ml

## Appendix 3 – City of Brantford Water System Inorganic Parameter Summary 2018

Parameter	Recent Sample	Unit of Measure	MAC	MDL	Treated Water	Within Regulatory Limit
Bromate	29-Nov-18	mg/L	0.01	0.003	0.003	YES
Bromide	29-Nov-18	mg/L		0.001	0.042	YES
Nitrite (as Nitrogen)	29-Nov-18	mg/L	1	0.003	0.004	YES
Nitrate (as Nitrogen)	29-Nov-18	mg/L	10	0.006	5.37	YES
Antimony	29-Nov-18	ug/L	6	0.020	0.15	YES
Arsenic	29-Nov-18	ug/L	10	0.200	0.3	YES
Barium	29-Nov-18	ug/L	1000	0.020	33.7	YES
Boron	29-Nov-18	ug/L	5000	2.000	51.0	YES
Cadmium	29-Nov-18	ug/L	5	0.003	0.007	YES
Chromium	29-Nov-18	ug/L	50	0.030	0.44	YES
Mercury	29-Nov-18	ug/L	1	0.010	0.01	YES
Sodium	29-Nov-18	mg/L	20	0.010	61.9	NO*
Selenium	29-Nov-18	ug/L	50	0.040	0.15	YES
Uranium	29-Nov-18	ug/L	20	0.002	0.667	YES

Definitions:

MDL - Method Detection Limit

MAC - Maximum Acceptable Concentration

\* - refer to Section E. iii. Adverse Chemical Results & Corrective Actions of the Annual Summary Report

## Appendix 4 – City of Brantford Water System Organic Parameter Summary 2018

Parameter	Recent Sample	Unit of Measure	MAC	MDL	Treated Water	Within Regulatory Limit
Benzene	29-Nov-18	ug/L	1	0.32	0.32	YES
Carbon tetrachloride	29-Nov-18	ug/L	2	0.16	0.16	YES
1,2-Dichlorobenzene	29-Nov-18	ug/L	200	0.41	0.41	YES
1,4-Dichlorobenzene	29-Nov-18	ug/L	5	0.36	0.36	YES
1,1-Dichloroethylene	29-Nov-18	ug/L	14	0.33	0.33	YES
1,2-Dichloroethane	29-Nov-18	ug/L	5	0.35	0.35	YES
Dichloromethane	29-Nov-18	ug/L	50	0.35	0.35	YES
Monochlorobenzene	29-Nov-18	ug/L	80	0.30	0.30	YES
Tetrachloroethylene	29-Nov-18	ug/L	10	0.35	0.35	YES
Trichloroethylene	29-Nov-18	ug/L	5	0.44	0.44	YES
Vinyl Chloride	29-Nov-18	ug/L	1	0.17	0.17	YES
Polychlorinated Biphenyls (PCBs) - Total	29-Nov-18	ug/L	3	0.001	0.04	YES
Benzo(a)pyrene	29-Nov-18	ug/L	0.01	0.004	0.004	YES
Alachlor	29-Nov-18	ug/L	5	0.02	0.02	YES
Atrazine + N-dealkylated metabolites	29-Nov-18	ug/L	5	0.01	0.04	YES
Atrazine	29-Nov-18	ug/L		0.01	0.02	YES
Desethyl atrazine	29-Nov-18	ug/L		0.01	0.01	YES
Azinphos-methyl	29-Nov-18	ug/L	20	0.02	0.05	YES
Carbaryl	29-Nov-18	ug/L	90	0.01	0.05	YES
Carbofuran	29-Nov-18	ug/L	90	0.01	0.01	YES
Chlorpyrifos	29-Nov-18	ug/L	90	0.02	0.02	YES
Diazinon	29-Nov-18	ug/L	20	0.02	0.02	YES
Dimethoate	29-Nov-18	ug/L	20	0.03	0.03	YES
Diuron	29-Nov-18	ug/L	150	0.03	0.03	YES
Malathion	29-Nov-18	ug/L	190	0.02	0.02	YES
Metolachlor	29-Nov-18	ug/L	50	0.01	0.01	YES

Metribuzin	29-Nov-18	ug/L	80	0.02	0.02	YES
Phorate	29-Nov-18	ug/L	2	0.01	0.01	YES
Prometryne	29-Nov-18	ug/L	1	0.03	0.03	YES
Simazine	29-Nov-18	ug/L	10	0.01	0.01	YES
Terbufos	29-Nov-18	ug/L	1	0.01	0.01	YES
Triallate	29-Nov-18	ug/L	230	0.01	0.01	YES
Trifluralin	29-Nov-18	ug/L	45	0.02	0.02	YES
2,4-dichlorophenoxyacetic acid (2,4-D)	29-Nov-18	ug/L	100	0.19	0.19	YES
Bromoxynil	29-Nov-18	ug/L	5	0.33	0.33	YES
Dicamba	29-Nov-18	ug/L	120	0.20	0.20	YES
Diclofop-methyl	29-Nov-18	ug/L	9	0.40	0.40	YES
MCPA	29-Nov-18	ug/L	0.1	0.00012	0.00012	YES
Picloram	29-Nov-18	ug/L	190	1	1	YES
2,4-dichlorophenol	29-Nov-18	ug/L	900	0.15	0.15	YES
2,4,6-trichlorophenol	29-Nov-18	ug/L	5	0.25	0.25	YES
2,3,4,6-tetrachlorophenol	29-Nov-18	ug/L	100	0.20	0.20	YES
Pentachlorophenol	29-Nov-18	ug/L	60	0.15	0.15	YES
Haloacetic Acids	29-Nov-18	ug/L		5.3	5.4	YES
THMs (total)	29-Nov-18	ug/L	100	0.37	17	YES
NDMA N-Nitrosodimethylamine	29-Nov-18	ug/L	0.009	0.0008	0.000	YES
MIB	15-Aug-18	ng/L		0.003	0.003	N/A
Geosmin	15-Aug-18	ng/L		3	3	N/A
Diquat	15-Aug-18	ug/L		1	1	N/A
Paraquat	15-Aug-18	ug/L		1	1	N/A
Glyphosate	15-Aug-18	ug/L		1	1	N/A

Definitions:

MDL - Method Detection Limit

MAC - Maximum Acceptable Concentration