2022 Annual Drinking Water System Summary Report

Brownsville Drinking Water System

1. GENERAL INFORMATION

Oxford County (the County) prepares a report summarizing system operation and water quality for every municipal drinking water system annually. The reports detail the latest water quality testing results, water quantity statistics and any adverse conditions that may have occurred for the previous year. They are available for review by the end of February on the County website at www.oxfordcounty.ca/drinkingwater or by contacting the Public Works Department.

All efforts have been made to ensure the information presented in this report is accurate. If you have any questions or comments concerning the report please contact the County at the address and phone number listed below or by email at water@oxfordcounty.ca.

Drinking Water System:	Brownsville Drinking Water System
Drinking Water System Number:	220000638
Reporting Period:	January 1, 2022 – December 31, 2022

Drinking Water System Owner & Contact Information:

Oxford County Public Works Department - Water Services
P.O. Box 1614
21 Reeve Street
Woodstock, ON N4S 7Y3
Telephone: 519-539-9800
Toll Free: 866-537-7778
Email: water@oxfordcounty.ca

1.1 System Description

The Brownsville Drinking Water System is a Large Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and serves a population of approximately 590. The system consists of two well sources that are secure groundwater wells. The water is treated with sodium hypochlorite for disinfection and in 2022 approximately 1,260 L of sodium hypochlorite was used. This chemical is certified to meet standards set by the Standards Council of Canada or American National Standards Institute.

The two well facilities house pumps and treatment equipment. A separate pumping station houses high lift pumps, monitoring equipment and a 197 m^3 reservoir. A standby generator is available to run the pumping station in the event of a power outage. The system is maintained by licensed water system operators, who operate treatment and monitoring equipment and collect samples as specified by the Regulation. Alarms automatically notify operators in the event of failure of critical operational requirements.

1.2 Major Expenses

The Brownsville Drinking Water System is one of 14 water systems that have revenues and expenses pooled for economy of scale purposes. The systems are combined into the Township Water financial system and in 2022 had an operating and maintenance expenditures of approximately $3,300,000.

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Townships systems totaled $1,800,000 for improvements to water treatment systems and replacement of distribution mains in the Township System.

Township Capital Improvement Projects included:

- $940,000 distribution replacements
- $228,000 repair and maintenance on wells, water pump stations, and water treatment facilities
- $225,000 for facilities improvements

Capital Improvement projects for all systems included:

- $625,000 to develop Countywide SCADA Master Plan for all water systems
- $150,000 to develop Countywide Water Servicing Master Plan for all water systems

2. MICROBIOLOGICAL TESTING

2.1 E. coli and Total Coliform

Bacteriological tests for E. coli and total coliforms are required weekly on the raw and treated water at the facility and in the distribution system. Extra samples are taken after

major repairs or maintenance work. Any E. coli or total coliform results above 0 in treated water must be reported to the Ministry of Environment, Conservation and Parks (MECP) and Medical Officer of Health (MOH). Resamples and any other required actions are taken as quickly as possible. The results from the 2022 sampling program are shown in the table below. There were no adverse test results from 162 treated water samples in this reporting period.

	Number of Samples	*Range of E. coli Results Min - Max MAC = 0*	*Range of Total Coliform Results Min - Max MAC = 0*
Raw	**104**	**0**	**0**
Treated	**52**	**0**	**0**
Distribution	**110**	**0**	**0**

2.2 Heterotrophic Plate Count (HPC)

HPC analyses are required from the treated and distribution water. The tests are required weekly for treated water and for 25% of the required distribution system bacteriological samples. HPC should be less than 500 colonies per 1 mL. Results over 500 colonies per 1 mL may indicate a change in water quality but it is not considered an indicator of unsafe water. 2022 results are shown in the table below.

	Number of Samples	*Range of HPC Min - Max*
Treated	**52**	**0 - 45**
Distribution	**28**	**0 - 52**

3. CHEMICAL TESTING

The Safe Drinking Water Act requires periodic testing of the water for approximately 60 different chemical parameters. The latest results for all parameters are provided in Appendix A. The sampling frequency varies for different types and sizes of water systems. If the concentration of a parameter is above half of the Maximum Allowable Concentration (MAC) under the Ontario Drinking Water Quality Standards, an increased testing frequency of once every three months is required by the Regulation. Where concerns regarding a parameter exist, the MECP can also require additional sampling be undertaken.

Information on the health effects and allowable limits of components in drinking water may be found on the MECP web page through the link provided in Appendix A. Additional information on common chemical parameters specific to the Brownsville system is provided below.

3.1 Hardness

This is an aesthetic parameter that may affect the appearance of the water but is not related to health. Well water commonly has high levels of hardness and other minerals from being in contact with underground rock formations. Many households have water softeners to help reduce white calcium deposits and improve the efficiency of soaps. This information is included here to help set the water softener at the level recommended by the manufacturer. Samples for hardness are collected at a minimum every 3 years from raw water. The hardness for the Brownsville Drinking Water System was tested in 2022 and ranged from 75.3 - 88.8 mg/L (4 - 5 grains/gallon). Water in the Brownsville System is of medium hardness and a water softener should not be needed.

3.2 Sodium

Sodium levels in drinking water are tested once every five years. The aesthetic objective is 200 mg/L meaning at levels less than this, sodium will not impair the taste of the water.

When sodium levels are above 20 mg/L the MECP and MOH are notified. Southwestern Public Health maintains an information page on sodium in drinking water at https://www.swpublichealth.ca/en/partners-and-professionals/resources/Health-Care-Providers/Alerts-Advisories-Updates/Advisories/ADV_HIA-Sodium-20201203.pdf in order to help people on sodium restricted diets control their sodium intake. The average sodium level in Brownsville is 71.9 mg/L.

3.3 Fluoride

Fluoride levels are sampled once every five years and levels above 1.5 mg/L must be reported to the MECP and MOH. Levels under 2.4 mg/L are considered safe for consumption however at levels between 1.5 and 2.4 mg/L fluoride may cause staining or pitting of teeth in children less than 6 years old. Further information on fluoride can be found on the Southwestern Public Health web page at https://www.swpublichealth.ca/en/partners-and-professionals/resources/Health-Care-Providers/Alerts-Advisories-Updates/Advisories/ADV_HIA-Fluoride-20201203.pdf

The County does not add fluoride to the water at any of its drinking water systems. The Brownsville system has naturally occurring fluoride levels that average 1.73 mg/L.

3.4 Additional Testing Required by MECP

The Maximum Allowable Concentration (MAC) for arsenic is 10 µg/L. In Brownsville, an increased testing frequency of once every three months is required as the average arsenic level is above 5 µg/L. Results are summarized in Appendix A.

4. OPERATIONAL MONITORING

4.1 Chlorine Residual

Free chlorine levels of the treated water are monitored continuously at the discharge point of the pumping station and in the distribution system. As a target, free chlorine residual within the distribution system should be above 0.20 mg/L. A free chlorine level lower than 0.05 mg/L must be reported and corrective action taken. There were no reportable incidents in 2022. A summary of the chlorine residual readings is provided in the table in section 4.2.

4.2 Turbidity

Turbidity of treated water is continuously monitored at the treatment facility as a change in turbidity can indicate an operational problem. As a minimum, turbidity for each well is required to be tested monthly. Turbidity is measured in nephelometric turbidity units (NTU). Under O.Reg. 170/03 turbidity in groundwater from a secure well or a well with effective in-situ filtration is not reportable however turbidity should be < 1 NTU at the treatment plant and < 5 NTU in the distribution system. A summary of the monitoring results for 2022 is provided in the table below.

Parameter	*Number of Tests or Monitoring Frequency*	*Range of Results (Min – Max) and Average*
Chlorine residual after treatment (mg/L)	Continuous	(0.53 - 1.73) 1.18
Chlorine residual in distribution (mg/L)	Continuous	(0.20 - 2.51) 1.16
Well 5 turbidity before treatment (NTU)	52	(0.12 – 2.97) 0.50
Well 6 turbidity before treatment (NTU)	52	(0.10 – 1.42) 0.33
Turbidity after treatment (NTU)	Continuous	(0.02 - 3.24) 0.09

5. WATER QUANTITY

Continuous monitoring of flow rates from supply wells into the treatment system and from the Water Treatment Facility into the distribution system is required by O.Reg. 170/03. The Municipal Drinking Water License and Permit to Take Water (PTTW) issued by the MECP regulate the amount of water that can be utilized over a given time period. A summary of the 2022 flows are provided in the table below and presented graphically in Appendix B.

Flow Summary	*Quantity*
Permit to Take Water Limit	378 m^3/d
Municipal Drinking Water License Limit	366 m^3/d
2022 Average Daily Flow	74 m^3/d
2022 Maximum Daily Flow	166 m^3/d
2022 Average Monthly Flow	2,253 m^3
2022 Total Amount of Water Supplied	27,030 m^3

Firm Capacity is defined as the removal of the highest producing well in an emergency or operational / maintenance situation with the ability to transport a maximum of 100 m^3/day to maintain system integrity. This system comprises of two supply wells. Well 5 is removed for Firm Capacity calculations. T he remaining Well 6 has a limit of 181 m^3/day. Firm Capacity of this system is rated at 281 m^3/day. Reservoir storage capacity is 188 m^3.

6. NON-COMPLIANCE FINDINGS AND ADVERSE RESULTS

This section documents any known incidents of non-compliance or adverse results and the associated correction actions taken to resolve the issue. Non-compliance issues are typically identified by either the Operating Authority or the MECP Drinking Water Inspectors. The issues and associated required actions are documented by the Inspectors in the system's Annual Inspection Report. All non-compliance issues are investigated, corrective actions taken and documented using the County's Drinking Water Quality Management System (DWQMS) procedures.

6.1 Non-Compliance Findings

The annual MECP inspection took place in May 2022. There were no non-compliance findings and the 2022 Inspection Report Rating was 100%.

6.2 Adverse Results

Any adverse results from bacteriological samples, chemical samples, or observations of operational conditions that indicate adverse water quality are reported as required and corrective actions are taken. There were no adverse or reportable occurrences in 2022.

APPENDIX A: SUMMARY OF CHEMICAL RESULTS

UNDERSTANDING CHEMICAL TEST RESULTS

The following tables summarize the laboratory results of the chemical testing the County is required to complete. Different types of parameters are required to be tested for at different frequencies as noted below. Explanations on the health impacts of these parameters can be found in the MECP document PSIB 4449e01 titled "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines" available at https://cvc.ca/wp-content/uploads/2011/03/std01_079707.pdf.

Results are shown as concentrations with units of either milligrams per litre (mg/L) or micrograms per litre (µg/L). 1 mg/L is equal to 1000 µg/L. The Maximum Acceptable Concentration (MAC) is the highest amount of a parameter that is acceptable in Municipal drinking water and can be found in the MECP Drinking Water Standards. The Method Detection Limit (MDL) is the lowest amount to which the laboratory can confidently measure. A result of "ND" stands for "Not Detected" and means that the concentration of the chemical is lower than the laboratory's equipment is capable of measuring. In the event that some samples results are ND, and other results are above the MDL, the value of the MDL will be used in place of the ND where an average result must be calculated. Where all collected samples are ND the average sample result will be assumed to be ND.

Nitrate and nitrite samples are required every 3 months in normal operation.

Parameter	*Number of Tests*	*Result Range Min – Max (mg/L)*	*Average Result (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Nitrite	4	ND	ND	1.0	0.003
Nitrate	4	0.007 – 0.010	0.008	10.0	0.006

Trihalomethane (THM) and total Haloacetic Acids (HAA) are by-products of the disinfection process. The samples are required every 3 months from the distribution system.

Parameter	*Annual Average*	*Result Value (µg/L)*	*MAC (µg/L)*	*MDL (µg/L)*
Trihalomethane (THM)	2022	67.5	100	0.37
Haloacetic Acids (HAA)	2022	22.3	80	5.3

The following Table summarizes the most recent test results for Sodium and Fluoride. Testing and reporting any adverse results is required every 5 years.

Parameter	*Sample Date*	*Result Value (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Sodium	May 28, 2019	81.6	20*	0.01
Fluoride	May 28, 2019	1.77	1.5**	0.06

*Sodium levels between 20 – 200 mg/L must be reported every 5 years.
**Natural levels of fluoride between 1.5 – 2.4 mg/L must be reported every 5 years.

The following Table summarizes the most recent results for the Lead Testing Program. Lead samples are taken every 3 years. Levels of alkalinity and pH are monitored twice per year in the distribution system to ensure water quality is consistent and does not facilitate leaching of lead into the water.

Parameter	*Result Range (Min - Max)*	*Number of Samples*	*Acceptable Level*
Distribution Alkalinity 2022	149 – 156	4	30 – 500mg/L
Distribution pH 2022	8.09 – 8.50	4	6.5 – 8.5
Distribution Lead 2021	0.11 – 0.23	2	10 µg/L MAC

The following Table summarizes the most recent test results for Schedule 23. Testing is required every 3 years for secure groundwater wells in large systems. An increased testing frequency of once every three months is required as the average arsenic level is above 5 µg/L.

Parameter	*Sample Date*	*Result Value (µg/L)*	*MAC (µg/L)*	*MDL (µg/L)*
Antimony	May 30, 2022	ND	6	0.6
Arsenic	Annual average	5.6	10	0.2
Barium	May 30, 2022	30.5	1000	0.02
Boron	May 30, 2022	241	5000	2
Cadmium	May 30, 2022	ND	5	0.003
Chromium	May 30, 2022	0.22	50	0.08
Mercury	May 30, 2022	ND	1	0.01
Selenium	May 30, 2022	ND	50	0.04
Uranium	May 30, 2022	0.047	20	0.002

The following Table summarizes the most recent test results for Schedule 24. Testing is required every 3 years for secure groundwater wells in large systems.

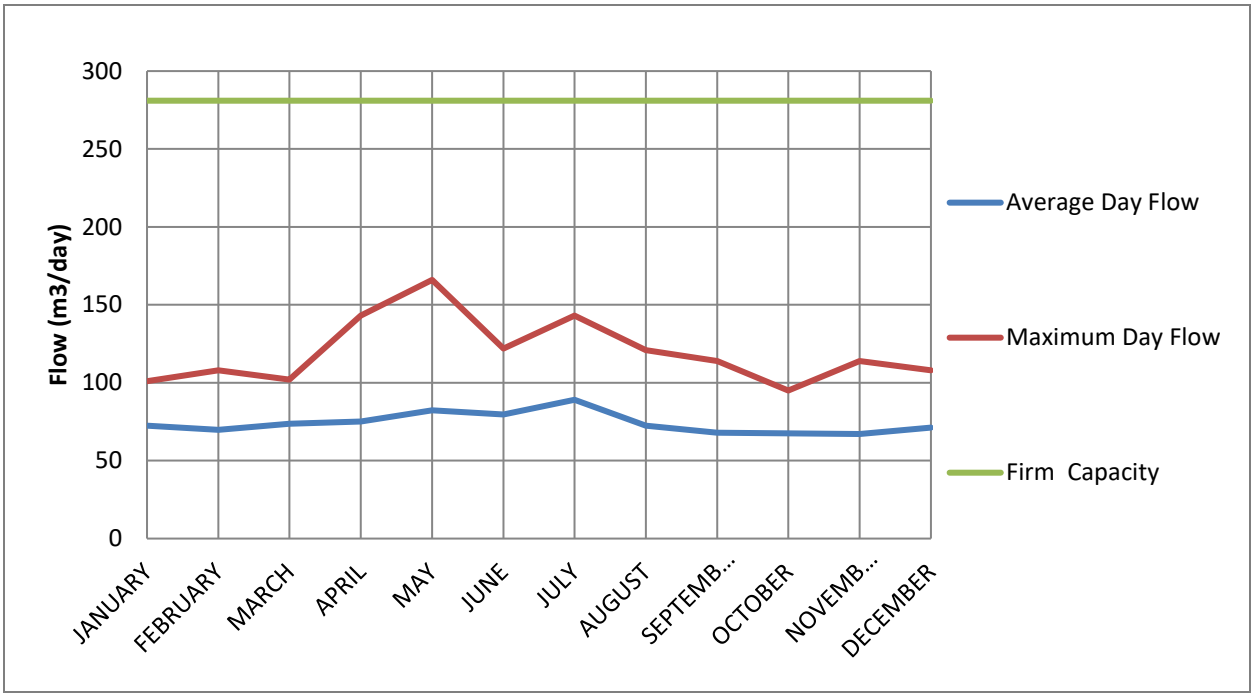
Parameter	*Sample Date*	*Result (µg/L)*	*MAC (µg/L)*	*MDL (µg/L)*
Alachlor	June 7, 2021	ND	5	0.02
Atrazine + N-dealkylatedmetobolites	June 7, 2021	ND	5	0.01
Azinphos-methyl	June 7, 2021	ND	20	0.05
Benzene	June 7, 2021	ND	1	0.32
Benzo(a)pyrene	June 7, 2021	ND	0.01	0.004
Bromoxynil	June 7, 2021	ND	5	0.33
Carbaryl	June 7, 2021	ND	90	0.05
Carbofuran	June 7, 2021	ND	90	0.01
Carbon Tetrachloride	June 7, 2021	ND	2	0.17
Chlorpyrifos	June 7, 2021	ND	90	0.02
Chlorpyrifos	June 7, 2021	ND	90	0.02
Diazinon	June 7, 2021	ND	20	0.02
Dicamba	June 7, 2021	ND	120	0.20
1,2-Dichlorobenzene	June 7, 2021	ND	200	0.41
1,4-Dichlorobenzene	June 7, 2021	ND	5	0.36
1,2-Dichloroethane	June 7, 2021	ND	5	0.35
1,1-Dichloroethylene (vinylidene chloride)	June 7, 2021	ND	14	0.33
Dichloromethane	June 7, 2021	ND	50	0.35
2-4 Dichlorophenol	June 7, 2021	ND	900	0.15

Parameter	*Sample Date*	*Result (µg/L)*	*MAC (µg/L)*	*MDL (µg/L)*
2,4-Dichlorophenoxy acetic acid (2,4-D)	June 7, 2021	ND	100	0.19
Diclofop-methyl	June 7, 2021	ND	9	0.40
Dimethoate	June 7, 2021	ND	20	0.06
Diquat	June 7, 2021	ND	70	1
Diuron	June 7, 2021	ND	150	0.03
Glyphosate	June 7, 2021	ND	280	1
Malathion	June 7, 2021	ND	190	0.02
2-methyl-4chlorophenoxyacetic acid (MCPA)	June 7, 2021	ND	100	0.12
Metolachlor	June 7, 2021	ND	50	0.01
Metribuzin	June 7, 2021	ND	80	0.02
Monochlorobenzene	June 7, 2021	ND	80	0.30
Paraquat	June 7, 2021	ND	10	1
Pentachlorophenol	June 7, 2021	ND	60	0.15
Phorate	June 7, 2021	ND	2	0.01
Picloram	June 7, 2021	ND	190	1
Polychlorinated Biphenyls(PCB)	June 7, 2021	ND	3	0.04
Prometryne	June 7, 2021	ND	1	0.03
Simazine	June 7, 2021	ND	10	0.01
Terbufos	June 7, 2021	ND	1	0.01
Tetrachloroethylene	June 7, 2021	ND	10	0.35
2,3,4,6-Tetrachlorophenol	June 7, 2021	ND	100	0.20
Triallate	June 7, 2021	ND	230	0.01
Trichloroethylene	June 7, 2021	ND	5	0.44
2,4,6-Trichlorophenol	June 7, 2021	ND	5	0.25
Trifluralin	June 7, 2021	ND	45	0.02
Vinyl Chloride	June 7, 2021	ND	1	0.17

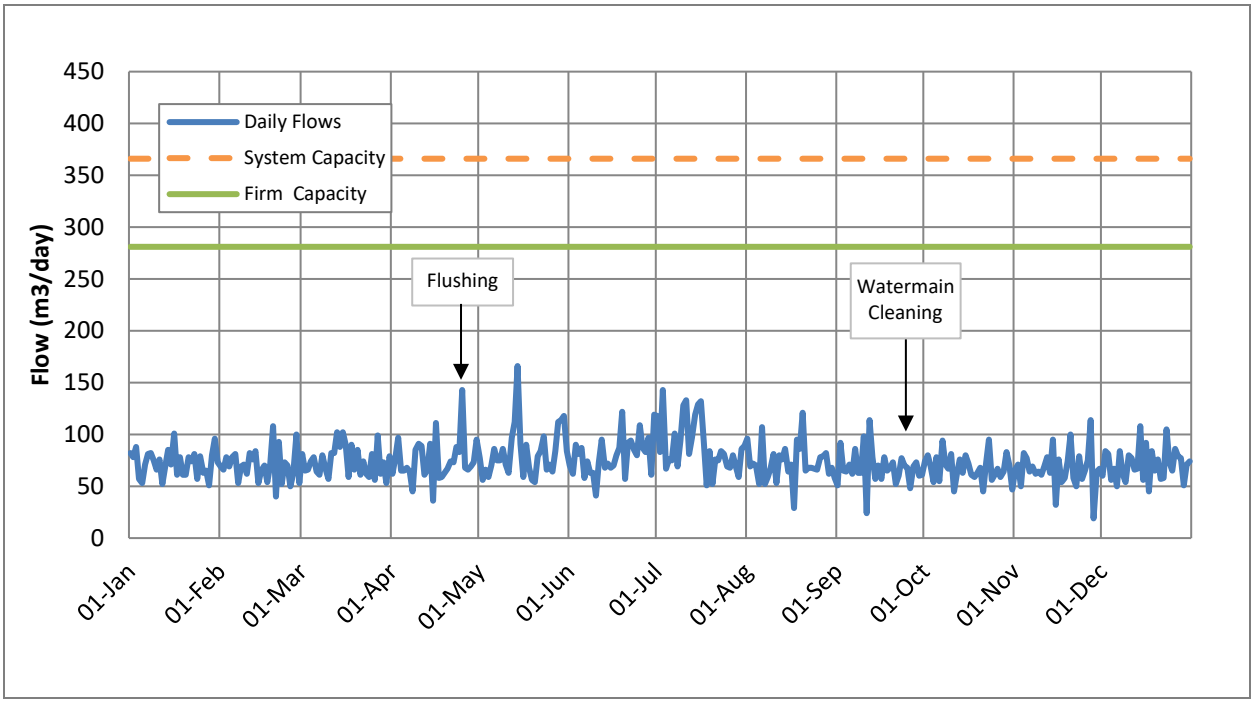
APPENDIX B: WATER QUANTITY SUMMARY

Brownsville Drinking Water System Firm Capacity 281 m^3/ day
Brownsville Drinking Water System Supply Capacity 366 m^3/ day

2022 Average vs Maximum Daily Flow Rates



2022 Daily Flow



2022 Total Production by Well