2021 Year End Report: Bracebridge Potable Water Plant (PWP)

Drinking Water Works Permit: 143-206

Municipal Drinking Water License: 143-106

Ministry of Environment and Climate Change Waterworks #: 220007276

Engineering and Public Works Department

70 Pine Street, Bracebridge, Ontario P1L 1N3

Phone: 705-645-6764

Toll-Free: 1-800-281-3483

Fax: 705-645-7599

Email: publicworks@muskoka.on.ca

Website: www.muskoka.on.ca

Introduction

The Bracebridge Potable Water Plant (PWP) services the community of Bracebridge and is owned and operated by the District Municipality of Muskoka.

It constructed in 1995 and has an initial design capacity of 10,000 meters cubed per day. The water system currently serves a population of approximately 10,400 people.

The plant operates under license 143-106 and permit 143-206, issued in September 2021under the Municipal Drinking Water Licensing Program. The plant also presently operates under Ministry of Environment, Conservation and Parks (MECP) permit to take water #2450-AV2JRU (expires February 16, 2028), which permits the operation of up to 10,000 meters cubed per day.

The Raw Water intake structure is located near Kirby's Beach in Lake Muskoka approximately 18 meters deep and 500 meters from shore.

The treatment system features pre-treatment consisting of chemically assisted coagulation, flocculation, sedimentation and filtration using dual media filters with a combination of sand and anthracite coal. Disinfection in a post treatment chlorine contact chamber is followed by fluoridation and final pH adjustment before the treated water is pumped to customers.

The distribution system includes one in ground reservoir and one above ground storage tank supplying Bracebridge.

All treatment control systems use a Supervisory Control And Data Acquisition (SCADA) system for process control and monitoring.

Legislation Requirements

Safe Drinking Water Act

In the Part Two Report of the Walkerton Inquiry, Commissioner Dennis O'Connor recommended that the Ontario Government enact a Safe Drinking Water Act to deal with matters related to treatment and distribution of drinking water. The Safe Drinking Water Act (SDWA) received royal assent in December, 2002.

The purpose of the Act is to gather in one place all legislation and regulations relating to the treatment and distribution of drinking water. The Act serves to protect human health through the control and regulation of drinking water systems and drinking water testing.

The foundation provisions of the Safe Drinking Water Act include:

- Purpose of the Act
- Definitions
- Minister's Powers and Duties
- Inspections
- Compliance and Enforcement
- Appeals and Offences
-

Ontario Regulations

The Ontario Government has enacted several supporting regulations under the SDWA (2002). These regulations combine previous requirements under the Ontario Water Resources Act and the new requirements under the SDWA. Key components of the regulations include:

- System Categories
- Groundwater Under Direct Influence Of Surface Water (GUDI)
- Exemptions
- Approval of Systems
- Treatment
- Testing and Operational Checks (General Rules)
- Operational Checks
- Microbiological Testing
- Chemical Testing
- Adverse Conditions
- Corrective Action
- Engineer's and Summary Reports

Municipal Drinking Water Licenses / Certificates of Approval

The Municipal Drinking Water Licensing Program has replaced the Certificate of Approval program for municipal residential drinking water systems. The Ontario Government has implemented the Municipal Drinking Water Licensing Program (MDWLP) as recommended by Justice O'Connor in the Part II Report of the Walkerton Inquiry. Justice O'Connor recommended a new approvals framework for municipal drinking water systems, which would require owners to obtain a license to operate their systems as well as incorporate the concept of quality management into their operations.

A municipal drinking water license is an approval that is issued by the MOECC to owners under the Safe Drinking Water Act, 2002 for the operation of municipal residential drinking water systems. The District of Muskoka operated under various Certificates of Approval until October 2010 when the operating licenses were issued.

Previous Certificates of Approval were required for the establishment, replacement or alteration of all municipal drinking water systems. The MOECC issued Certificates of Approval to ensure that all undertakings comply with the legislation (i.e. Acts and Regulations) and the Ministry's Environmental Guidelines and Procedures developed to provide consistency of approach to various aspects of environmental protection throughout the province. Municipal Drinking Water Licenses and Permits similar to previous Certificates of Approval provide specific details about the drinking water system including:

- Drinking Water System Description
- Definitions and Information
- General Information – Compliance, Other Legal Requirements, Adverse Effects, Inspections

- Performance – Rated Capacity, Management of Residue
- Monitoring and Recording – Flow Measuring Devices, Sampling
- Operations and Maintenance

Comparison to Rated Capacity and Flow Rates

The Bracebridge Potable Water Plant has a rated capacity of 10,000 meters cubed per day. In 2021, the total monthly average flow for the year was 3,969 meters cubed per day. The maximum day flow for the year was 7,127 meters cubed per day, however the 3-year average for maximum day flow is 6,297 meters cubed per day. This represents 63% of the plant design capacity. No problems have been associated with this flow.

Monthly flows are shown in the attached table.

The Permit to Take Water (PTTW #2450-AV2JRU) permits 10,000 meters cubed per day; therefore there were no exceedances of this permit.

Summary of Analytical Results

A total of 417 microbiological regulatory tests were performed in 2021 and compliance with Provincial standards was achieved throughout the entire year.

There were 615 free chlorine residual tests performed in the distribution system and all results were satisfactory. Staff continue to routinely sample all areas of the system to ensure adequate free chlorine residuals are available throughout the distribution system.

A summary of other analytical results is also shown in this report.

Summary of Treatment Chemicals

The following chemicals are used for the treatment of drinking water at the Bracebridge PWP:

- Aluminum Sulfate: Coagulant
- Sodium Hydroxide: pH Adjustment
- Hydrofluosilicic Acid: Fluoride Dental supplement
- Hydrated Lime: Alkalinity
- Carbon Dioxide: pH Adjustment
- Sodium Hypochlorite: Disinfectant

A table summarizing the chemical use and average dosages is included in this report.

Documentation of System Repairs and Upgrades

There was significant engineering work performed to review the Bracebridge water distribution system for risks. This work has resulted in additions to the capital work plan to mitigate risk of WM breaks at river crossings and increase water storage in the system. In addition, pressure sensors were installed throughout the distribution system at District wastewater pumping stations to provide real-time remote pressure readings to the water operators to aid in locating system watermain breaks.

External Audits

MOE Inspection

A MOE inspection was completed on November 25, 2021.

DWQMS Audit

In 2021, all drinking water systems within the District had an external reaccreditation audit performed. There were no minor non-conformances reported and all drinking water systems have been recertified. Overall, all drinking water systems are performing satisfactorily.

Bracebridge Water Distribution Summary 2021

New Services:

A total of 77 customers connected to existing serviced properties in 2021.

Broken Watermains:

Three water main breaks occurred in 2021. Of particular note a watermain failure occurred within the Town of Bracebridge (Bracebridge) water distribution system on January 9, 2021, which resulted in a Boil Water Advisory being issued by the District Municipality of Muskoka (District) followed by a Boil Water Order (BWO) being issued by the Simcoe Muskoka District Health Unit.

The watermain failure occurred in a section of pipeline located on Wharf Road, alongside the Muskoka River. The watermain that experienced the failure is part of the main pipeline that extends from the Ecclestone Booster Pumping Station (BPS) to the Hamblin Reservoir, and includes several branch lines that supply directly into Pressure Zone 2 of the town water distribution system. The water pipeline that experienced the failure was a PVC pipeline that was installed in 1994. The WM was repaired and returned to service Tuesday January 12 with the BWO rescinded Thursday January 14.

Service Leaks:

Sixteen municipal service leaks was reported and repaired in 2021.

Service Relocation:

There were no service relocations to report in 2021.

Frozen Services:

No municipal water services were frozen in 2021.

Replacement Watermains:

There was no watermain replacement in Bracebridge in 2021

New Watermains:

Approximately 810m of new watermain was installed in the Clearbrook (Mattamy) subdivision by the developer's contractors servicing new street's Stother Cres and Chamber St. An extension to Kestrel Glen Subdivision was also added which created another loop in the existing system which will reduce maintenance and increase overall water quality.

Valve Replacement:

2 mainline valves were replaced and one repaired in 2021.

Fire Hydrants:

There are 659 Municipality assumed hydrants maintained by the District in the Town of Bracebridge. All hydrants were pumped dry in the fall, and scoped during the winter months to ensure they are not susceptible to freezing. 6 additional hydrants were added in 2021 as well as 1 being replaced.

Meter Installations:

A total of 56 water meters were replaced in Bracebridge in 2021 as part of the aged meter change out program. The average meter age in Bracebridge is 9 years.

Turn on/offs:

District field staff responded to 128 water turn on/off requests in 2021.

Air-Vacuum Release Valves:

Thirty air release valves were inspected and tested for proper operation in 2021 with 2 new ones added. Each chamber was inspected and pumped out as required.

Locates:

The District, either in-house or with contracted staff, completed 914 buried utility locate requests in 2021 to comply with Ontario OneCall requests.

Table 1 Water Flow Summary - 2021

Month	Total Monthly (m^3)	Average Day Flow (m^3/d)	Maximum Day Flow (m^3/d)	Minimum Day Flow (m^3/d)
January	119,143	3,843	7,127	3,266
February	100,307	3,582	3,691	3,392
March	116,116	3,746	5,932	3,553
April	108,116	3,604	3,729	3,476
May	133,080	4,293	5,289	3,493
June	145,396	4,847	5,822	3,953
July	130,555	4,211	4,682	3,843
August	132,035	4,259	4,668	3,603
September	117,785	3,926	4,315	3,575
October	118,200	3,813	4,298	3,479
November	110,945	3,698	4,063	3,485
December	117,037	3,775	4,192	3,284

Total Flow: 1,448,714m^3
Average Day: 3,969
Maximum Day: 7,127
Minimum Day: 3,266

Table 2 Raw Water Monthly Analysis Summary 2021 Part 1

Month	Alkalinity (mg/L)	Hardness (mg/L)	pH	Turbidity (ntu)	True Colour (tcu)	Temperature (Celsius)
January	6.3	12.0	6.9	0.3	15	4.0
February	6.3	11.2	6.8	0.3	15	3.5
March	6.7	12.0	6.7	0.3	15	6.9
April	6.7	10.8	7.0	0.5	15	7.7
May	6.5	10.0	7.0	0.5	15	9.4
June	6.6	10.0	6.9	0.4	15	10.0
July	6.6	11.0	6.7	0.4	16	10.8
August	6.7	10.7	6.6	0.4	15	11.8
September	7.2	11.3	6.6	0.3	16	13.2
October	7.4	12.4	6.8	0.4	15	13.8
November	7.6	12.0	7.0	0.4	15	11.7
December	7.3	12.0	7.1	0.4	15	7.0
Average	6.8	11.3	6.8	0.4	15.2	9.2

Table 3 Raw Water Monthly Analysis Summary 2021 Part 2

Month	Microcystin (ug/L)	TDS (mg/L)	Langliers Saturation Index	Total Coliforms (CFU/100mL)	E. Coli (CFU/100mL)	Total Number of Samples
January	Not Sampled	24	-3.1	4	0.0	4
February	Not Sampled	24.5	-3.3	1	0.3	4
March	Not Sampled	25	-3.3	2	0.0	5
April	Not Sampled	23.7	-3.4	5	0.0	4
May	Not Sampled	25.0	-3.0	9	0.5	4
June	<0.1 MDL	25.8	-3.2	2	0.8	5
July	<0.1 MDL	26.1	-3.3	7	0.8	4
August	<0.1 MDL	25.5	-3.4	7	0.4	5
September	<0.1 MDL	25.2	-3.3	21	4.3	4
October	<0.1 MDL	25.5	-3.2	11	5.0	4
November	Not Sampled	24.3	-2.8	13	5.4	5
December	Not Sampled	24.6	-2.9	14	1.0	4
Average	Not Sampled	24.9	-3.2	8	1.5	4

Table 4 Chemical Usage Summary: CO2

Month	Average Dosage mg/L	Total kg
January	25.4	3,012.2
February	25.7	2,561.8
March	25.1	2,901.7
April	26.8	2,888.6
May	24.3	3,216.7
June	21.1	3,085.2
July	20.2	2,636.2
August	19.2	2,538.6
September	20.2	2,383.2
October	20.8	2,427.6
November	21.3	2,345.1
December	22.5	2,604.7
Average	22.7	2716.8

Total Yearly Kilograms: 36,602kg

Table 5 Chemical Usage Summary: Hydrated Lime

Month	Average Dosage mg/L	Total kg
January	32.4	3,839.4
February	32.4	3,227.8
March	32.4	3,745.2
April	32.5	3,505.2
May	32.5	4,319.0
June	32.5	4,739.0
July	32.5	4,256.5
August	32.5	4,295.0
September	32.5	3,844.8
October	32.5	3,801.8
November	32.5	3,580.5
December	32.5	3,763.5
Average	32	3803.4

Total Yearly Kilograms: 45,641kg

Table 6 Chemical Usage Summary: Coagulant

Month	Average Dosage mg/L	Total kg
January	27.7	3,295
February	27.4	2,732
March	29.3	3,383
April	26.3	2,839
May	30.6	4,109
June	27.8	4,068
July	28.2	3,696
August	28.0	3,702
September	24.5	2,893
October	27.1	3,175
November	24.4	2,683
December	27.5	3,183
Average	27.4	3313

Total Yearly Kilograms: 39,758kg

Table 7 Chemical Usage Summary: Sodium Hydroxide

Month	Average Dosage mg/L	Total kg
January	12.3	1,430
February	12.2	1,198
March	13.6	1,548
April	12.9	1,365
May	13.5	1,748
June	12.6	1,801
July	11.4	1,457
August	11.7	1,505
September	10.6	1,219
October	12.9	1,490
November	11.5	1,248
December	11.1	1,273
Average	12.2	1440

Total Yearly Kilograms: 17,282kg

Table 8 Chemical Usage Summary: Fluoride

Month	Average Dosage mg/L	Total kg
January	0.71	81.9
February	0.78	75.9
March	0.73	82.8
April	0.76	80.8
May	0.78	101.2
June	0.75	106.2
July	0.74	94.2
August	0.74	95.4
September	0.73	83.7
October	0.75	86.7
November	0.76	82.8
December	0.67	76.3
Average	0.74	87

Total Yearly Kilograms: 1,048kg

Table 9 Chemical Usage Summary: Chlorine

Month	Average Dosage mg/L	Total kg
January	3.04	359.4
February	2.78	276.8
March	2.92	337.1
April	3.05	330.0
May	3.39	448.2
June	3.58	520.0
July	3.01	393.8
August	3.10	409.8
September	3.06	360.9
October	3.13	365.8
November	3.49	383.6
December	2.85	329.6
Average	3.18	394

Total Yearly Kilograms: 4,515kg