



2022 Annual Drinking Water System Summary Report

Beachville 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:	Beachville Drinking Water System
Drinking Water System Number:	2200000674
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 Beachville Drinking Water System is a Small Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and serves a population of approximately 221. The system consists of one well that is secure groundwater. The water is treated with sodium hypochlorite for disinfection and in 2022 approximately 425 L of the chemical was used in the water treatment process. This chemical is certified to meet standards set by the Standards Council of Canada or American National Standards Institute.

The treatment facility houses pumps, monitoring equipment and a 40 m³ underground reservoir. A standby generator is available to run the facility in the event of a power failure. 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 Beachville 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 taken weekly from the raw water at the facility and from the distribution system. Samples of treated water are not required for Small Municipal systems but may be taken periodically. 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 on the table below. There were no adverse test results from 104 treated water samples in this reporting period.

	<i>Number of Samples</i>	<i>Range of E. coli Results Min - Max MAC = 0</i>	<i>Range of Total Coliform Results Min - Max MAC = 0</i>
Raw	56	0	0 – OG*
Treated	52	0	0
Distribution	52	0	0

**OG means over grown bacteria growth resulted in a sample where the colonies could not be counted.
This result did not impact treated water quality and is not reportable as an adverse condition.

2.2 Heterotrophic Plate Count (HPC)

HPC analyses are completed weekly from the distribution water for small systems. 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. The 2022 results are shown in the table below.

	<i>Number of Samples</i>	<i>Range of HPC Min - Max</i>
Distribution	52	0 – 250

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 and chemical parameters. 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 Beachville Drinking Water 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 average hardness for the Beachville Drinking Water System is 320 mg/L (19 grains/gallon) based on samples collected from 2010-2022.

3.2 Additional Testing Required by MECP

None.

4. OPERATIONAL MONITORING

4.1 Chlorine Residual

Free chlorine levels of the treated water are monitored continuously at the discharge point of the Water Treatment Facility. In the distribution system, free chlorine is checked twice weekly at various locations. 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.

<i>Parameter</i>	<i>Number of Tests or Monitoring Frequency</i>	<i>Range of Results (Min – Max) and Average</i>
Chlorine residual after treatment (mg/L)	Continuous	(0.17 - 2.26) 1.33
Chlorine residual in distribution (mg/L)	105	(0.34 – 1.32) 0.79
Well 1 turbidity before treatment (NTU)	56	(0.20 – 6.91) 1.11
Turbidity after treatment (NTU)	Continuous	(0.08 – 4.00) 0.62

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.

<i>Flow Summary</i>	<i>Quantity</i>
Permit to Take Water Limit	657 m ³ /d
Municipal Drinking Water License Limit	656 m ³ /d
2022 Average Daily Flow	35 m ³ /d
2022 Maximum Daily Flow	126 m ³ /d
2022 Average Monthly Flow	1,072 m ³
2022 Total Amount of Water Supplied	12,867 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 m³/day to maintain system integrity. Since this system comprises of only one supply well Firm Capacity restricts further growth and is rated at 100 m³/day.

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 June 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.

<i>Parameter</i>	<i>Number of Tests</i>	<i>Result Range Min – Max (mg/L)</i>	<i>Average Result (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Nitrite	4	ND	ND	1.0	0.003
Nitrate	4	1.95 – 2.26	2.14	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.

<i>Parameter</i>	<i>Annual Average</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Trihalomethane (THM)	2022	14.9	100	0.37
Haloacetic Acids (HAA)	2022	5.9	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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Sodium	August 16, 2021	15.7	20*	0.01
Fluoride	August 16, 2021	0.69	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.

<i>Parameter</i>	<i>Result Range (Min - Max)</i>	<i>Number of Samples</i>	<i>Acceptable Level</i>
Distribution Alkalinity 2022	252 – 254	2	30 – 500mg/L
Distribution pH 2022	7.50 – 7.74	2	6.5 – 8.5
Distribution Lead 2022	0.13	1	10 µg/L MAC

The following Table summarizes the most recent test results for Schedule 23. Testing is required every 5 years for secure groundwater wells in small systems.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Antimony	May 28, 2019	ND	6	0.09
Arsenic	May 28, 2019	1.0	10	0.2
Barium	May 28, 2019	78.2	1000	0.02
Boron	May 28, 2019	43.0	5000	2
Cadmium	May 28, 2019	0.032	5	0.003
Chromium	May 28, 2019	0.25	50	0.08
Mercury	May 28, 2019	ND	1	0.01
Selenium	May 28, 2019	0.45	50	0.04
Uranium	May 28, 2019	0.716	20	0.002

The following Table summarizes the most recent test results for Schedule 24. Testing is required every 5 years for secure groundwater wells in small systems.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Alachlor	June 7, 2021	ND	5	0.02
Atrazine + N-dealkylatedmetabolites	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
Bromoxnyl	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
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
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

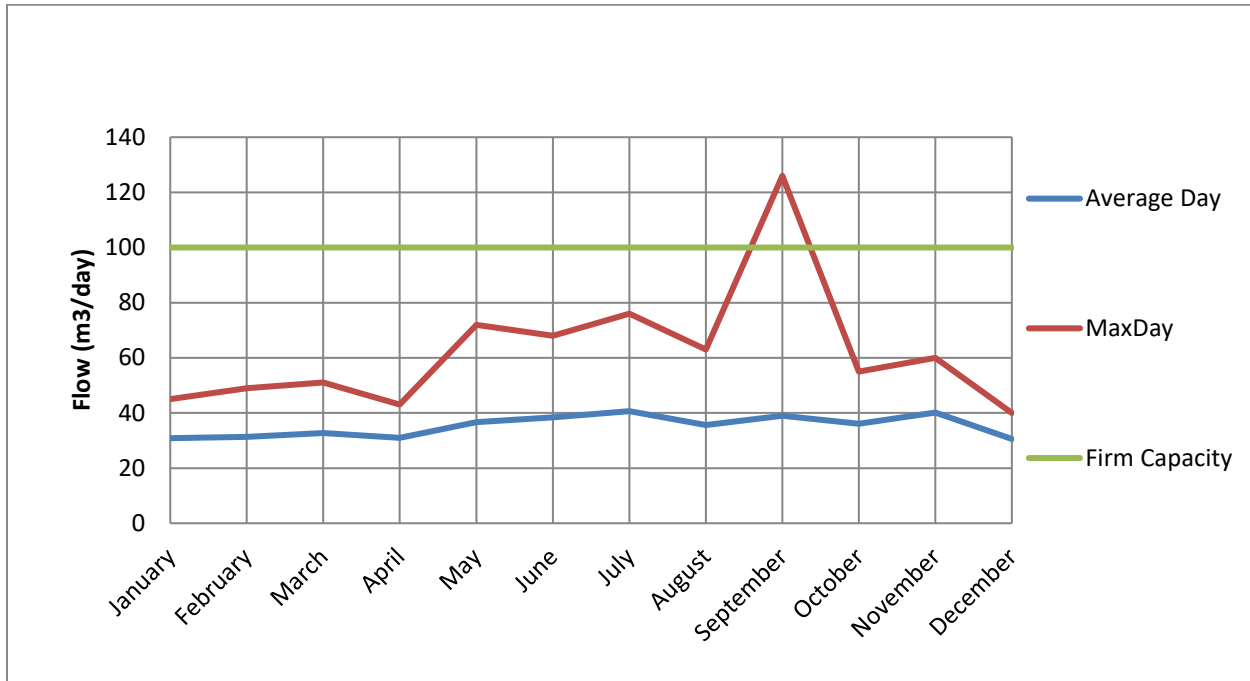
<i>Parameter</i>	<i>Sample Date</i>	<i>Result (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Diquat	June 7, 2021	ND	70	1
Diuron	June 7, 2021	ND	150	0.03
Glyphosate	June 7, 2021	ND	280	1
Malathion	June 7, 2021	ND	190	0.02
2-Methyl-4-chlorophenoxyacetic acid (MCPA)	June 7, 2021	ND	100	0.12
Metolachlor	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

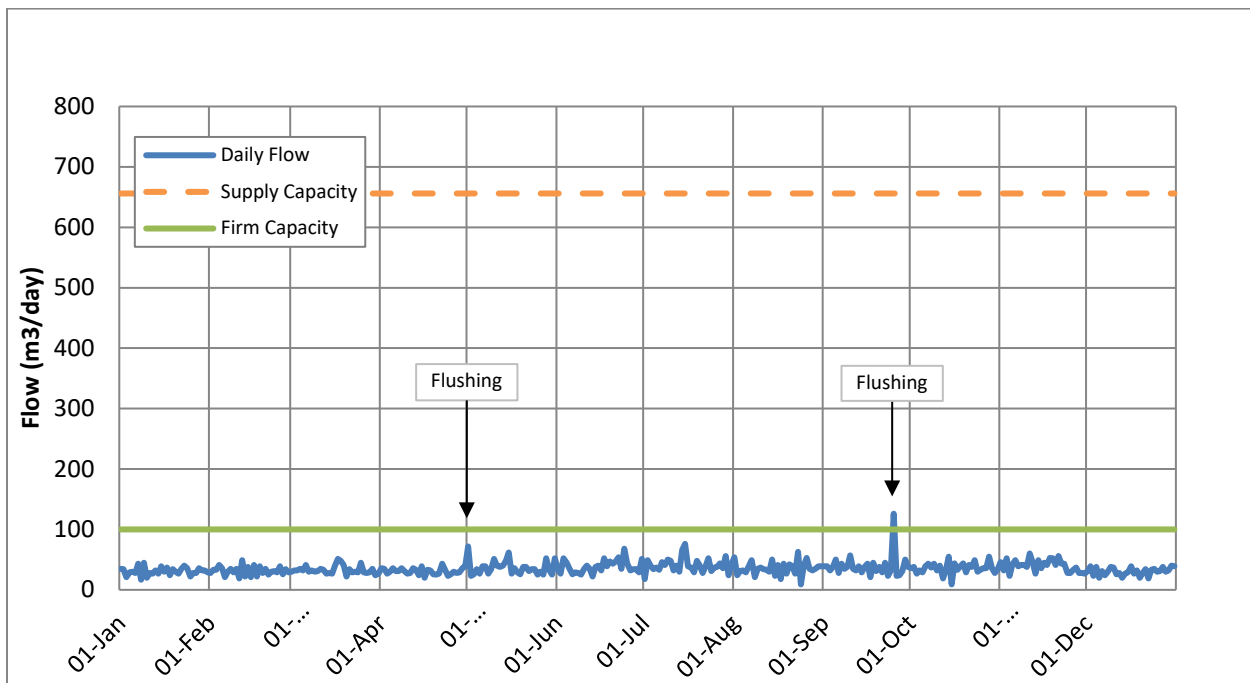
Beachville Drinking Water System Firm Capacity 100 m³/ day

Beachville Drinking Water System Supply Capacity 656 m³/ day

2022 Average vs Maximum Daily Flow Rates



2022 Daily Flow Summary



2022 Annual Drinking Water System Summary Report

Bright 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:	Bright Drinking Water System
Drinking Water System Number:	220009050
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 Bright Drinking Water System is a Large Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and serves a population of approximately 436. The system consists of two wells that are secure groundwater. The water is treated with sodium hypochlorite for disinfection and sodium silicate to sequester iron which improves water quality. In 2022, approximately 820 L of sodium hypochlorite and 615 L (870kg) of sodium silicate were used in the water treatment process. These chemicals are certified to meet standards set by the Standards Council of Canada or American National Standards Institute.

The well facility houses pumps and treatment equipment. A separate pumping station houses high lift pumps, monitoring equipment, an 86 m³ in-ground reservoir and a 180 m³ standpipe. A standby generator is available to run the pump station in the event of a power failure. 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 Bright 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:

- \$228,000 R&M on Wells, Water Pump stations, and Water Treatment Facilities
- \$940,000 distribution replacements
- \$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 undertake a County Wide Water and Wastewater Master Plan

2. MICROBIOLOGICAL TESTING

2.1 E. coli and Total Coliform

Bacteriological tests for *E. coli* and total coliforms are required weekly from the raw and treated water at the facility and from 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 sample 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 on the table below. There were no adverse test results from 166 treated water samples in this reporting period.

	<i>Number of Samples</i>	<i>Range of E. coli Results Min - Max MAC = 0</i>	<i>Range of Total Coliform Results Min - Max MAC = 0</i>
Raw	104	0	0
Treated	52	0	0
Distribution	114	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.

	<i>Number of Samples</i>	<i>Range of HPC Min - Max</i>
Treated	52	0 - 40
Distribution	28	0 - 54

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 and chemical parameters. 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 Bright Drinking Water System is provided below.

3.1 Hardness, Iron, and Manganese

These are aesthetic parameters that may affect the appearance of the water but are 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, improve the efficiency of soaps and reduce iron levels. 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 Bright Drinking Water System was tested in 2022 and ranged from 445 - 531 mg/L (26 - 31 grains/gallon)

Levels of iron less than 0.30 mg/L (ppm) are not considered to cause aesthetic problems such as discoloured water. In Bright, sodium silicate is added to keep the iron in suspension. Manganese is commonly found in conjunction with iron and also causes discoloured water. Manganese levels in this system are at or above the aesthetic objective of 0.05 mg/L.

- The average iron concentration in 2022 was 0.525 mg/L (ppm).
- The average manganese concentration in 2022 was 0.045 mg/L (ppm).

3.2 Sodium

Sodium levels in treated 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 provide information for people on sodium restricted diets to control their sodium intake. The average sodium level in Bright is 67.7 mg/L.

3.3 Additional Testing Required by MECP

None.

4. OPERATIONAL MONITORING

4.1 Chlorine Residual

Free chlorine levels of the treated water are monitored continuously at the discharge point of the Water Treatment Facility. In the distribution system, free chlorine is checked twice weekly at various locations. 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 below.

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.

<i>Parameter</i>	<i>Number of Tests or Monitoring Frequency</i>	<i>Range of Results (Min – Max) and Average</i>
Chlorine residual after treatment (mg/L)	Continuous	(0.92 - 2.23) 1.39
Chlorine residual in distribution (mg/L)	Continuous	(0.70 - 2.34) 1.23
Well 4A Turbidity before treatment (NTU)	52	(0.36 – 2.36) 0.81
Well 5 Turbidity before treatment (NTU)	52	(0.15 – 1.39) 0.60
Turbidity after treatment (NTU)	Continuous	(0.27 – 4.0) 0.60

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.

<i>Flow Summary</i>	<i>Quantity</i>
Permit to Take Water Limit	327 m ³ /d
Municipal Drinking Water License Limit	589 m ³ /d
2022 Average Daily Flow	72 m ³
2022 Maximum Daily Flow	212 m ²
2022 Average Monthly Flow	2197 m ³
2022 Total Amount of Water Supplied	26,367 m ³

Although the PTTW for the system is 327 m³/day, the wells are not capable of producing this quantity. A more realistic maximum capacity of the system is approximately 296 m³/day. The County has begun exploration for an additional source.

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 m³/day if necessary to maintain system integrity. This system comprises of two supply wells. Well 4A is removed for Firm Capacity calculations. The remaining Well 5 has a water taking limit of 86 m³/day. Firm Capacity of this system is rated at 186 m³/day with storage capacity of 266 m³.

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 August 2022. There were no non-compliance findings and the 2022 Inspection Report Rating was 100%.

6.2 Adverse Results

Any adverse results from bacteriological, 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.

<i>Parameter</i>	<i>Number of Tests</i>	<i>Result Range Min – Max (mg/L)</i>	<i>Average Result (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Nitrite	4	ND	ND	1.0	0.003
Nitrate	4	0.72 – 0.75	0.74	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.

<i>Parameter</i>	<i>Annual Average</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Trihalomethane (THM)	2022	16	100	0.37
Haloacetic Acids (HAA)	2022	5.7	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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Sodium	May 21, 2019	66.2	20*	0.01
Fluoride	May 21, 2019	0.09	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.

<i>Parameter</i>	<i>Result Range (Min - Max)</i>	<i>Number of Samples</i>	<i>Acceptable Level</i>
Distribution Alkalinity 2022	252 – 336	3	30 – 500mg/L
Distribution pH 2022	7.25 – 7.59	3	6.5 – 8.5
Distribution Lead 2021	1.01 – 1.90	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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Antimony	May 30, 2022	ND	6	0.6
Arsenic	May 30, 2022	2.1	10	0.2
Barium	May 30, 2022	121	1000	0.02
Boron	May 30, 2022	77	5000	2
Cadmium	May 30, 2022	0.004	5	0.003
Chromium	May 30, 2022	0.19	50	0.08
Mercury	May 30, 2022	ND	1	0.01
Selenium	May 30, 2022	0.15	50	0.04
Uranium	May 30, 2022	1.80	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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Alachlor	June 7, 2021	ND	5	0.02
Atrazine + N-dealkylatedmetabolites	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
2,4-Dichlorophenoxy acetic acid (2,4-D)	June 7, 2021	ND	100	0.19
Diclofop-methyl	June 7, 2021	ND	9	0.40

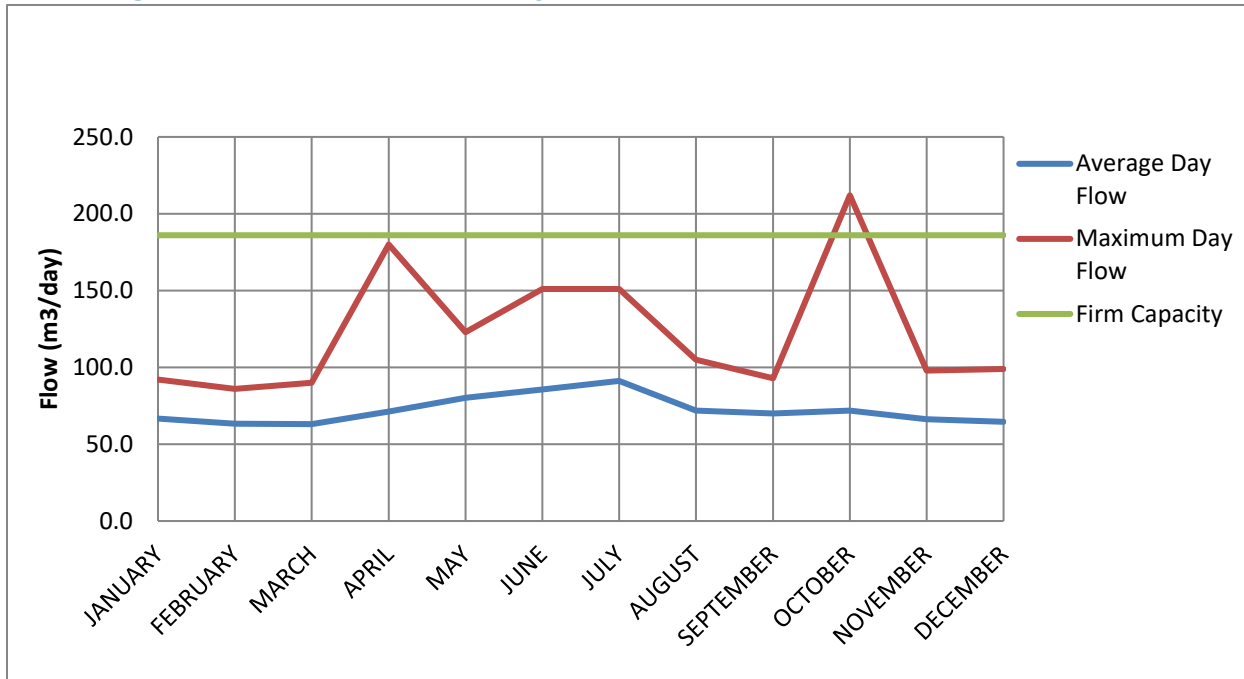
<i>Parameter</i>	<i>Sample Date</i>	<i>Result (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Dimethoate	June 7, 2021	ND	20	0.06
Diquat	June 7, 2021	ND	70	1
Diuron	June 7, 2021	ND	150	0.03
Glyphosate	June 7, 2021	ND	280	1
Malathion	June 7, 2021	ND	190	0.02
2-methyl-4chlorophenoxyacetic acid (MCPA)	June 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

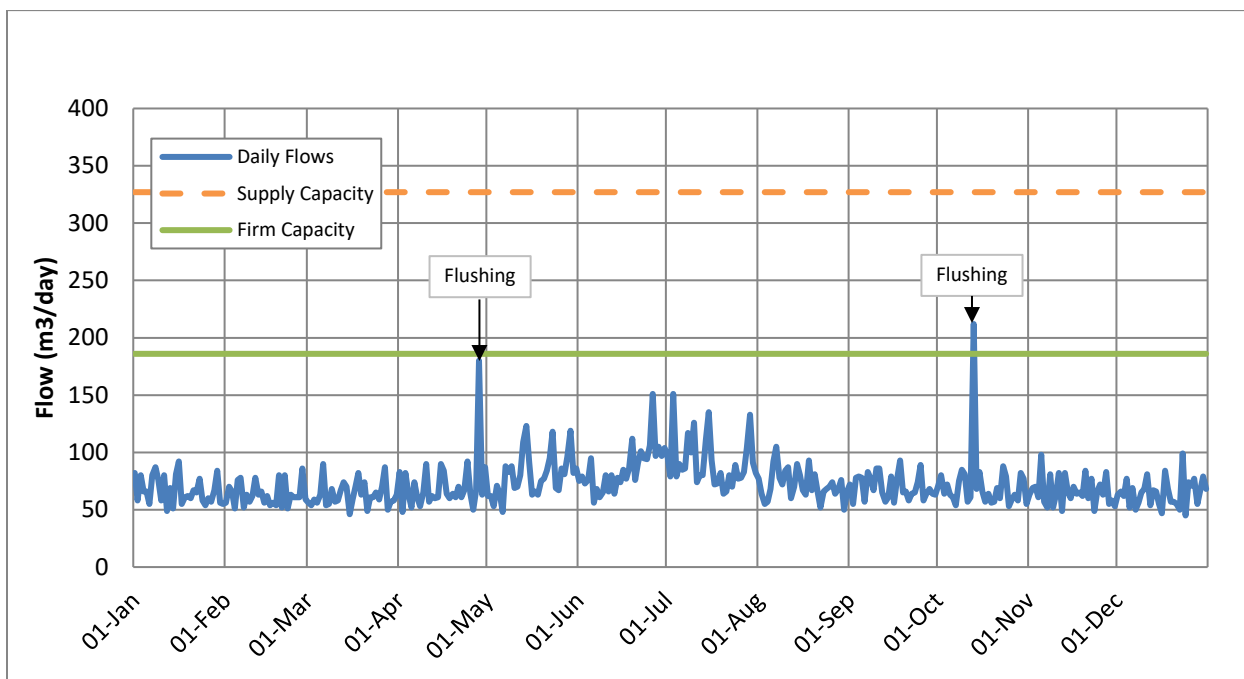
Bright Drinking Water System Firm Capacity 186 m³/ day

Bright Drinking Water System Supply Capacity 327 m³/ day

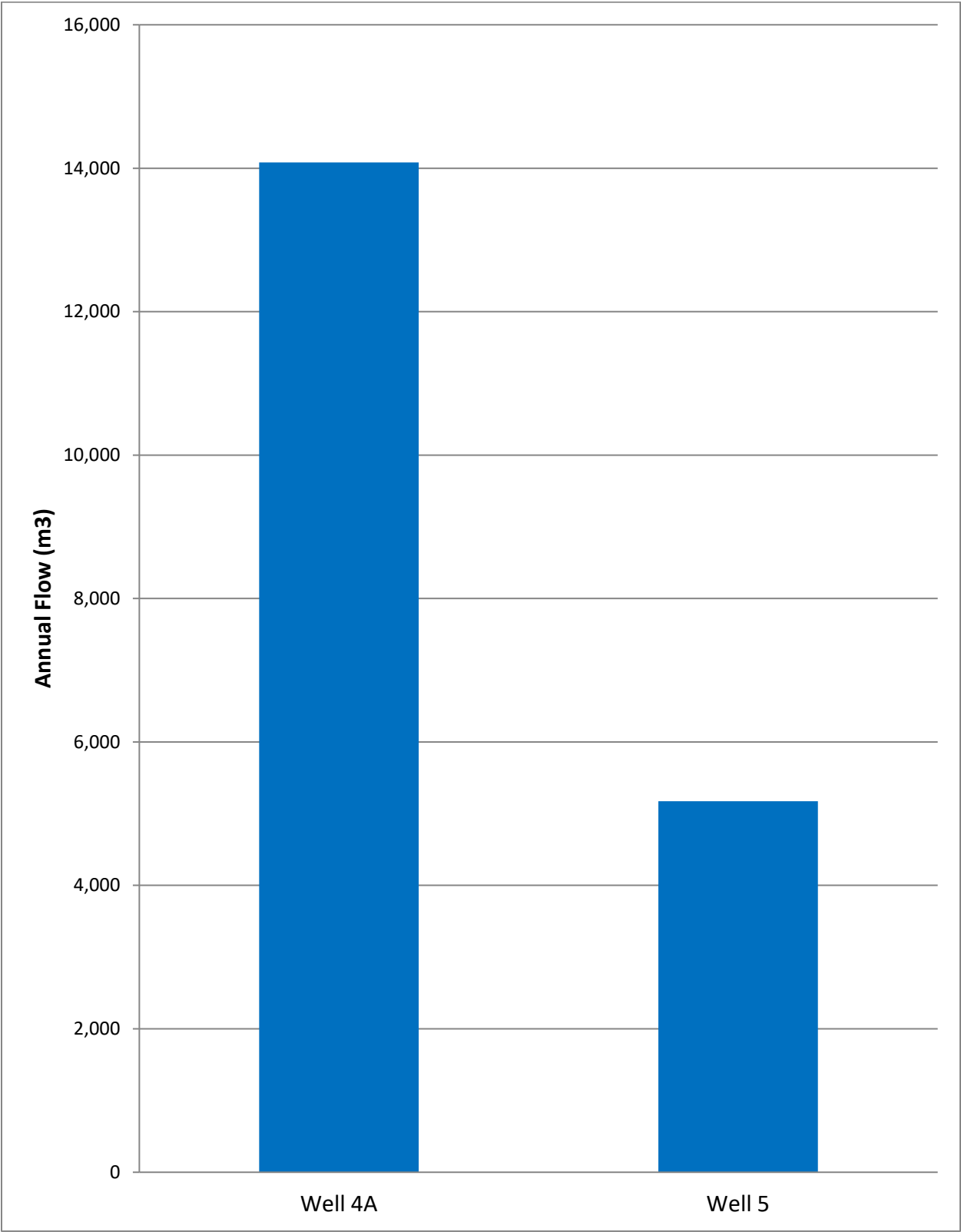
Average vs Maximum Daily Flow Rates



2022 Daily Flow



2022 Total Production by Well



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 m³ 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.

	<i>Number of Samples</i>	<i>Range of E. coli Results Min - Max MAC = 0</i>	<i>Range of Total Coliform Results Min - Max MAC = 0</i>
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.

	<i>Number of Samples</i>	<i>Range of HPC Min - Max</i>
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.

<i>Parameter</i>	<i>Number of Tests or Monitoring Frequency</i>	<i>Range of Results (Min – Max) and Average</i>
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.

<i>Flow Summary</i>	<i>Quantity</i>
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 m³/day to maintain system integrity. This system comprises of two supply wells. Well 5 is removed for Firm Capacity calculations. The remaining Well 6 has a limit of 181 m³/day. Firm Capacity of this system is rated at 281 m³/day. Reservoir storage capacity is 188 m³.

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.

<i>Parameter</i>	<i>Number of Tests</i>	<i>Result Range Min – Max (mg/L)</i>	<i>Average Result (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
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.

<i>Parameter</i>	<i>Annual Average</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
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.

<i>Parameter</i>	<i>Result Range (Min - Max)</i>	<i>Number of Samples</i>	<i>Acceptable Level</i>
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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Alachlor	June 7, 2021	ND	5	0.02
Atrazine + N-dealkylatedmetabolites	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

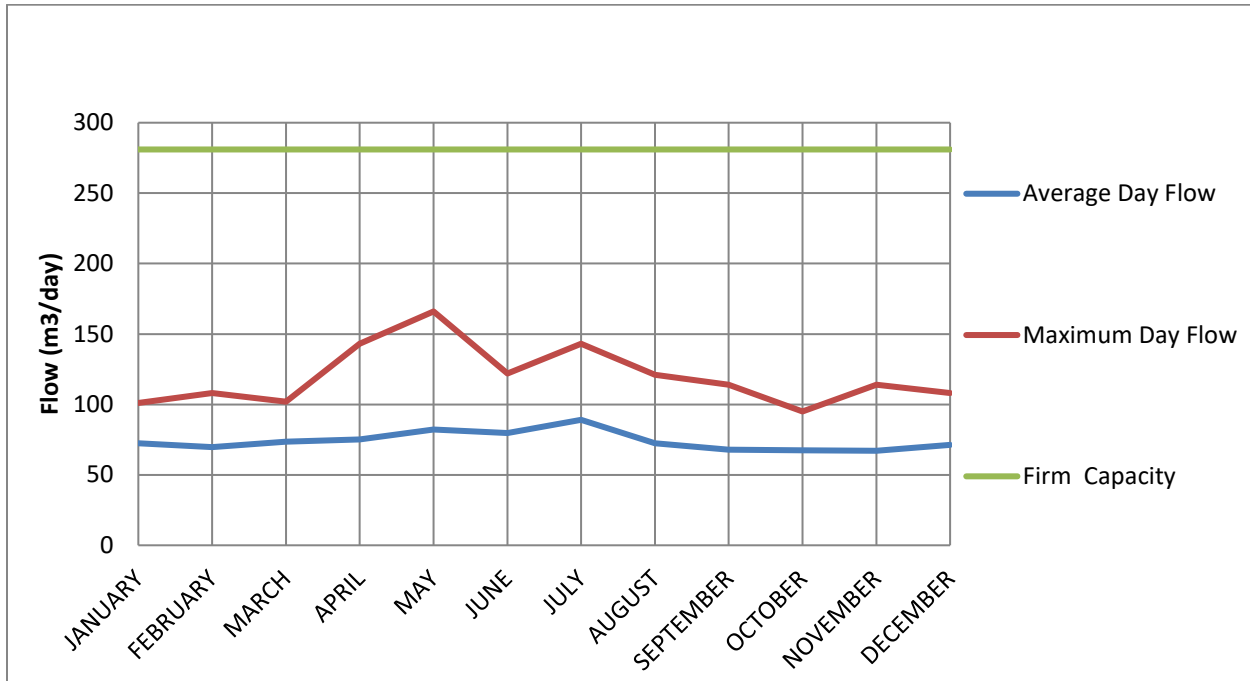
<i>Parameter</i>	<i>Sample Date</i>	<i>Result (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
2,4-Dichlorophenoxy acetic acid (2,4-D)	June 7, 2021	ND	100	0.19
Diclofop-methyl	June 7, 2021	ND	9	0.40
Dimethoate	June 7, 2021	ND	20	0.06
Diquat	June 7, 2021	ND	70	1
Diuron	June 7, 2021	ND	150	0.03
Glyphosate	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

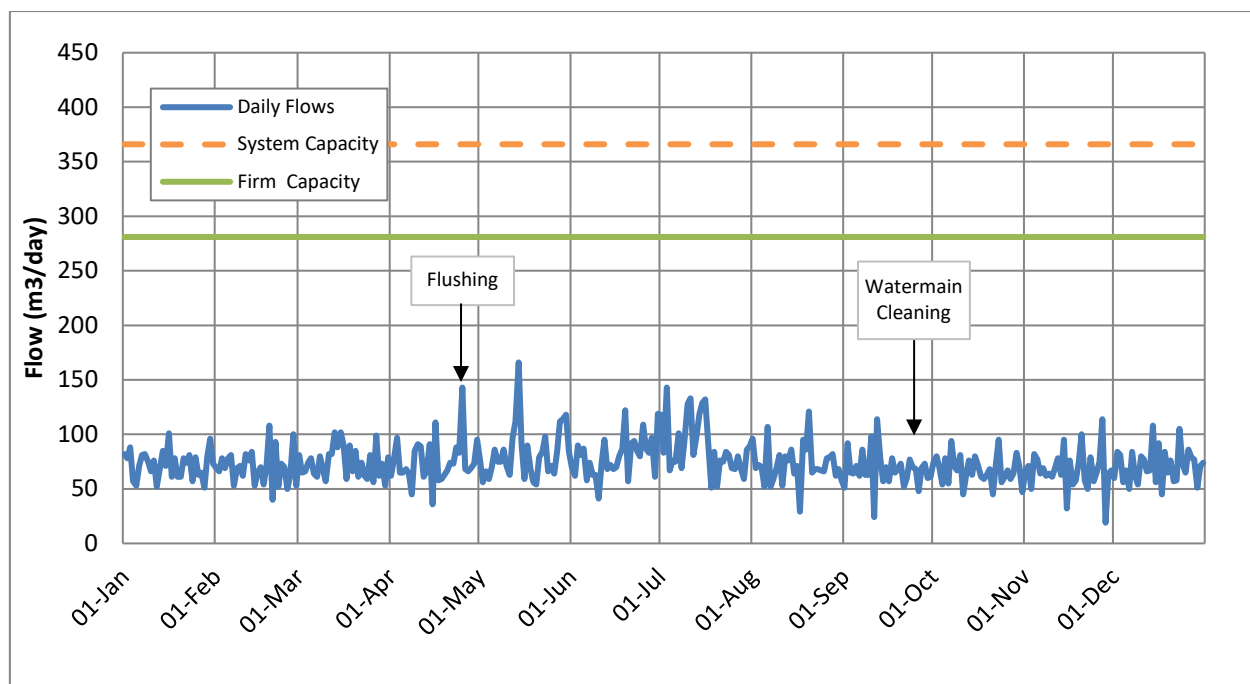
Brownsville Drinking Water System Firm Capacity 281 m³/ day

Brownsville Drinking Water System Supply Capacity 366 m³/ day

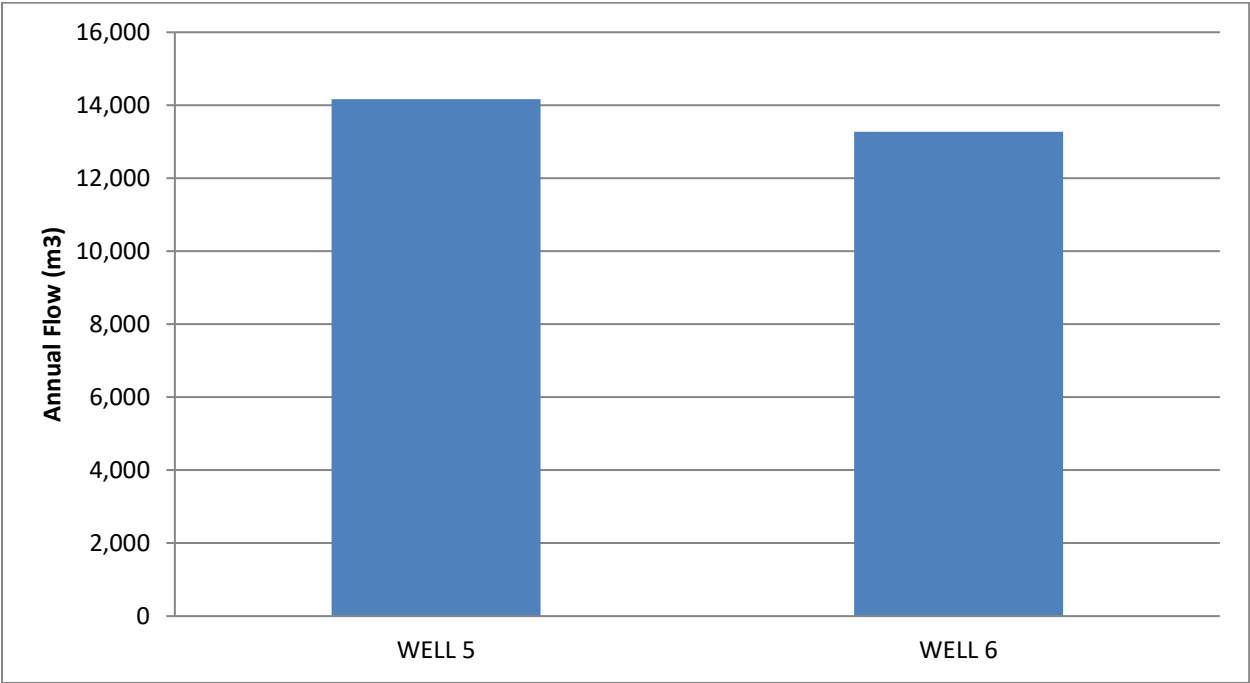
2022 Average vs Maximum Daily Flow Rates



2022 Daily Flow



2022 Total Production by Well



2022 Annual Drinking Water System Summary Report

Dereham Centre 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:	Dereham Centre Drinking Water System
Drinking Water System Number:	220001510
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 Dereham Centre Drinking Water System is a Small Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and serves a population of approximately 84. The system consists of one secure groundwater well and a treatment facility. The water is treated with sodium hypochlorite for disinfection and in 2022 approximately 48L 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 treatment facility houses pumps, MD-80 filters to improve water quality, treatment and monitoring equipment, and a 37 m³ underground reservoir. A standby generator is available to run the facility in the event of a power failure. 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 Dereham Centre 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 taken weekly from the raw water at the facility and from the distribution system. Samples of treated water are not

required for Small Municipal systems but may be taken periodically. 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 104 treated water samples in this reporting period.

	<i>Number of Samples</i>	<i>Range of E. coli Results Min - Max MAC = 0</i>	<i>Range of Total Coliform Results Min - Max MAC = 0</i>
Raw	52	0	0
Treated	52	0	0
Distribution	52	0	0

2.2 Heterotrophic Plate Count (HPC)

HPC analyses are completed weekly from the distribution water for small systems. 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.

	<i>Number of Samples</i>	<i>Range of HPC Min - Max</i>
Distribution	52	0 - 6

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 Dereham Centre system is provided below.

3.1 Hardness and Iron

These are aesthetic parameters that may affect the appearance of the water but are 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 Dereham Centre Drinking Water System was 255 mg/L (14.9 grains/gallon) based on the sample collected from 2022.

Levels of iron less than 0.30 mg/L (ppm) are not considered to cause problems such as discoloured water. The updated filtration process added in 2021 has effectively reduced iron concentrations in the treated water to below 0.3 mg/L.

Samples for iron were collected quarterly from treated water in 2022. Iron for the Dereham Centre Drinking Water System was less than the detection limit for all samples collected in 2022.

3.2 Additional Testing Required by MECP

The Maximum Allowable Concentration (MAC) for arsenic is 10 µg/L. In Dereham Centre, the average arsenic concentrations in the raw well water are naturally above 10 µg/L. In 2021, filters were installed in Dereham Centre to remove arsenic from the water. After the filters were installed, the MECP reviewed treated water results and approved quarterly sampling for arsenic. In 2022, the arsenic in treated drinking water ranged from 3.3 – 3.6 µg/L, with an average concentration of 3.45 µg/L.

4. OPERATIONAL MONITORING

4.1 Chlorine Residual

Free chlorine levels of the treated water are monitored continuously at the discharge point of the Water Treatment Facility. In the distribution system, free chlorine is checked twice weekly at various locations. 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 actions 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.

<i>Parameter</i>	<i>Number of Tests or Monitoring Frequency</i>	<i>Range of Results (Min – Max) and Average</i>
Chlorine residual after treatment (mg/L)	Continuous	(0.31 - 1.84) 1.09
Chlorine residual in distribution (mg/L)	105	(0.82 - 1.43) 1.05
Well 2 turbidity before treatment (NTU)	52	(0.10 - 0.96) 0.27
Turbidity after treatment (NTU)	Continuous	(0.02 - 0.96) 0.08

5. WATER QUANTITY

Continuous monitoring of flowrates from the well into the treatment system and from the facility into the distribution system is required by O.Reg. 170/03. The Municipal Drinking Water License and Permit to Take Water 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.

<i>Flow Summary</i>	<i>Quantity</i>
Water Taking Limit	50 m ³ /d
Municipal Drinking Water License Limit	78 m ³ /d
2022 Average Daily Flow	7 m ³ /d
2022 Maximum Daily Flow	22 m ³ /d
2022 Average Monthly Flow	297 m ³
2022 Total Amount of Water Supplied	3,567 m ³

A review of the available supply capacity and the anticipated growth forecasted for the community indicates that the system has sufficient capacity over the 20 year planning horizon.

Firm Capacity of this system is rated at 50 m³/day. Firm Capacity is defined as the removal of the highest producing well in an emergency or operational / maintenance situation with the ability to transport water if necessary to maintain system integrity. This system comprises of one supply well that is limited to 50 m³/day. When this well is not in service 50 m³/day can be supplied via trucked water.

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

At the time that this report was drafted the Annual MECP Inspection for the Dereham Centre Drinking Water System had not yet taken place.

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.

<i>Parameter</i>	<i>Number of Tests</i>	<i>Result Range Min – Max (mg/L)</i>	<i>Average Result (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Nitrite	4	ND	ND	1.0	0.003
Nitrate	4	0.008 – 0.010	0.009	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.

<i>Parameter</i>	<i>Annual Average</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Trihalomethane (THM)	2022	8.2	100	0.37
Haloacetic Acids (HAA)	2022	ND	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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Sodium	August 16, 2021	11.6	20*	0.01
Fluoride	August 16, 2021	0.59	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.

<i>Parameter</i>	<i>Result Range (Min - Max)</i>	<i>Number of Samples</i>	<i>Acceptable Level</i>
Distribution Alkalinity 2022	224 – 233	2	30 – 500mg/L
Distribution pH 2022	7.83 – 7.84	2	6.5 – 8.5
Distribution Lead 2021	0.22 – 0.41	2	10 µg/L MAC

The following Table summarizes the most recent test results for Schedule 23. Testing is required every 5 years for secure groundwater wells in small systems.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Antimony	December 2, 2019	ND	6	0.09
Arsenic	Annual average	3.45	10	0.2
Barium	December 2, 2019	239	1000	0.02
Boron	December 2, 2019	29	5000	2
Cadmium	December 2, 2019	ND	5	0.003
Chromium	December 2, 2019	0.10	50	0.08
Mercury	December 2, 2019	0.01	1	0.01
Selenium	December 2, 2019	ND	50	0.04
Uranium	December 2, 2019	0.112	20	0.002

The following Table summarizes the most recent test results for Schedule 24. Testing is required every 5 years for secure groundwater wells in small systems.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Alachlor	December 2, 2019	ND	5	0.02
Atrazine + N-dealkylatedmetabolites	December 2, 2019	ND	5	0.01
Azinphos-methyl	December 2, 2019	ND	20	0.05
Benzene	December 2, 2019	ND	1	0.32
Benzo(a)pyrene	December 2, 2019	ND	0.01	0.004
Bromoxynil	December 2, 2019	ND	5	0.33
Carbaryl	December 2, 2019	ND	90	0.05
Carbofuran	December 2, 2019	ND	90	0.01
Carbon Tetrachloride	December 2, 2019	ND	2	0.17
Chlorpyrifos	December 2, 2019	ND	90	0.02
Chlorpyrifos	December 2, 2019	ND	90	0.02
Diazinon	December 2, 2019	ND	20	0.02
Dicamba	December 2, 2019	ND	120	0.20
1,2-Dichlorobenzene	December 2, 2019	ND	200	0.41
1,4-Dichlorobenzene	December 2, 2019	ND	5	0.36
1,2-Dichloroethane	December 2, 2019	ND	5	0.35
1,1-Dichloroethylene (vinylidene chloride)	December 2, 2019	ND	14	0.33
Dichloromethane	December 2, 2019	ND	50	0.35
2-4 Dichlorophenol	December 2, 2019	ND	900	0.15
2,4-Dichlorophenoxy acetic acid (2,4-D)	December 2, 2019	ND	100	0.19
Diclofop-methyl	December 2, 2019	ND	9	0.40

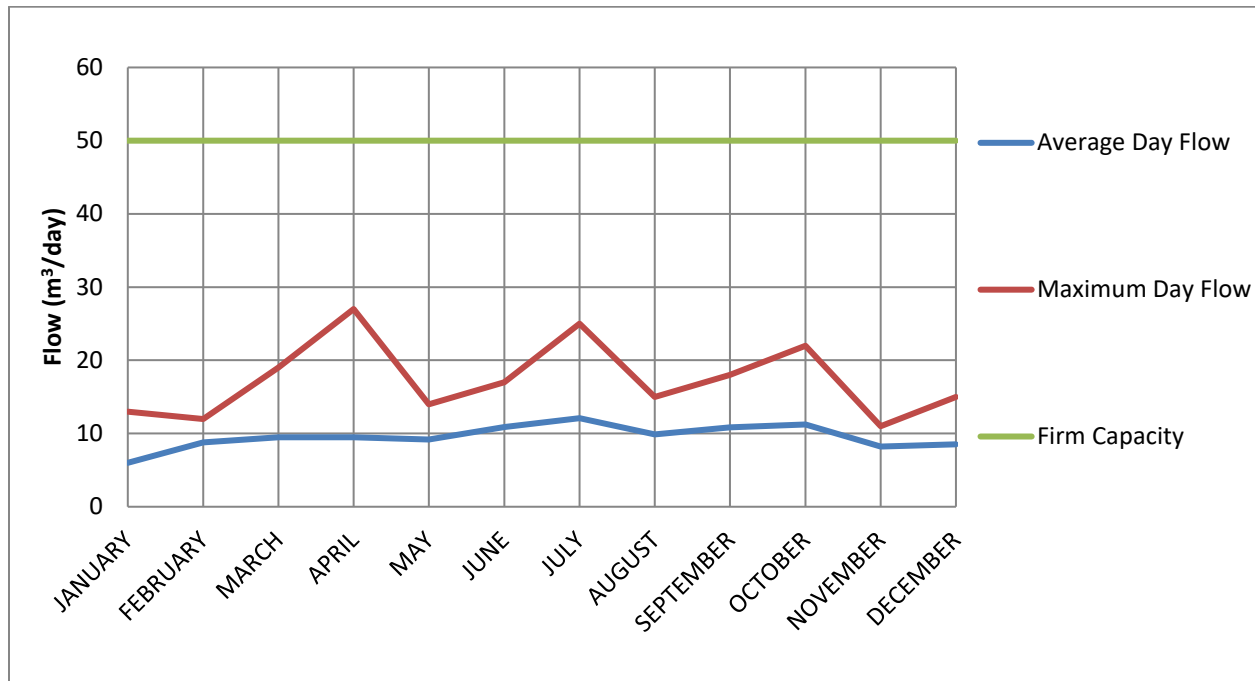
<i>Parameter</i>	<i>Sample Date</i>	<i>Result (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Dimethoate	December 2, 2019	ND	20	0.06
Diquat	December 2, 2019	ND	70	1
Diuron	December 2, 2019	ND	150	0.03
Glyphosate	December 2, 2019	ND	280	1
Malathion	December 2, 2019	ND	190	0.02
2-methyl-4chlorophenoxyacetic acid (MCPA)	December 2, 2019	ND	100	0.12
Metolachlor	December 2, 2019	ND	50	0.01
Metribuzin	December 2, 2019	ND	80	0.02
Monochlorobenzene	December 2, 2019	ND	80	0.30
Paraquat	December 2, 2019	ND	10	1
Pentachlorophenol	December 2, 2019	ND	60	0.15
Phorate	December 2, 2019	ND	2	0.01
Picloram	December 2, 2019	ND	190	1
Polychlorinated Biphenyls(PCB)	December 2, 2019	ND	3	0.04
Prometryne	December 2, 2019	ND	1	0.03
Simazine	December 2, 2019	ND	10	0.01
Terbufos	December 2, 2019	ND	1	0.01
Tetrachloroethylene	December 2, 2019	ND	10	0.35
2,3,4,6-Tetrachlorophenol	December 2, 2019	ND	100	0.20
Triallate	December 2, 2019	ND	230	0.01
Trichloroethylene	December 2, 2019	ND	5	0.44
2,4,6-Trichlorophenol	December 2, 2019	ND	5	0.25
Trifluralin	December 2, 2019	ND	45	0.02
Vinyl Chloride	December 2, 2019	ND	1	0.17

APPENDIX B: WATER QUANTITY SUMMARY

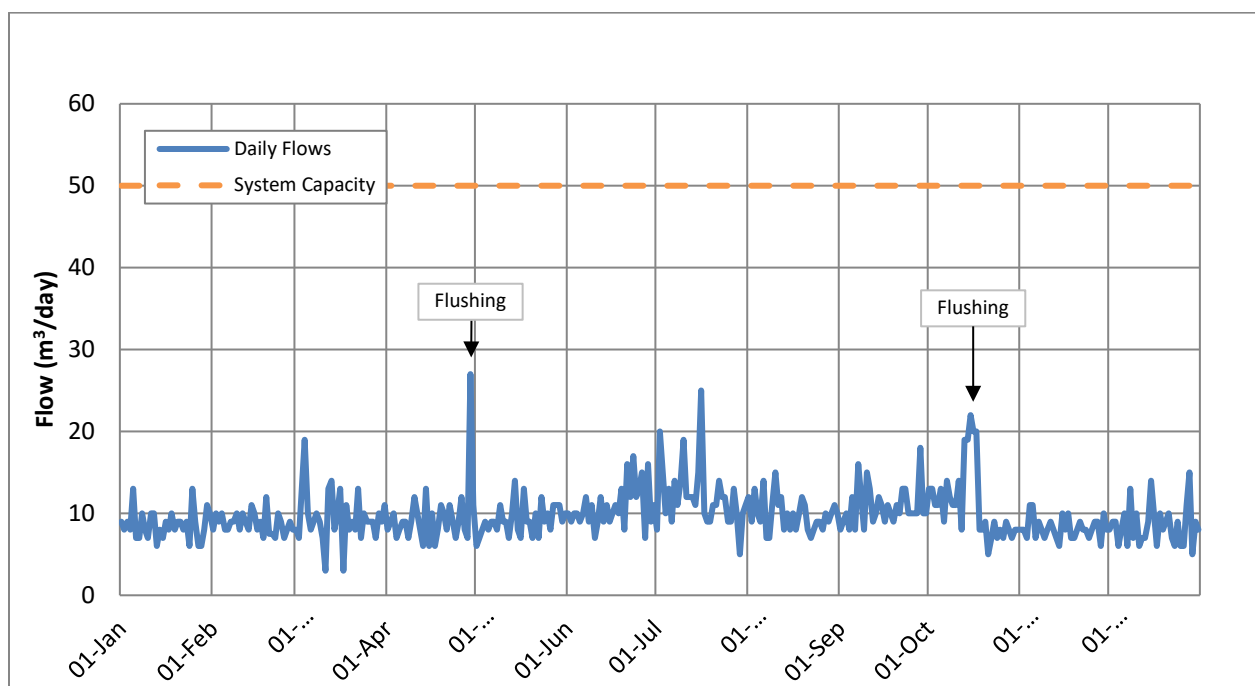
Dereham Centre Drinking Water System Firm Capacity 50 m³/ day

Dereham Centre Drinking Water System Supply Capacity 50 m³/ day

2022 Average vs Maximum Daily Flow Rates



2022 Daily Flow



2022 Annual Drinking Water System Summary Report

Drumbo-Princeton 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:	Drumbo-Princeton Drinking Water System
Drinking Water System Number:	220007515
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 Drumbo-Princeton Drinking Water System is a Large Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and serves a population of approximately 1,615. The system consists of three wells that are secure groundwater, connected to a central treatment facility all located in Drumbo. The facility houses high lift pumps, monitoring equipment, and a 516 m³ reservoir. Treatment consists of the addition of sodium hypochlorite for disinfection and sodium silicate to sequester iron, which improves water quality. A standby generator is available to run the facility in the event of a power failure. The two communities are linked by a transmission main. In Princeton, there is a pressure control facility with chlorine residual monitoring, re-chlorination equipment, and a 271 m³ storage standpipe.

In 2022, approximately 3,075 L of sodium hypochlorite and 1640 L (2320kg) of sodium silicate were used in the water treatment process. These chemicals are certified to meet standards set by the Standards Council of Canada or the American National Standards Institute.

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 Drumbo-Princeton 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:

- \$228,000 R&M on Wells, Water Pump stations, and Water Treatment Facilities
- \$940,000 distribution replacements
- \$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 from the raw and treated water at the facility and from 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 sample 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 on the table below. There were no adverse test results from 208 treated water samples in this reporting period.

	<i>Number of Samples</i>	<i>Range of E. coli Results Min - Max MAC = 0</i>	<i>Range of Total Coliform Results Min - Max MAC = 0</i>
Raw	156	0	0
Treated	52	0	0
Distribution	156	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.

	<i>Number of Samples</i>	<i>Range of HPC Min - Max</i>
Treated	52	0 - 6
Distribution	39	0 - 8

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 and chemical parameters. 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 Drumbo-Princeton Drinking Water System is provided below.

3.1 Hardness, Iron, and Manganese

These are aesthetic parameters that may affect the appearance of the water but are 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, improve the efficiency of soaps and reduce iron levels. 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 Drumbo-Princeton Drinking Water System was tested in 2022 and ranged from 303 - 365 mg/L (18 - 21 grains/gallon).

Levels of iron less than 0.30 mg/L (ppm) are not considered to cause aesthetic problems such as discoloured water. In Drumbo-Princeton, sodium silicate is added to keep the iron in suspension at wells 1 and 2A. Manganese is commonly found in conjunction with iron and also causes discoloured water. Manganese levels in this system are above a new proposed aesthetic objective of 0.02 mg/L.

- The average iron level in 2022 was 0.329 mg/L (ppm).
- The average manganese level in 2022 was 0.033 mg/L (ppm).

3.2 Additional Testing Required by MECP

None.

4. OPERATIONAL MONITORING

4.1 Chlorine Residual

Free chlorine levels of the treated water are monitored continuously at the discharge point of the Water Treatment Facility. In the distribution system, free chlorine is checked twice weekly at various locations. 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 below in section 4.2. The maximum free chlorine residual in the distribution system may exceed that of the residual collected post treatment due to re-chlorination of the distribution water in Princeton.

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.

<i>Parameter</i>	<i>Number of Tests or Monitoring Frequency</i>	<i>Range of Results (Min – Max) and Average</i>
Chlorine residual after treatment (mg/L)	Continuous	(0.95 - 2.30) 1.39
Chlorine residual in distribution (mg/L)	Continuous	(0.75 – 2.35) 1.31
Well 1 turbidity before treatment (NTU)	52	(0.13 – 0.94) 0.45
Well 2A turbidity before treatment (NTU)	52	(0.10 – 0.90) 0.48
Well 3 turbidity before treatment (NTU)	52	(0.12 – 0.94) 0.50
Turbidity after treatment (NTU)	Continuous	(1.77 - 0.18) 0.28

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.

<i>Flow Summary</i>	<i>Quantity</i>
Permit to Take Water Limit	1,329 m ³ /d
Municipal Drinking Water License Limit	1,329 m ³ /d
2022 Average Daily Flow	289 m ³
2022 Maximum Daily Flow	608 m ³
2022 Average Monthly Flow	8,792 m ³
2022 Total Amount of Water Supplied	105,508 m ³

A review of the available supply capacity and the anticipated growth forecasted for the community indicates that the system has sufficient capacity over the 20 year planning horizon.

Firm Capacity of this system is rated at 709 m³/day. 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 m³/day if necessary to maintain system integrity. This system comprises of three supply wells. Well 3 is removed for Firm Capacity calculations. The remaining Wells 1 and 2 have a capacity of 609 m³/day.

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 October 2022. There were no non-compliance findings and the 2022 Inspection Report Rating was 100%.

6.2 Adverse Results

Any adverse results from bacteriological, 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.

<i>Parameter</i>	<i>Number of Tests</i>	<i>Result Range Min – Max (mg/L)</i>	<i>Average Result (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Nitrite	4	ND – 0.004	0.003	1.0	0.003
Nitrate	4	0.697 – 0.773	0.740	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.

<i>Parameter</i>	<i>Annual Average</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Trihalomethane (THM)	2022	12.9	100	0.37
Haloacetic Acids (HAA)	2022	ND	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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Sodium	August 16, 2021	11.4	20*	0.01
Fluoride	August 16, 2021	0.16	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.

<i>Parameter</i>	<i>Result Range (Min - Max)</i>	<i>Number of Samples</i>	<i>Acceptable Level</i>
Distribution Alkalinity 2022	258 – 262	4	30 – 500mg/L
Distribution pH 2022	7.45 – 7.85	4	6.5 – 8.5
Distribution Lead 2021	0.01 – 0.25	4	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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Antimony	May 30, 2022	ND	6	0.6
Arsenic	May 30, 2022	1.1	10	0.2
Barium	May 30, 2022	167	1000	0.02
Boron	May 30, 2022	32	5000	2
Cadmium	May 30, 2022	0.010	5	0.003
Chromium	May 30, 2022	0.21	50	0.08
Mercury	May 30, 2022	ND	1	0.01
Selenium	May 30, 2022	ND	50	0.04
Uranium	May 30, 2022	0.804	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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Alachlor	June 7, 2021	ND	5	0.02
Atrazine + N-dealkylatedmetabolites	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
2,4-Dichlorophenoxy acetic acid (2,4-D)	June 7, 2021	ND	100	0.19
Diclofop-methyl	June 7, 2021	ND	9	0.40

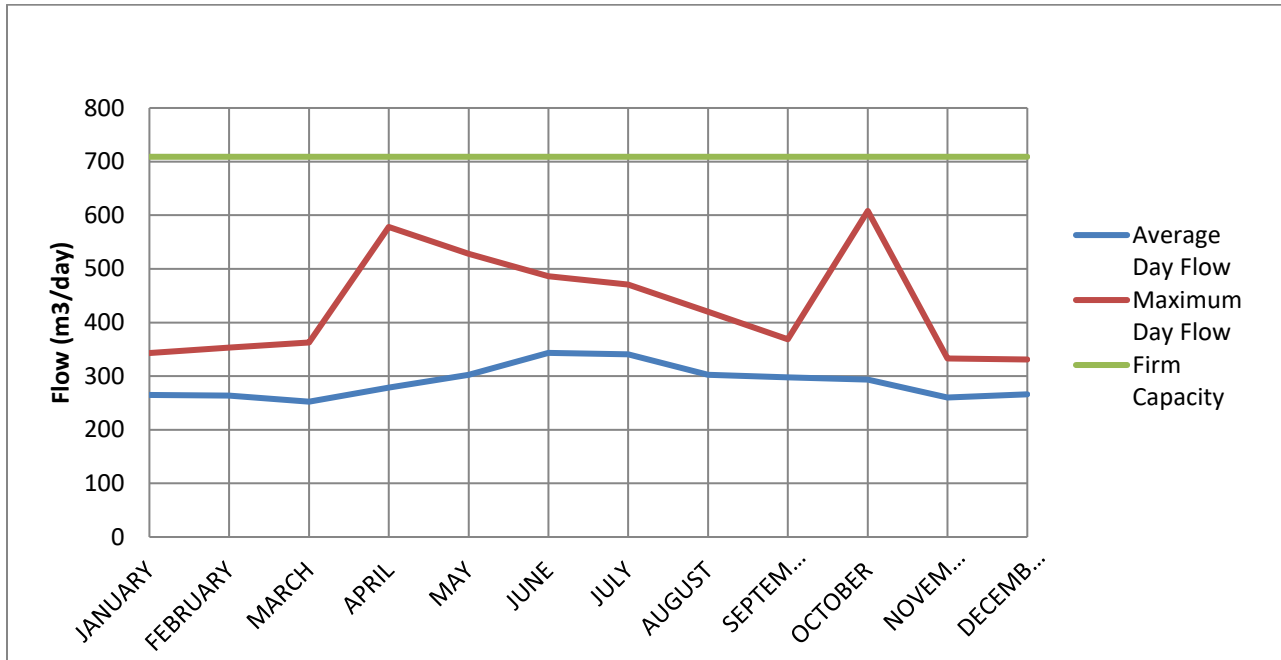
<i>Parameter</i>	<i>Sample Date</i>	<i>Result (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Dimethoate	June 7, 2021	ND	20	0.06
Diquat	June 7, 2021	ND	70	1
Diuron	June 7, 2021	ND	150	0.03
Glyphosate	June 7, 2021	ND	280	1
Malathion	June 7, 2021	ND	190	0.02
2-methyl-4chlorophenoxyacetic acid (MCPA)	June 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

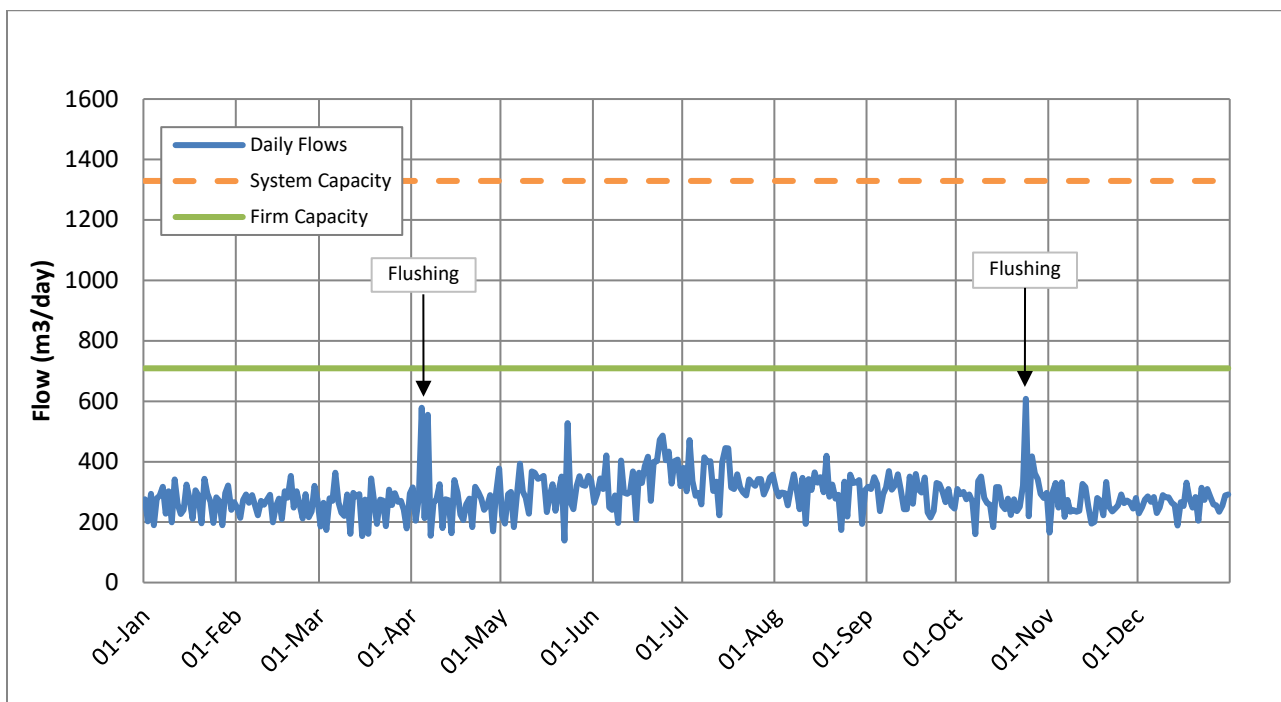
Drumbo-Princeton Drinking Water System Firm Capacity 709 m³/ day

Drumbo-Princeton Drinking Water System Supply Capacity 1,329 m³/ day

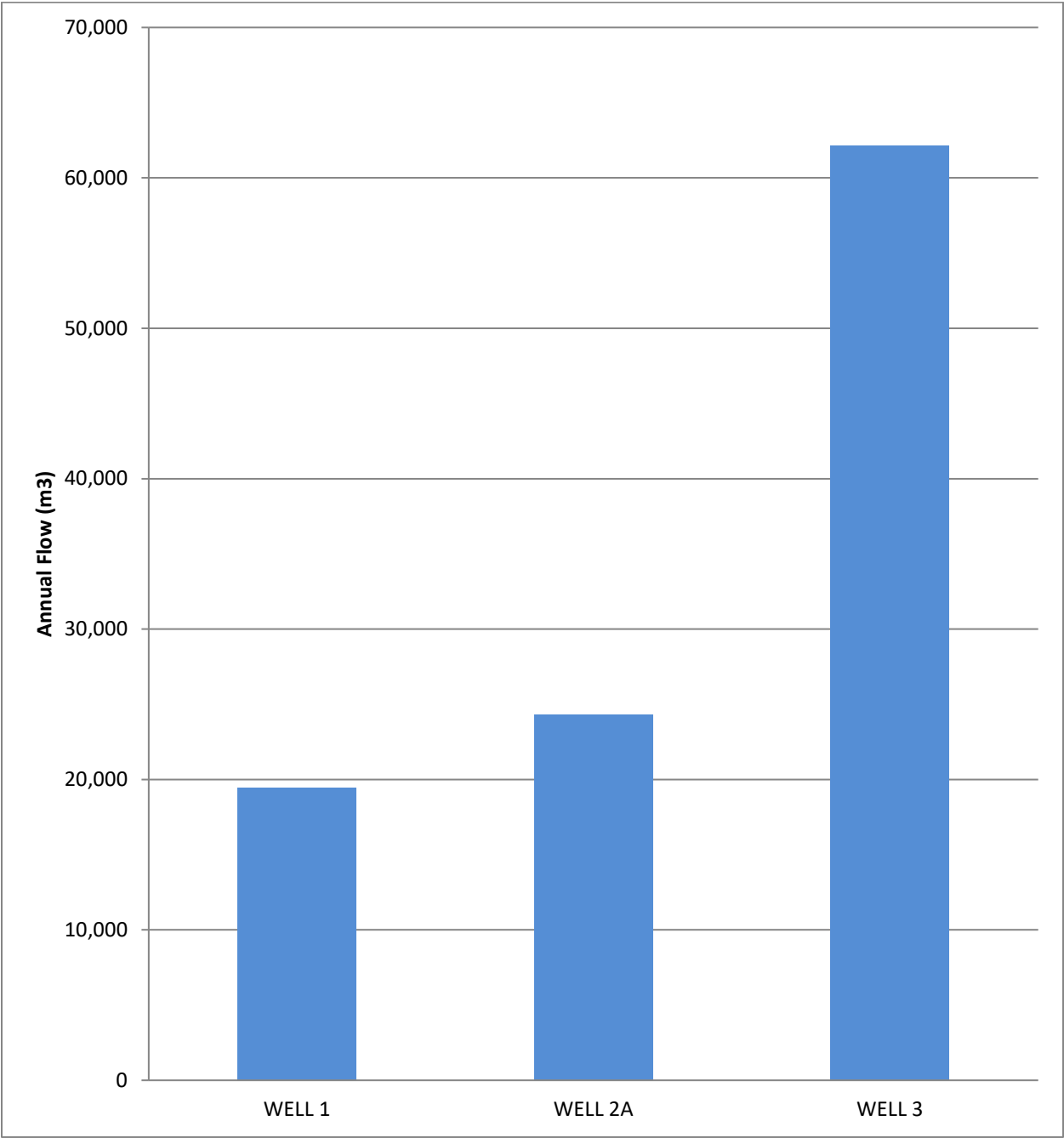
Average vs Maximum Daily Flow Rates



2022 Daily Flow



2022 Total Production by Well



2022 Annual Drinking Water System Summary Report

Embro 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:	Embro Drinking Water System
Drinking Water System Number:	220000665
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 Embro Drinking Water System is a Large Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and serves a population of approximately 996. The system consists of two well sources which are secure groundwater wells. The water is treated by filtration to remove iron and sodium hypochlorite for disinfection.

In 2022, approximately 3,895 L of sodium hypochlorite was used in the water treatment process. The chemical is certified to meet standards set by the Standards Council of Canada or American National Standards Institute.

The treatment facility houses two MD-80 filters, pumps, treatment equipment and a 350 m³ reservoir. A standby generator is available to run the facility in the event of a power failure. 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 Embro 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:

- \$228,000 R&M on Wells, Water Pump stations, and Water Treatment Facilities
- \$940,000 distribution replacements
- \$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 for updated water systems modeling

2. MICROBIOLOGICAL TESTING

2.1 *E. coli* and Total Coliform

Bacteriological tests for *E. coli* and total coliforms are required weekly from the raw and treated water at the facility and from 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 sample 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 on the table below. There were no adverse test results from 210 treated water samples in this reporting period.

	<i>Number of Samples</i>	<i>Range of E. coli Results Min - Max MAC = 0</i>	<i>Range of Total Coliform Results Min - Max MAC = 0</i>
Raw	104	0	0
Treated	52	0	0
Distribution	158	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.

	<i>Number of Samples</i>	<i>Range of HPC Min - Max</i>
Treated	52	0 - 16
Distribution	39	0 - 25

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 and chemical parameters. 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 Embro Drinking Water System is provided below.

3.1 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, the 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 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 maximum measured sodium level in Embro is 24.5 mg/L.

3.2 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 Embro Drinking Water System was tested in 2022 and ranged from 521 - 574 mg/L (30 - 34 grains/gallon).

3.3 Additional Testing Required by MECP

None.

4. OPERATIONAL MONITORING

4.1 Chlorine Residual

Free chlorine levels of the treated water are monitored continuously at the discharge point of the Water Treatment Facility. In the distribution system, free chlorine is checked twice weekly at various locations. 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 below 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.

<i>Parameter</i>	<i>Number of Tests or Monitoring Frequency</i>	<i>Range of Results (Min – Max) and Average</i>
Chlorine residual after treatment (mg/L)	Continuous	(1.09 – 2.31) 1.38
Chlorine residual in distribution (mg/L)	Continuous	(0.56 – 2.13) 1.39
Well 1A turbidity before treatment (NTU)	52	(0.06 – 1.86) 0.47
Well 3turbidity before treatment (NTU)	51	(0.11 – 9.21) 0.92
Turbidity after treatment (NTU)	Continuous	(0.03 – 4) 0.07

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.

<i>Flow Summary</i>	<i>Quantity</i>
Permit to Take Water Limit	917 m ³ /d
Municipal Drinking Water License Limit	916 m ³ /d
2022 Average Daily Flow	219 m ³ /d
2022 Maximum Daily Flow	375 m ³ /d
2022 Average Monthly Flow	6,650 m ³ /d
2022 Total Amount of Water Supplied	80,041 m ³ /d

A review of the available supply capacity and the anticipated growth forecasted for the community indicates that the system has sufficient capacity over the 20 year planning horizon.

Firm Capacity of this system is rated at 1,016 m³/day. 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 m³/day if necessary to maintain system integrity. This system comprises of two supply wells. The MDWL limits pumping rate of either well to 916 m³/day for Firm Capacity calculations.

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 June 2022. There were no non-compliance findings and the 2022 Inspection Report Rating was 100%.

6.2 Adverse Results

Any adverse results from bacteriological, 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.

<i>Parameter</i>	<i>Number of Tests</i>	<i>Result Range Min – Max (mg/L)</i>	<i>Average Result (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Nitrite	4	ND	ND	1.0	0.003
Nitrate	4	0.017 – 0.019	0.018	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.

<i>Parameter</i>	<i>Annual Average</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Trihalomethane (THM)	2022	17.0	100	0.37
Haloacetic Acids (HAA)	2022	7.7	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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Sodium	May 21, 2019	20.2	20*	0.01
Fluoride	August 16, 2021	1.26	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.

<i>Parameter</i>	<i>Result Range (Min - Max)</i>	<i>Number of Samples</i>	<i>Acceptable Level</i>
Distribution Alkalinity 2022	204 – 224	4	30 – 500mg/L
Distribution pH 2022	7.27 – 7.74	4	6.5 – 8.5
Distribution Lead 2021	0.13 – 1.19	4	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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Antimony	May 30, 2022	ND	6	0.6
Arsenic	May 30, 2022	ND	10	0.2
Barium	May 30, 2022	59.7	1000	0.02
Boron	May 30, 2022	87	5000	2
Cadmium	May 30, 2022	ND	5	0.003
Chromium	May 30, 2022	0.15	50	0.08
Mercury	May 30, 2022	ND	1	0.01
Selenium	May 30, 2022	ND	50	0.04
Uranium	May 30, 2022	0.031	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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Alachlor	June 7, 2021	ND	5	0.02
Atrazine + N-dealkylatedmetabolites	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
2,4-Dichlorophenoxy acetic acid (2,4-D)	June 7, 2021	ND	100	0.19
Diclofop-methyl	June 7, 2021	ND	9	0.40

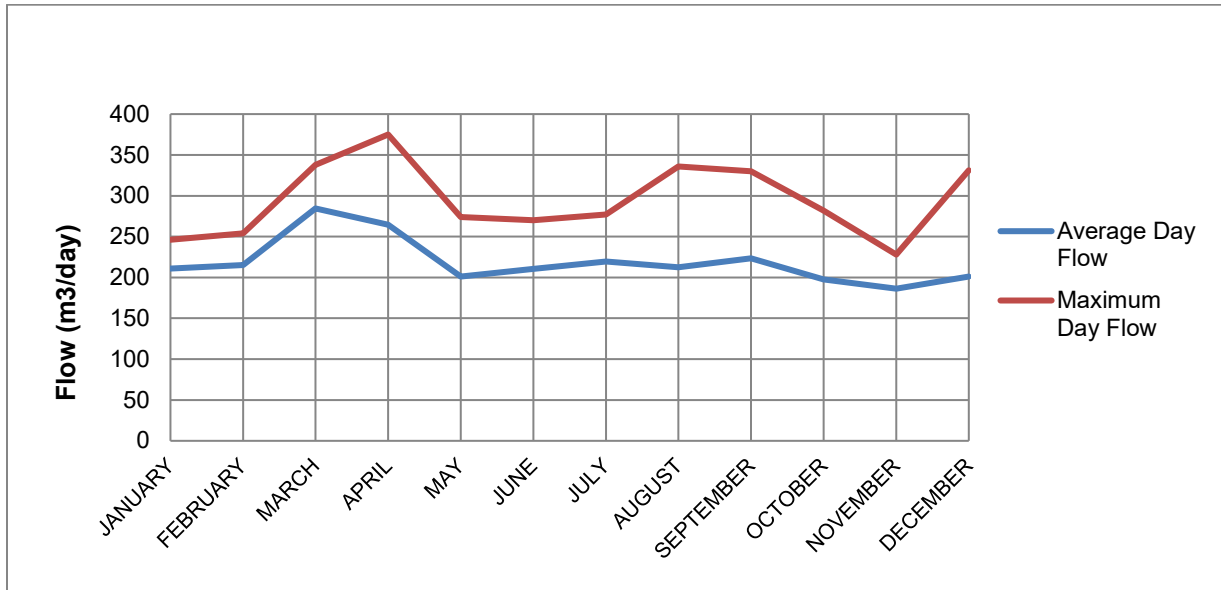
<i>Parameter</i>	<i>Sample Date</i>	<i>Result (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Dimethoate	June 7, 2021	ND	20	0.06
Diquat	June 7, 2021	ND	70	1
Diuron	June 7, 2021	ND	150	0.03
Glyphosate	June 7, 2021	ND	280	1
Malathion	June 7, 2021	ND	190	0.02
2-methyl-4chlorophenoxyacetic acid (MCPA)	June 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

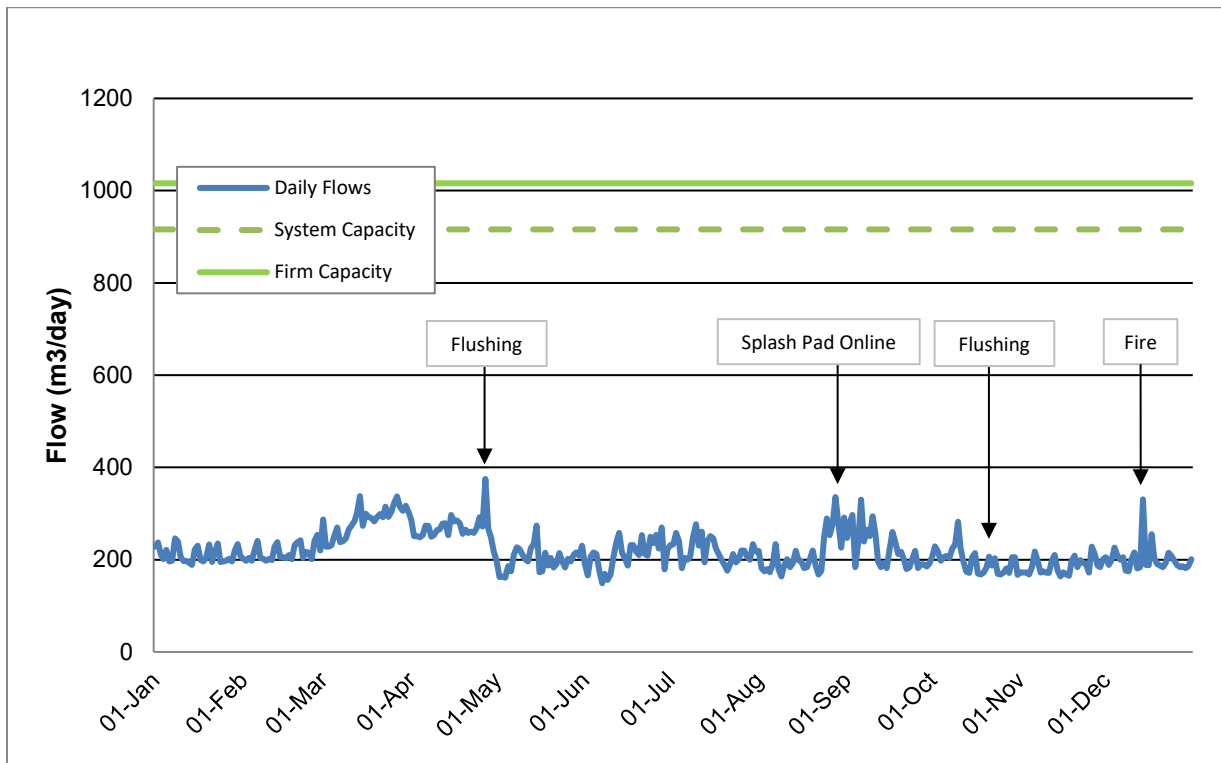
Embro Drinking Water System Firm Capacity 1,016 m³/ day

Embro Drinking Water System Supply Capacity 916 m³/ day

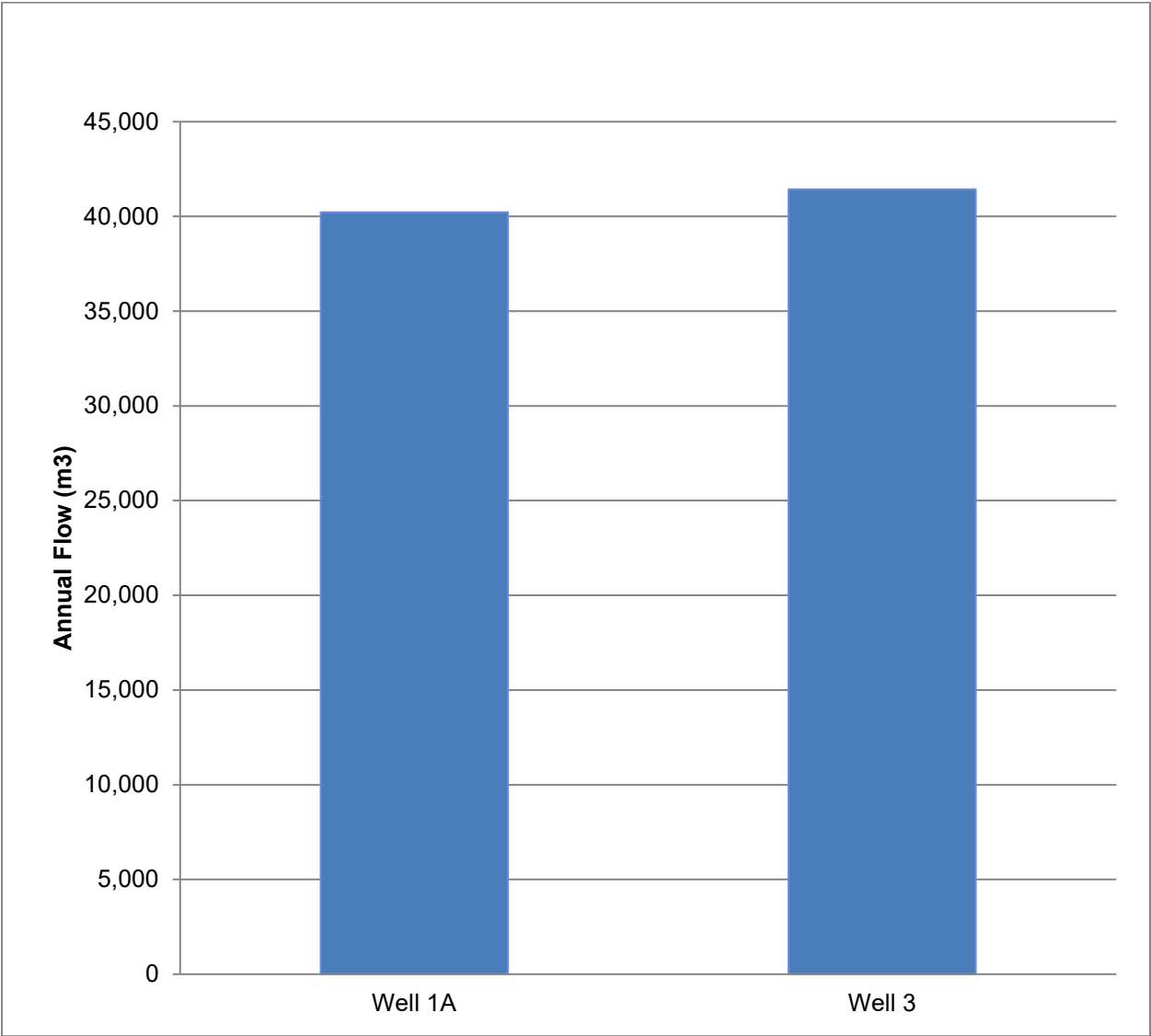
Average vs Maximum Daily Flow Rates



2022 Daily Flow



2022 Total Production by Well



2022 Annual Drinking Water System Summary Report

Hickson 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:	Hickson Drinking Water System
Drinking Water System Number:	2200006124
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 Hickson Drinking Water System is a Small Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and serves a population of approximately 103. The system consists of one well that is secure groundwater and a treatment facility. The water is treated with sodium hypochlorite for disinfection and in 2022 approximately 210 of the chemical was used in the water treatment process. This chemical is certified to meet standards set by the Standards Council of Canada or American National Standards Institute.

The treatment facility houses pumps, monitoring equipment, and a 62 m³ underground reservoir. A standby generator is available to run the facility in the event of a power failure. 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 Hickson 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:

- \$228,000 R&M on Wells, Water Pump stations, and Water Treatment Facilities
- \$940,000 distribution replacements
- \$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 taken weekly from the raw water at the facility and from the distribution system. Samples of treated water are not required for Small Municipal systems but may be taken periodically. 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 on the table below. There were no adverse test results from 106 treated water samples in this reporting period.

	<i>Number of Samples</i>	<i>Range of E. coli Results Min - Max MAC = 0</i>	<i>Range of Total Coliform Results Min - Max MAC = 0</i>
Raw	52	0	0 - 1
Treated	52	0	0
Distribution	54	0	0

2.2 Heterotrophic Plate Count (HPC)

HPC analyses are completed weekly from the distribution water for small systems. 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. The 2022 results are shown in the table below.

	<i>Number of Samples</i>	<i>Range of HPC Min - Max</i>
Distribution	52	0 - 9

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 and chemical parameters. 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 Hickson Drinking Water 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 Hickson Drinking Water System was tested in 2022. The average hardness is 329 mg/L (19 grains/gallon) based on samples collected from 2010-2022.

3.2 Additional Testing Required by MECP

None.

4. OPERATIONAL MONITORING

4.1 Chlorine Residual

Free chlorine levels of the treated water are monitored continuously at the discharge point of the Water Treatment Facility. In the distribution system, free chlorine is checked twice weekly at various locations. 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.

<i>Parameter</i>	<i>Number of Tests or Monitoring Frequency</i>	<i>Range of Results (Min – Max) and Average</i>
Chlorine residual after treatment (mg/L)	Continuous	(0.69 – 2.02) 1.17
Chlorine residual in distribution (mg/L)	106	(0.63 – 1.30) 0.92
Turbidity before treatment (NTU)	52	(0.09 – 0.98) 0.38
Turbidity after treatment (NTU)	Continuous	(0.15 – 3.0) 0.23

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.

<i>Flow Summary</i>	<i>Quantity</i>
Permit to Take Water Limit	300 m ³ /d
Municipal Drinking Water License Limit	389 m ³ /d
2022 Average Daily Flow	21 m
2022 Maximum Daily Flow	50 m
2022 Average Monthly Flow	637 m
2022 Total Amount of Water Supplied	7,646 m

A review of the available supply capacity and the anticipated growth forecasted for the community indicates that the system has sufficient capacity over the 20 year planning horizon.

Firm Capacity of this system is rated at 100 m³/day. 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 m³/day if necessary to maintain system integrity. This system comprises of one supply well. The reservoir capacity is 62 m³/day.

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 99%. There was one non-compliance as the summary of the raw water turbidity results were not stated in the 2021 Annual Report. Raw water turbidity is not a reportable parameter in ground water systems but is checked weekly. The inclusion of raw water turbidity results in the Annual Report has been incorporated for 2022 for all systems moving forward.

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.

<i>Parameter</i>	<i>Number of Tests</i>	<i>Result Range Min – Max (mg/L)</i>	<i>Average Result (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Nitrite	4	ND	ND	1.0	0.003
Nitrate	4	ND – 0.008	< 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.

<i>Parameter</i>	<i>Annual Average</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Trihalomethane (THM)	2022	11.1	100	0.37
Haloacetic Acids (HAA)	2022	6.3	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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Sodium	August 16, 2021	10.9	20*	0.01
Fluoride	August 16, 2021	1.29	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.

<i>Parameter</i>	<i>Result Range (Min - Max)</i>	<i>Number of Samples</i>	<i>Acceptable Level</i>
Distribution Alkalinity 2022	225 – 246	2	30 – 500mg/L
Distribution pH 2022	7.38 – 7.76	2	6.5 – 8.5
Distribution Lead 2021	0.14 – 0.23	2	10 µg/L MAC

The following Table summarizes the most recent test results for Schedule 23. Testing is required every 5 years for secure groundwater wells in small systems.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Antimony	May 21, 2019	ND	6	0.6
Arsenic	May 21, 2019	ND	10	0.2
Barium	May 21, 2019	53.5	1000	0.02
Boron	May 21, 2019	27	5000	2
Cadmium	May 21, 2019	ND	5	0.003
Chromium	May 21, 2019	0.18	50	0.08
Mercury	May 21, 2019	ND	1	0.01
Selenium	May 21, 2019	ND	50	0.04
Uranium	May 21, 2019	0.040	20	0.002

The following Table summarizes the most recent test results for Schedule 24. Testing is required every 5 years for secure groundwater wells in small systems.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Alachlor	June 7, 2021	ND	5	0.02
Atrazine + N-dealkylatedmetabolites	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
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

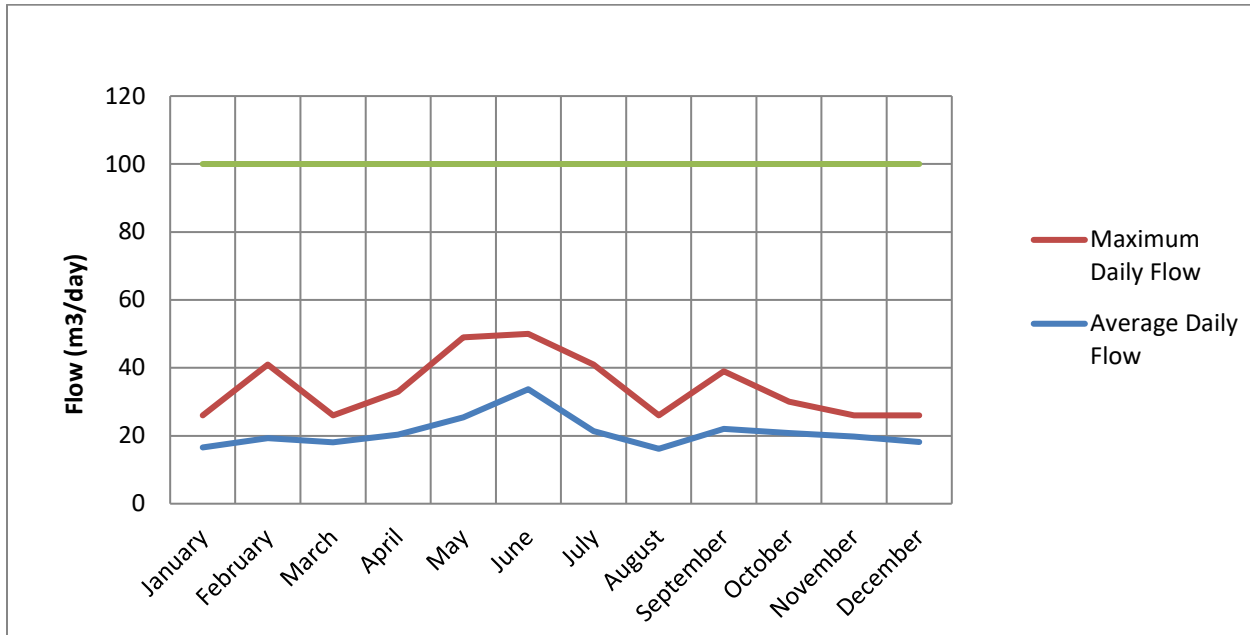
<i>Parameter</i>	<i>Sample Date</i>	<i>Result (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Diuron	June 7, 2021	ND	150	0.03
Glyphosate	June 7, 2021	ND	280	1
Malathion	June 7, 2021	ND	190	0.02
2-Methyl-4-chlorophenoxyacetic acid (MCPA)	June 7, 2021	ND	100	0.12
Metolachlor	June 7, 2021	ND	50	0.01
Metribuzin	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

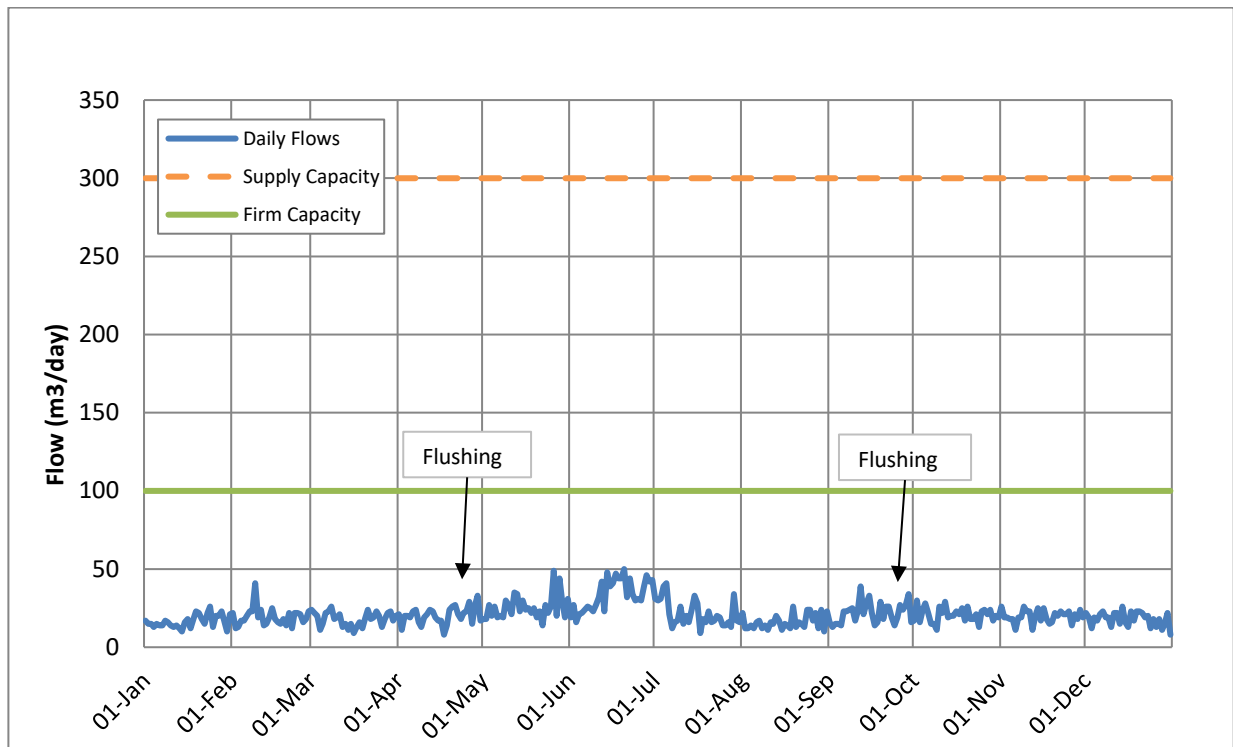
Hickson Drinking Water System Firm Capacity 100 m³/ day

Hickson Drinking Water System Supply Capacity 300 m³/ day

Average vs Maximum Daily Flow Rates



2022 Daily Flow



2022 Annual Drinking Water System Summary Report

Ingersoll 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:	Ingersoll Drinking Water System
Drinking Water System Number:	220000692
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 Ingersoll Drinking Water System is a Large Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and serves a population of approximately 14,065. There are seven secure groundwater wells and Water Treatment Facilities (WTF) serving the Ingersoll systems as follows:

<i>Treatment Facility</i>	<i>Well</i>	<i>Treatment</i>
Merritt St. WTF	2	Oxidation and filtration. Disinfection with chlorine gas.
Hamilton Rd. WTF	3	Oxidation and filtration. Disinfection with sodium hypochlorite and chlorine gas.
Canterbury St. WTF	5	Oxidation and filtration. Disinfection with sodium hypochlorite and chlorine gas.
West St. WTF	7	Not operational in 2022.
Dunn's Rd. WTF	8	Oxidation and filtration. Disinfection with sodium hypochlorite and chlorine gas.
Thompson Rd. WTF	10	Oxidation and filtration. Disinfection with sodium hypochlorite and chlorine gas.
Wallace Line	11	Not operational in 2022

Due to the elevated levels of naturally occurring hydrogen sulphide, the WTF's, with the exception of Wallace Line, have hydrogen sulphide removal equipment consisting of an oxidation and filtration process. The filters also improve the water quality by reducing other parameters such as turbidity and iron.

Each WTF has an in-ground reservoir, automated chlorine injection system, monitoring and alarm equipment, and supplies water directly to the distribution system. In 2022, approximately 166,489 litres of sodium hypochlorite (liquid chlorine) and 952 kg of chlorine gas were used in the water treatment process. Also 1,200 kg of ferric sulfate was used at the Dunn's Rd and Merritt St WTF's to improve filter performance. These chemicals are certified to meet standards set by the Standards Council of Canada or American National Standards Institute.

Storage capacity is provided by a 2,840 m³ water tower and a 3,290 m³ reservoir at the Merritt Street WTF. Standby generators are located at Merritt Street, Thompson Road and Dunn's Road WTF's to provide electrical power to these facilities during power outages.

The system is maintained by licensed water system operators, who operate the treatment and monitoring equipment and collect samples as specified by the Regulations. Microbiological and chemical samples are analyzed at certified laboratories. A SCADA (Supervisory Control and Data Acquisition) system controls the normal operation of the facilities and collects operational data. Alarms automatically notify operators in the event of failure of critical operational requirements.

1.2 Major Expenses

In 2022, the Ingersoll Drinking Water System had forecasted operating and maintenance expenditures of approximately \$2,100,000.

In addition to regular operational and maintenance expenditures, Capital improvement projects for Ingersoll totaled \$5,900,000 for improvements to water treatment systems and replacement of distribution mains in the Ingersoll Drinking Water System.

Town of Ingersoll capital improvement projects included:

- \$3,570,000 Ingersoll storage tower paint and repair
- \$1,200,000 watermain replacements
- \$ 611,000 for water facilities improvements
- \$ 170,000 well rehabilitation and pump replacements
- \$ 160,000 monitoring well installations
- \$ 122,000 cast iron pipe replacements
- \$ 100,000 to update water systems modelling

Capital Improvement projects for all County 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 from the raw and treated water at the facility and from 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 sample 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. There was one adverse test result from 580 treated water samples taken in 2022. The corrective for which is summarized in section 6.2. The results from the 2022 sampling program are shown on the table below.

	<i>Number of Samples</i>	<i>Range of E. coli Results Min - Max MAC = 0</i>	<i>Range of Total Coliform Results Min - Max MAC = 0</i>
Raw	260	0	0 - 1
Treated	263	0	0 - 18
Distribution	317	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.

	<i>Number of Samples</i>	<i>Range of HPC Min - Max</i>
Treated	260	0 - 21
Distribution	67	0 -13

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 and chemical parameters. 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 Ingersoll Drinking Water System is provided below.

3.1 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 the water is 59 mg/L (ranging from 31 to 91 mg/L) and the test results for each treatment facility are provided in Appendix A.

3.2 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 Ingersoll system has naturally occurring fluoride levels averaging 1.8 mg/L (ranging from 0.8 to 2.4 mg/L). The test results for each treatment facility are provided in Appendix A.

3.3 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. Raw water hardness for the Ingersoll Drinking Water System was tested in 2022 and ranged from 355 - 495 mg/L (21 – 30 grains/gallon). Water in the Ingersoll System is considered very hard (>180 mg/L).

3.4 Additional Testing Required by MECP

Additional testing for Sulfides is required annually for the Ingersoll Drinking Water System to monitor levels under the MDWL. The results are summarized in the table below.

<i>Water Treatment Facility</i>	<i>Date Sampled</i>	<i>Result Raw Water</i>	<i>Result Treated Water</i>	<i>Aesthetic Objective (mg/L)</i>	<i>MDL (mg/L)</i>
Merritt St.	November 21, 2022	0.098	0.006	0.050	0.006
Hamilton Rd.	November 21, 2022	4.070	0.006	0.050	0.006
Canterbury St.	November 21, 2022	0.029	0.006	0.050	0.006
Dunn's Rd.	November 21, 2022	2.980	0.007	0.050	0.006
Thompson Rd.	November 21, 2022	0.188	0.008	0.050	0.006

4. OPERATIONAL MONITORING

4.1 Chlorine Residual

Free chlorine levels of the treated water are monitored continuously at the discharge point of the Water Treatment Facility. In the distribution system, free chlorine is checked twice weekly at various locations. 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 below 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.

<i>Parameter</i>	<i>Number of Tests or Monitoring Frequency</i>	<i>Range of Results (Min – Max) and Average</i>
Merritt St. WTF, Well 2		
Chlorine residual after treatment (mg/L)	Continuous	(0.54 – 2.64) 1.28
Turbidity before treatment (NTU)	52	(0.13 – 0.78) 0.35
Turbidity after treatment (NTU)	Continuous	(0.07 – 6.78) 0.48
Hamilton Rd. WTF, Well 3		
Chlorine residual after treatment (mg/L)	Continuous	(0.39 – 2.45) 1.38
Turbidity before treatment (NTU)	52	(0.10 – 1.26) 0.41
Turbidity after treatment (NTU)	Continuous	(0.04 – 4.00) 0.17
Canterbury St. WTF, Well 5		
Chlorine residual after treatment (mg/L)	Continuous	(0.74 – 3.54) 1.46
Turbidity before treatment (NTU)	52	(0.08 – 2.10) 0.75
Turbidity after treatment (NTU)	Continuous	(0.04 – 2.83) 0.10
Dunn's Rd. WTF, Well 8		
Chlorine residual after treatment (mg/L)	Continuous	(0.66 – 2.08) 1.35
Turbidity before treatment (NTU)	52	(0.13 – 1.45) 0.46
Turbidity after treatment (NTU)	Continuous	(0.04 – 2.98) 0.08
Thompson Rd. WTF, Well 10		
Chlorine residual after treatment (mg/L)	Continuous	(0.79 – 2.91) 1.51
Turbidity before treatment (NTU)	52	(0.13 – 0.74) 0.26
Turbidity after treatment (NTU)	Continuous	(0.04 – 3.58) 0.14

<i>Parameter</i>	<i>Number of Tests or Monitoring Frequency</i>	<i>Range of Results (Min – Max) and Average</i>
Distribution System		
Chlorine residual in distribution (mg/L)	Continuous	(0.25 - 2.61) 1.11

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.

<i>Flow Summary</i>	<i>Quantity</i>
Permit to Take Water Limit	26,413 m ³ /d
Municipal Drinking Water License Limit	26,521 m ³ /d
2022 Average Daily Flow	4,162 m ³ /d
2022 Maximum Daily Flow	5,944 m ³ /d
2022 Average Monthly Flow	126,532 m ³
2022 Total Amount of Water Supplied	1,518,386 m ³

A review of the available supply capacity and the anticipated growth forecasted for the community indicates that the system has sufficient capacity over the 20 year planning horizon.

Firm Capacity of this system is rated at 10,454 m³/day. Firm Capacity is defined as the removal of the highest producing well in an emergency or operational / maintenance situation. This system comprises of seven supply wells with only five active wells. Wells 2, 3, 5 and 8 were used to calculate Firm Capacity.

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 November 2022. At the time this report was written the inspection report findings and rating were not available.

6.2 Adverse Results

Any adverse results from bacteriological, chemical samples or observations of operational conditions that indicate adverse water quality are reported as required and corrective actions are taken. There was one adverse treated water sample collected in 2022.

A bacteriological sample result taken from the Hamilton Road Water Treatment Facility on July 25, 2022 was found to have total coliforms of 18 cfu/100 mL. The result was reported to the MECP and MOH. Resamples were collected at the site and two downstream locations and all re-sampled were determined to be acceptable by ODWS levels.

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.

<i>Parameter & Location</i>	<i>Number of Tests</i>	<i>Result Range Min – Max (mg/L)</i>	<i>Average Result (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Nitrite					
Merritt St.	4	ND	ND	1.0	0.003
Hamilton Rd.	4	ND	ND	1.0	0.003
Canterbury St.	4	ND	ND	1.0	0.003
Dunn’s Rd.	4	ND	ND	1.0	0.003
Thompson Rd.	4	ND	ND	1.0	0.003
Nitrate					
Merritt St.	4	0.006 – 0.007	0.007	10.0	0.006
Hamilton Rd.	4	ND – 0.009	0.007	10.0	0.006
Canterbury St.	4	0.009 – 0.011	0.010	10.0	0.006
Dunn’s Rd.	4	0.007 – 0.009	0.008	10.0	0.006
Thompson Rd.	4	ND – 0.007	0.006	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.

<i>Parameter</i>	<i>Annual Average</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Trihalomethane (THM)	2022	20.0	100	0.37
Haloacetic Acids (HAA)	2022	5.2	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.

<i>Parameter & Location</i>	<i>Sample Date</i>	<i>Result Value (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Sodium				
Merritt St.	July 10, 2019	51.4	20*	0.01
Hamilton Rd.	June 5, 2019	47.9	20*	0.01
Canterbury St.	June 3, 2019	55.2	20*	0.01
Dunn's Rd.	June 3, 2019	61.2	20*	0.01
Thompson Rd.	June 3, 2019	45.5	20*	0.01
Fluoride				
Merritt St.	July 10, 2019	2.12	1.5**	0.06
Hamilton Rd.	May 27, 2019	0.77	1.5**	0.06
Canterbury St.	June 3, 2019	1.50	1.5**	0.06
Dunn's Rd.	June 3, 2019	1.96	1.5**	0.06
Thompson Rd.	June 3, 2019	1.57	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.

<i>Parameter</i>	<i>Result Range (Min - Max)</i>	<i>Number of Samples</i>	<i>Acceptable Level</i>
Distribution Alkalinity 2022	203 – 243	8	30 – 500mg/L
Distribution pH 2022	7.06 – 7.74	8	6.5 – 8.5
Distribution Lead 2021	ND – 0.57	8	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.

<i>Parameter</i>	<i>Result Value (µg/L)</i>					<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
	<i>Merritt St. WTF May 30, 2022</i>	<i>Hamilton Rd. WTF May 30, 2022</i>	<i>Canterbury St. WTF May 30, 2022</i>	<i>Dunn's Rd. WTF May 30, 2022</i>	<i>Thompson Rd. WTF May 30, 2022</i>		
Antimony	ND	ND	ND	ND	ND	6	0.6
Arsenic	ND	ND	0.3	ND	ND	10	0.2
Barium	45.3	114	67.4	25.8	71.8	1000	0.02
Boron	124	93	75	167	104	5000	2
Cadmium	ND	ND	ND	ND	ND	5	0.003
Chromium	0.14	0.17	0.17	0.26	0.15	50	0.08
Mercury	ND	ND	ND	ND	ND	1	0.01
Selenium	ND	ND	ND	ND	ND	50	0.04
Uranium	0.047	0.078	0.384	0.029	0.142	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	Result Value (µg/L)					MAC (µg/L)	MDL (µg/L)
	Merritt St. WTF Aug. 16, 2021	Hamilton Rd. WTF June 7, 2021	Canterbury St. WTF May 20, 2021	Dunn's Rd WTF June 7, 2021	Thompson Rd WTF June 7, 2021		
Alachlor	ND	ND	ND	ND	ND	5	0.02
Atrazine + N-dealkylatedmetabolites	ND	ND	ND	ND	ND	5	0.01
Azinphos-methyl	ND	ND	ND	ND	..ND	20	0.05
Benzene	ND	ND	ND	ND	ND	1	0.32
Benzo(a)pyrene	ND	ND	ND	ND	ND	0.01	0.004
Bromoxynil	ND	ND	ND	ND	ND	5	0.33
Carbaryl	ND	ND	ND	ND	ND	90	0.05
Carbofuran	ND	ND	ND	ND	ND	90	0.01
Carbon Tetrachloride	ND	ND	ND	ND	ND	2	0.17
Chlorpyrifos	ND	ND	ND	ND	ND	90	0.02
Chlorpyrifos	ND	ND	ND	ND	ND	90	0.02
Diazinon	ND	ND	ND	ND	ND	20	0.02
Dicamba	ND	ND	ND	ND	ND	120	0.20
1,2-Dichlorobenzene	ND	ND	ND	ND	ND	200	0.41
1,4-Dichlorobenzene	ND	ND	ND	ND	ND	5	0.36
1,2-Dichloroethane	ND	ND	ND	ND	ND	5	0.35
1,1-Dichloroethylene (vinylidene chloride)	ND	ND	ND	ND	ND	14	0.33
Dichloromethane	ND	ND	ND	ND	ND	50	0.35
2-4 Dichlorophenol	ND	ND	ND	ND	ND	900	0.15
2,4-Dichlorophenoxy acetic acid (2,4-D)	ND	ND	ND	ND	ND	100	0.19
Diclofop-methyl	ND	ND	ND	ND	ND	9	0.40
Dimethoate	ND	ND	ND	ND	ND	20	0.06
Diquat	ND	ND	ND	ND	ND	70	1
Diuron	ND	ND	ND	ND	ND	150	0.03
Glyphosate	ND	ND	ND	ND	ND	280	1
Malathion	ND	ND	ND	ND	ND	190	0.02
2-methyl-4chlorophenoxyacetic acid (MCPA)	ND	ND	ND	ND	ND	100	0.12
Metolachlor	ND	ND	ND	ND	ND	50	0.01
Metribuzin	ND	ND	ND	ND	ND	80	0.02
Monochlorobenzene	ND	ND	ND	ND	ND	80	0.30
Paraquat	ND	ND	ND	ND	ND	10	1
Pentachlorophenol	ND	ND	ND	ND	ND	60	0.15
Phorate	ND	ND	ND	ND	ND	2	0.01
Picloram	ND	ND	ND	ND	ND	190	1
Polychlorinated Biphenyls(PCB)	ND	ND	ND	ND	ND	3	0.04
Prometryne	ND	ND	ND	ND	ND	1	0.03
Simazine	ND	ND	ND	ND	ND	10	0.01
Terbufos	ND	ND	ND	ND	ND	1	0.01
Tetrachloroethylene	ND	ND	ND	ND	ND	10	0.35

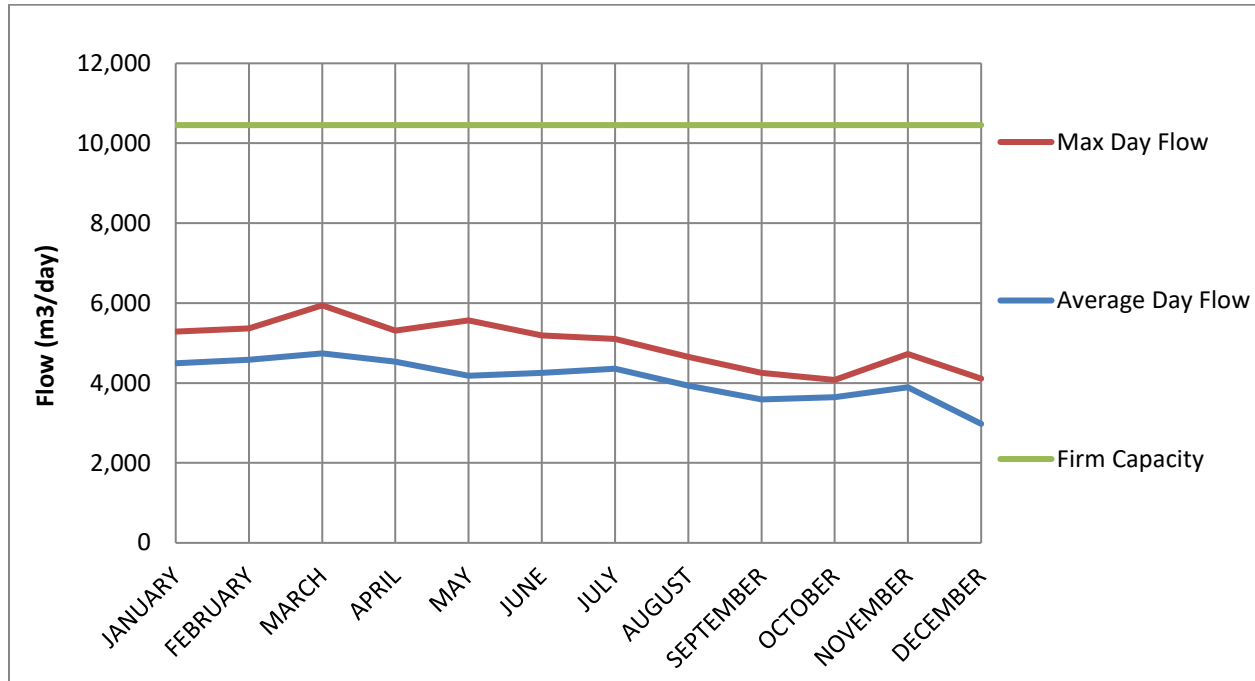
<i>Parameter</i>	<i>Result Value (µg/L)</i>					<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
	<i>Merritt St. WTF Aug. 16, 2021</i>	<i>Hamilton Rd. WTF June 7, 2021</i>	<i>Canterbury St. WTF May 20, 2021</i>	<i>Dunn's Rd WTF June 7, 2021</i>	<i>Thompson Rd WTF June 7, 2021</i>		
2,3,4,6-Tetrachlorophenol	ND	ND	ND	ND	ND	100	0.20
Triallate	ND	ND	ND	ND	ND	230	0.01
Trichloroethylene	ND	ND	ND	ND	ND	5	0.44
2,4,6-Trichlorophenol	ND	ND	ND	ND	ND	5	0.25
Trifluralin	ND	ND	ND	ND	ND	45	0.02
Vinyl Chloride	ND	ND	ND	ND	ND	1	0.17

APPENDIX B: WATER QUANTITY SUMMARY

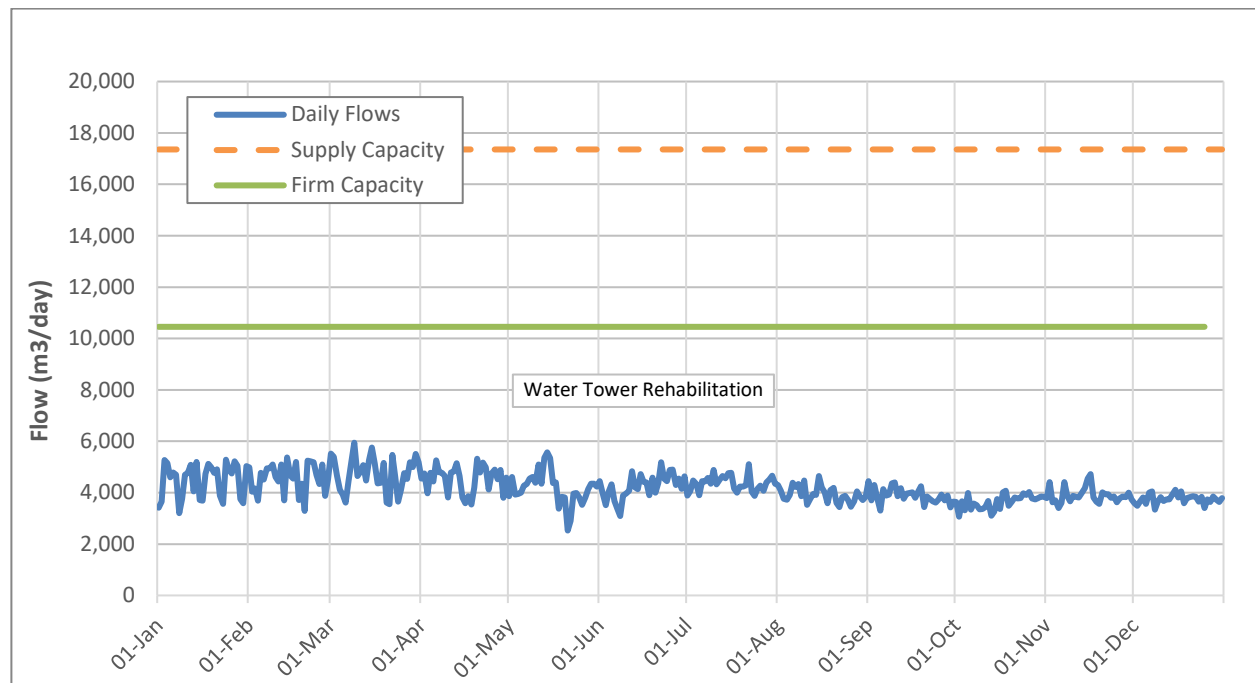
Ingersoll Drinking Water System Firm Capacity 10,454 m³/ day

Ingersoll Drinking Water System Supply Capacity 17,357 m³/ day

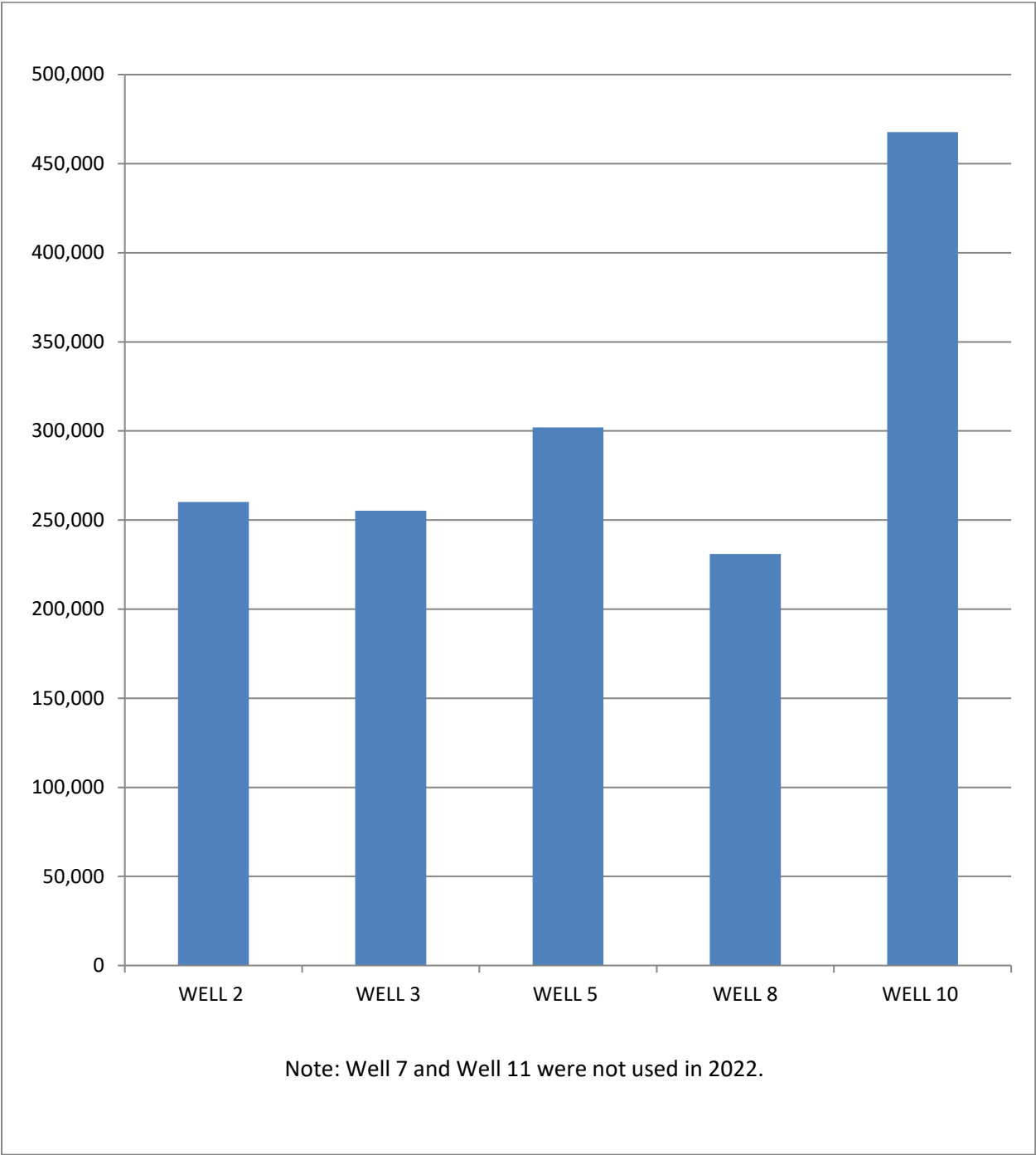
2022 Average vs Maximum Daily Flow Rates



2022 Daily Flow



2022 Total Production by Well



2022 Annual Drinking Water System Summary Report

Innerkip 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:	Innerkip Drinking Water System
Drinking Water System Number:	260046995
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 Innerkip Drinking Water System is a Large Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and serves a population of approximately 1,596. The system consists of two well sources which are secure groundwater wells. The water is filtered to remove iron and manganese. Sodium hypochlorite is added as an oxidant and for disinfection.

In 2022, approximately 8,195L of sodium hypochlorite was used in the water treatment process. This chemical is certified to meet standards set by the Standards Council of Canada or American National Standards Institute.

The treatment facility houses filters, high lift pumps, monitoring equipment, and a 700 m³ storage standpipe. There is a retention lagoon for backwash water from the filters which discharges to a tributary of the Thames River. A standby generator is available to run the facility in the event of a power failure. 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 Innerkip 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:

- \$228,000 R&M on Wells, Water Pump stations, and Water Treatment Facilities
- \$940,000 distribution replacements
- \$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 from the raw and treated water at the facility and from 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 sample 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 on the table below. There were no adverse test results from 208 treated water samples in this reporting period.

	<i>Number of Samples</i>	<i>Range of E. coli Results Min - Max MAC = 0</i>	<i>Range of Total Coliform Results Min - Max MAC = 0</i>
Raw	104	0	0
Treated	52	0	0
Distribution	156	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.

	<i>Number of Samples</i>	<i>Range of HPC Min - Max</i>
Treated	52	0 – 6
Distribution	42	0 – 3

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 and chemical parameters. 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 Innerkip Drinking Water 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 Innerkip Drinking Water System was tested in 2022 and ranged from 929 - 1,670 mg/L (54 - 98 grains/gallon).

3.2 Additional Testing Required by MECP

Testing of the lagoon backwash discharge is required for the Innerkip Drinking Water System under the MDWL. A summary of the monitoring results for 2022 is below.

<i>Parameter</i>	<i>Result Range (Min–Max) mg/L</i>	<i>Average mg/L</i>	<i>Number of Samples</i>	<i>Limit</i>	<i>MDL (mg/L)</i>
Suspended Solids from lagoon backwash discharge	(2 – 38)	13	52	25 mg/L Annual Average	2.0

4. OPERATIONAL MONITORING

4.1 Chlorine Residual

Free chlorine levels of the treated water are monitored continuously at the discharge point of the Water Treatment Facility. In the distribution system, free chlorine is checked twice weekly at various locations. 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 below 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.

<i>Parameter</i>	<i>Number of Tests or Monitoring Frequency</i>	<i>Range of Results (Min – Max) and Average</i>
Chlorine residual after treatment (mg/L)	Continuous	(0.66 – 2.283) 1.44
Chlorine residual in distribution (mg/L)	Continuous	(0.52 – 1.97) 1.20
Well 1 turbidity before treatment (NTU)	51	(0.15 – 6.31) 0.98
Well 2 turbidity before treatment (NTU)	52	(0.11 – 4.16) 0.67
Turbidity after treatment (NTU)	Continuous	(0.04 – 4.0) 0.08

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.

<i>Flow Summary</i>	<i>Quantity</i>
Permit to Take Water Limit	1,728 m ³ /d
Municipal Drinking Water License Limit	1,296 m ³ /d
2022 Average Daily Flow	358 m ³
2022 Maximum Daily Flow	571 m ³
2022 Average Monthly Flow	10,884 m ³
2022 Total Amount of Water Supplied	130,602 m ³

A review of the available supply capacity and the anticipated growth forecasted for the community indicates that the system has sufficient capacity over the 20 year planning horizon.

Firm Capacity of this system is rated at 1,296 m³/day. Firm Capacity is defined as the removal of the highest producing well in an emergency or operational / maintenance. This system comprises of two supply wells. MDWL Limits pumping rate to 1,296 m³/day for Firm Capacity calculations.

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 September 2022. There were no non-compliance findings and the 2022 Inspection Report Rating was 100%.

6.2 Adverse Results

Any adverse results from bacteriological, 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.

<i>Parameter</i>	<i>Number of Tests</i>	<i>Result Range Min – Max (mg/L)</i>	<i>Average Result (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Nitrite	4	ND	ND	1.0	0.003
Nitrate	4	0.044 – 0.056	0.051	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.

<i>Parameter</i>	<i>Annual Average</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Trihalomethane (THM)	2022	17	100	0.37
Haloacetic Acids (HAA)	2022	10.6	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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Sodium	August 16, 2021	17.7	20*	0.01
Fluoride	February 18, 2020	0.74	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.

<i>Parameter</i>	<i>Result Range (Min - Max)</i>	<i>Number of Samples</i>	<i>Acceptable Level</i>
Distribution Alkalinity 2022	225 – 240	4	30 – 500mg/L
Distribution pH 2022	7.02 – 7.49	4	6.5 – 8.5
Distribution Lead 2021	ND – 0.02	4	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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Antimony	February 18, 2020	0.09	6	0.6
Arsenic	February 18, 2020	ND	10	0.2
Barium	February 18, 2020	72.5	1000	0.02
Boron	February 18, 2020	102	5000	2
Cadmium	February 18, 2020	0.007	5	0.003
Chromium	February 18, 2020	0.12	50	0.08
Mercury	February 18, 2020	ND	1	0.01
Selenium	February 18, 2020	ND	50	0.04
Uranium	February 18, 2020	0.697	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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Alachlor	February 18, 2020	ND	5	0.02
Atrazine + N-dealkylatedmetabolites	February 18, 2020	ND	5	0.01
Azinphos-methyl	February 18, 2020	ND	20	0.05
Benzene	February 18, 2020	ND	1	0.32
Benzo(a)pyrene	February 18, 2020	ND	0.01	0.004
Bromoxynil	February 18, 2020	ND	5	0.33
Carbaryl	February 18, 2020	ND	90	0.05
Carbofuran	February 18, 2020	ND	90	0.01
Carbon Tetrachloride	February 18, 2020	ND	2	0.17
Chlorpyrifos	February 18, 2020	ND	90	0.02
Chlorpyrifos	February 18, 2020	ND	90	0.02
Diazinon	February 18, 2020	ND	20	0.02
Dicamba	February 18, 2020	ND	120	0.20
1,2-Dichlorobenzene	February 18, 2020	ND	200	0.41
1,4-Dichlorobenzene	February 18, 2020	ND	5	0.36
1,2-Dichloroethane	February 18, 2020	ND	5	0.35
1,1-Dichloroethylene (vinylidene chloride)	February 18, 2020	ND	14	0.33
Dichloromethane	February 18, 2020	ND	50	0.35
2-4 Dichlorophenol	February 18, 2020	ND	900	0.15
2,4-Dichlorophenoxy acetic acid (2,4-D)	February 18, 2020	ND	100	0.19
Diclofop-methyl	February 18, 2020	ND	9	0.40

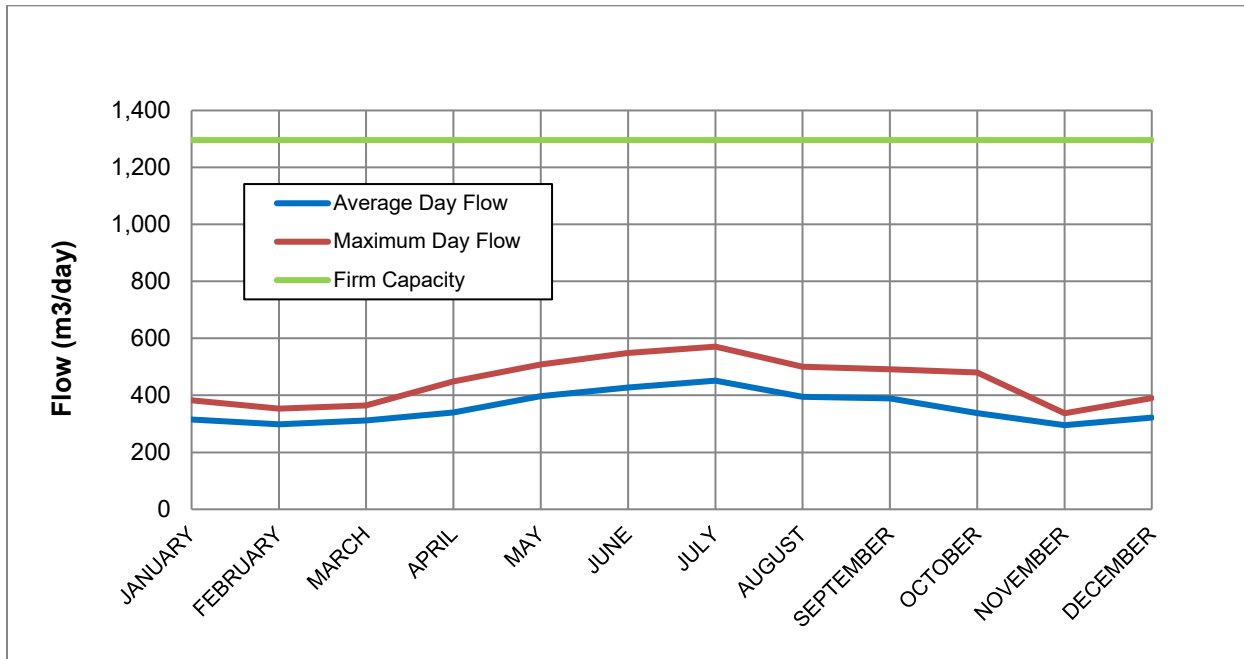
<i>Parameter</i>	<i>Sample Date</i>	<i>Result (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Dimethoate	February 18, 2020	ND	20	0.06
Diquat	February 18, 2020	ND	70	1
Diuron	February 18, 2020	ND	150	0.03
Glyphosate	February 18, 2020	ND	280	1
Malathion	February 18, 2020	ND	190	0.02
2-methyl-4chlorophenoxyacetic acid (MCPA)	February 18, 2020	ND	100	0.12
Metolachlor	February 18, 2020	ND	50	0.01
Metribuzin	February 18, 2020	ND	80	0.02
Monochlorobenzene	February 18, 2020	ND	80	0.30
Paraquat	February 18, 2020	ND	10	1
Pentachlorophenol	February 18, 2020	ND	60	0.15
Phorate	February 18, 2020	ND	2	0.01
Picloram	February 18, 2020	ND	190	1
Polychlorinated Biphenyls(PCB)	February 18, 2020	ND	3	0.04
Prometryne	February 18, 2020	ND	1	0.03
Simazine	February 18, 2020	ND	10	0.01
Terbufos	February 18, 2020	ND	1	0.01
Tetrachloroethylene	February 18, 2020	ND	10	0.35
2,3,4,6-Tetrachlorophenol	February 18, 2020	ND	100	0.20
Triallate	February 18, 2020	ND	230	0.01
Trichloroethylene	February 18, 2020	ND	5	0.44
2,4,6-Trichlorophenol	February 18, 2020	ND	5	0.25
Trifluralin	February 18, 2020	ND	45	0.02
Vinyl Chloride	February 18, 2020	ND	1	0.17

APPENDIX B: WATER QUANTITY SUMMARY

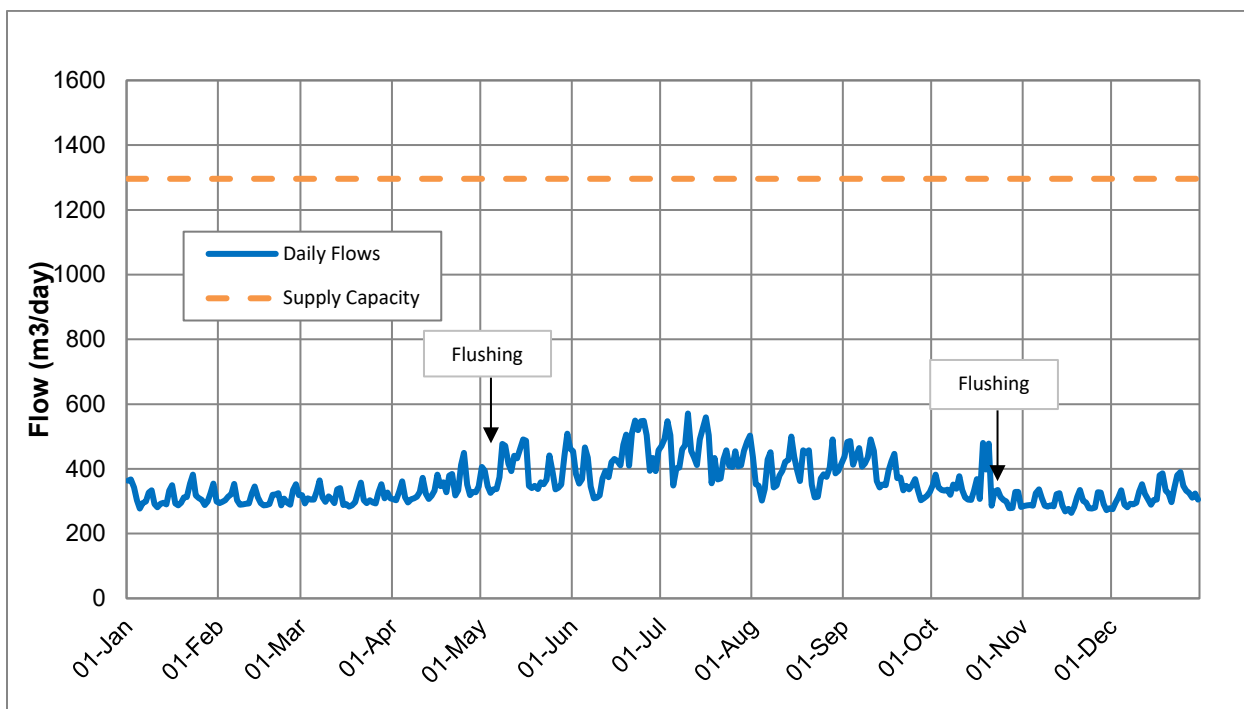
Innerkip Drinking Water System Firm Capacity 1,296 m³/ day

Innerkip Drinking Water System Supply Capacity 1,296 m³/ day

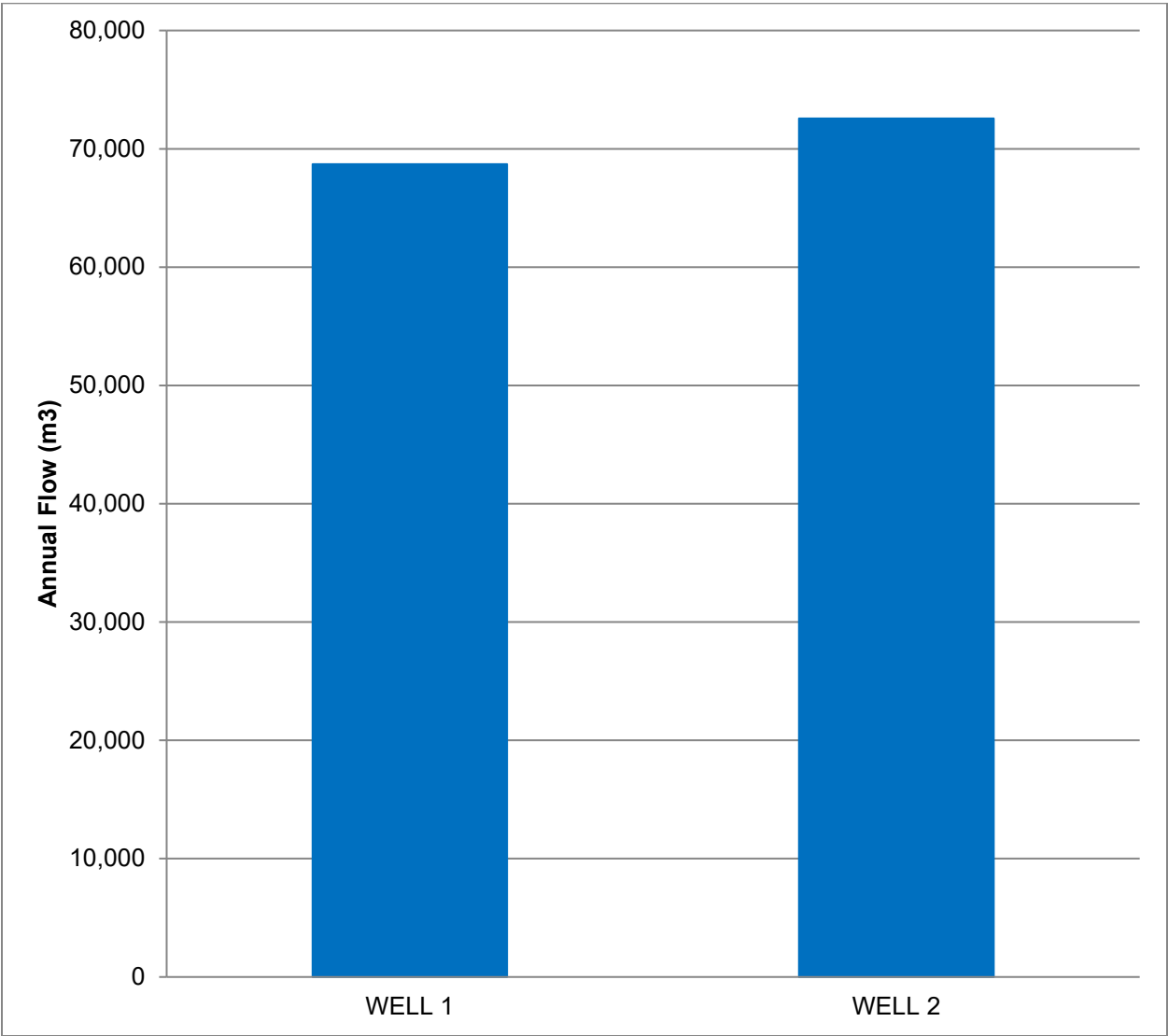
Average vs Maximum Daily Flow Rates



2022 Daily Flow



2022 Total Production by Well



2022 Annual Drinking Water System Summary Report

Lakeside 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:	Lakeside Drinking Water System
Drinking Water System Number:	220007533
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 Lakeside Drinking Water System is a Large Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and serves a population of approximately 490. The system consists of one groundwater well with treatment that consists of disinfection with sodium hypochlorite and sodium silicate to sequester iron.

In 2022, approximately 505 L of sodium hypochlorite and 314 L of sodium silicate were used in the water treatment process. The chemical is certified to meet standards set by the Standards Council of Canada or American National Standards Institute.

The treatment facility houses high lift pumps, monitoring equipment and a 150 m³ water standpipe to provide storage. A standby generator is available to run the facility in the event of a power failure. 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 Lakeside 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:

- \$228,000 R&M on Wells, Water Pump stations, and Water Treatment Facilities
- \$940,000 distribution replacements
- \$225,000 for facilities improvements

Capital Improvement projects for all systems included:

- \$625,000 to develop Countywide SCADA Master Plan for all water system
- \$150,000 to undertake a County Wide Water and Wastewater Master Plan

2. MICROBIOLOGICAL TESTING

2.1 *E. coli* and Total Coliform

Bacteriological tests for *E. coli* and total coliforms are required weekly from the raw and treated water at the facility and from 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 sample 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 on the table below. There were no adverse test results from 158 treated water samples in this reporting period.

	<i>Number of Samples</i>	<i>Range of E. coli Results Min - Max MAC = 0</i>	<i>Range of Total Coliform Results Min - Max MAC = 0</i>
Raw	52	0	0
Treated	52	0	0
Distribution	106	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.

	<i>Number of Samples</i>	<i>Range of HPC Min - Max</i>
Treated	52	0 - 4
Distribution	27	0 - 4

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 and chemical parameters. 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 Lakeside Drinking Water System is provided below.

3.1 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.

Oxford County does not add fluoride to the water at any of its drinking water systems however the Lakeside system has naturally occurring fluoride levels of 1.65 mg/L.

3.2 Hardness and Iron

These are aesthetic parameters that may affect the appearance of the water but are 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, improve the efficiency of soaps and reduce iron levels. This information is included here to help set the water softener at the level recommended by the manufacturer. In Lakeside, chemicals are used to keep iron in suspension. Samples for hardness are collected at a minimum every 3 years from raw or treated water. The Hardness for the Lakeside Drinking Water System was tested in 2022. The average hardness is 231 mg/L (14 grains/gallon) based on samples collected from 2010 to 2022.

- The average iron level in 2022 was 0.42 mg/L (ppm)

3.3 Additional Testing Required by MECP

None.

4. OPERATIONAL MONITORING

4.1 Chlorine Residual

Free chlorine levels of the treated water are monitored continuously at the discharge point of the Water Treatment Facility. In the distribution system, free chlorine is checked twice weekly at various locations. 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 below 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.

<i>Parameter</i>	<i>Number of Tests or Monitoring Frequency</i>	<i>Range of Results (Min – Max) and Average</i>
Chlorine residual after treatment (mg/L)	Continuous	(0.25 – 3.23) 1.44
Chlorine residual in distribution (mg/L)	365	(0.82 – 1.97) 1.37
Well 2 turbidity before treatment (NTU)	52	(0.10 – 2.60) 0.52
Turbidity after treatment (NTU)	Continuous	(0.04 – 4.0) 0.08

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.

<i>Flow Summary</i>	<i>Quantity</i>
Permit to Take Water Limit	270 m ³ /d
Municipal Drinking Water License Limit	432 m ³ /d
2022 Average Daily Flow	38 m ³
2022 Maximum Daily Flow	102 m ³
2022 Average Monthly Flow	1,182 m ³
2022 Total Amount of Water Supplied	14,180 m ³

Firm Capacity of this system is rated at 100 m³/day. 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 m³/day to maintain system integrity. Since this system comprises of only one supply well Firm Capacity restricts further growth.

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 three non-compliances findings and the 2022 Inspection Report Rating was 95%.

- A non-compliance was issued as the summary of the raw water turbidity results were not stated in the 2021 Annual Report. Raw water turbidity is not a reportable parameter in groundwater systems but is checked weekly by Water

Services staff. The inclusion of raw water turbidity results in the Annual Report has been incorporated for 2022 for all County drinking water systems moving forward.

- Two non-compliances for the Lakeside drinking water system were noted due to a loss of continuous monitoring for free chlorine and flow data that spanned approximately 2.5 hours on a single day. The data loss occurred when both the primary and back up data recorders failed. It is important to note that during this outage the plant is still equipped with automatic alarms and shut offs to ensure the water supplied to distribution continues to meet Ontario Drinking Water Standards. During the outage County water operators attended the site and confirmed that the chlorine residuals and plant operations were normal. The MECP did not require any corrective actions.

6.2 Adverse Results

Any adverse results from bacteriological, 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.

<i>Parameter</i>	<i>Number of Tests</i>	<i>Result Range Min – Max (mg/L)</i>	<i>Average Result (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Nitrite	4	ND	ND	1.0	0.003
Nitrate	4	ND – 0.008	0.007	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.

<i>Parameter</i>	<i>Annual Average</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Trihalomethane (THM)	2022	17.0	100	0.37
Haloacetic Acids (HAA)	2022	ND	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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Sodium	August 06, 2019	12.1	20*	0.01
Fluoride	August 06, 2019	1.65	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.

<i>Parameter</i>	<i>Result Range (Min - Max)</i>	<i>Number of Samples</i>	<i>Acceptable Level</i>
Distribution Alkalinity 2022	194 – 213	3	30 – 500mg/L
Distribution pH 2022	7.42 – 7.94	3	6.5 – 8.5
Distribution Lead 2022	0.03 – 0.13	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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Antimony	May 30, 2022	ND	6	0.6
Arsenic	May 30, 2022	0.4	10	0.2
Barium	May 30, 2022	301	1000	0.02
Boron	May 30, 2022	35	5000	2
Cadmium	May 30, 2022	ND	5	0.003
Chromium	May 30, 2022	0.24	50	0.08
Mercury	May 30, 2022	ND	1	0.01
Selenium	May 30, 2022	ND	50	0.04
Uranium	May 30, 2022	0.014	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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Alachlor	June 7, 2021	ND	5	0.02
Atrazine + N-dealkylatedmetabolites	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
2,4-Dichlorophenoxy acetic acid (2,4-D)	June 7, 2021	ND	100	0.19
Diclofop-methyl	June 7, 2021	ND	9	0.40

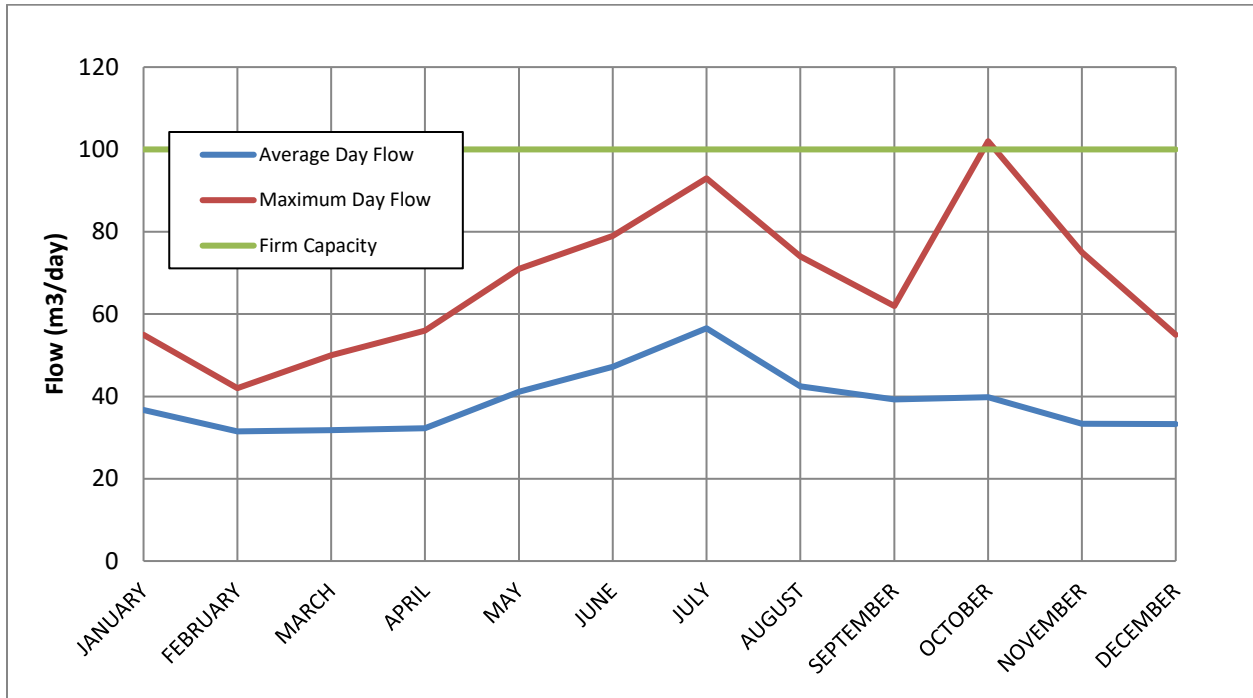
<i>Parameter</i>	<i>Sample Date</i>	<i>Result (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Dimethoate	June 7, 2021	ND	20	0.06
Diquat	June 7, 2021	ND	70	1
Diuron	June 7, 2021	ND	150	0.03
Glyphosate	June 7, 2021	ND	280	1
Malathion	June 7, 2021	ND	190	0.02
2-methyl-4chlorophenoxyacetic acid (MCPA)	June 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

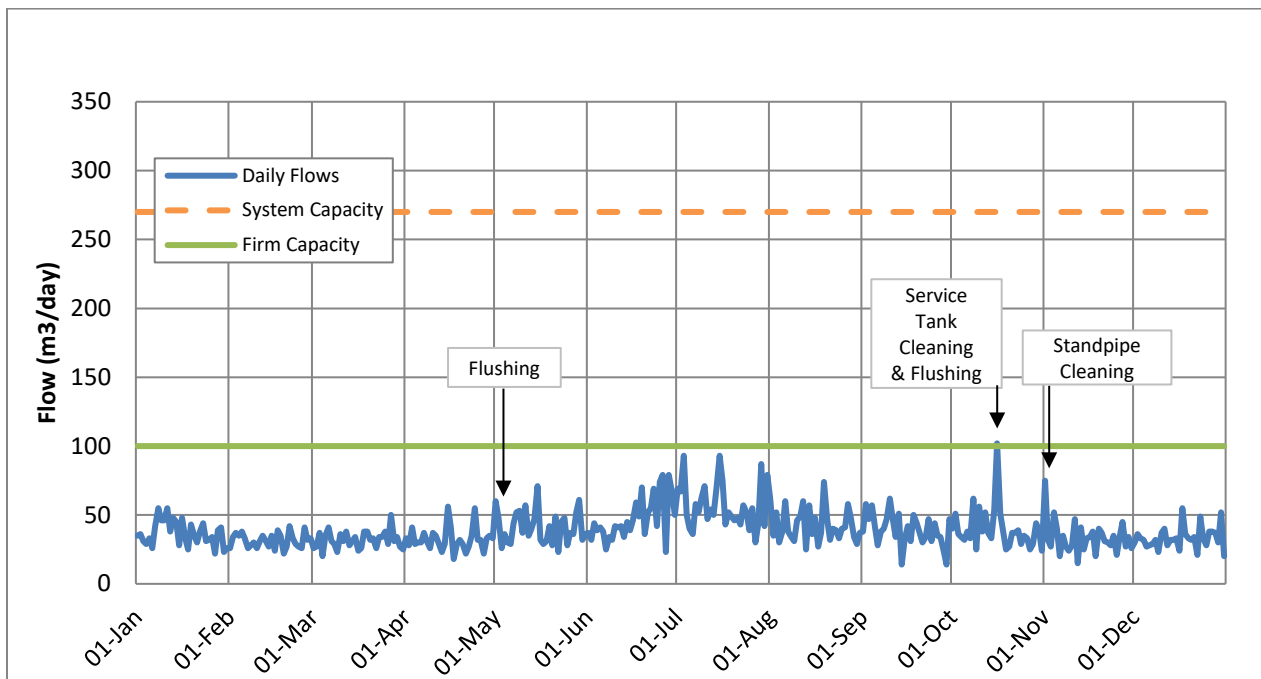
Lakeside Drinking Water System Firm Capacity 100 m³/ day

Lakeside Drinking Water System Supply Capacity 270 m³/ day

2022 Average vs Maximum Daily Flow Rates



2022 Daily Flow



2022 Annual Drinking Water System Summary Report

Mount Elgin 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:	Mount Elgin Drinking Water System
Drinking Water System Number:	220000629
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 Mount Elgin Drinking Water System is a Large Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and serves a population of approximately 702. The water from Mount Elgin Well 3A was treated with approximately 1,720 L of sodium hypochlorite (liquid chlorine) for disinfection and the water from Well 5 was treated with approximately 880 L of sodium hypochlorite and 6,830 kg of carbon dioxide for pH adjustment. The chemical is certified to meet standards set by the Standards Council of Canada or American National Standards Institute.

The system consists of two secure groundwater wells and two water treatment facilities as follows:

<i>Treatment Facility</i>	<i>Well</i>	<i>Treatment</i>
Mount Elgin WTF	3A	Disinfection with sodium hypochlorite
Graydon WTF	5	Reduction of naturally occurring sulphide and methane in raw water through membrane filtration assisted by pH adjustment with carbon dioxide. Disinfection with sodium hypochlorite.

The treatment facilities each have pumps, monitoring and treatment equipment, and there is a 380 m³ underground reservoir at the Mount Elgin WTF. Standby generators are available to run the both facilities in the event of a power failure. 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 Mount Elgin 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 from the raw and treated water at the facility and from 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 sample 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 on the table below. There were no adverse test results from 194 treated water samples in this reporting period.

	<i>Number of Samples</i>	<i>Range of E. coli Results Min - Max MAC = 0</i>	<i>Range of Total Coliform Results Min - Max MAC = 0</i>
Raw	103	0	0 - 4
Treated	100	0	0
Distribution	104	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.

	<i>Number of Samples</i>	<i>Range of HPC Min - Max</i>
Treated	99	0 - 18
Distribution	26	0 - 42

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 and chemical parameters. 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 Mount Elgin Drinking Water System is provided below.

3.1 Sodium

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 the Mount Elgin WTF is 21.3. The average sodium level from the Graydon WTF is 37.3.

3.2 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 Mount Elgin Drinking Water System was tested in 2022 and ranged from 154 - 274mg/L (9 – 16 grains/gallon). Water in the Mount Elgin System falls within the hard ($120 < 180$ mg/L) to very hard range (≥ 180 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 Graydon Water Treatment facility has naturally occurring fluoride levels that average 1.67 mg/L.

3.4 Additional Testing Required by MECP

None.

4. OPERATIONAL MONITORING

4.1 Chlorine Residual

Free chlorine levels of the treated water are monitored continuously at the discharge point of the Water Treatment Facilities. In the distribution system, free chlorine is checked twice weekly at various locations. 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 was one low chlorine event in 2022. The corrective for which are summarized in section 6.2. A summary of the chlorine residual readings is provided in the table below 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.

<i>Parameter</i>	<i>Number of Tests or Monitoring Frequency</i>	<i>Range of Results (Min – Max) and Average</i>
Mount Elgin Well 3A WTF		
Chlorine residual after treatment (mg/L)	Continuous	(0.58 – 4.01) 1.33
Well 3A turbidity before treatment (NTU)	52	(0.10 – 0.72) 0.30
Turbidity after treatment (NTU)	Continuous	(0.04 – 5.00) 0.15
Graydon Well 5 WTF		
Chlorine residual after treatment (mg/L)	Continuous	(0.02 - 5.00) 1.25
Well 5 turbidity before treatment (NTU)	51	(0.12 – 0.65) 0.26
Turbidity after treatment (NTU)	Continuous	(0.06 – 5.00) 0.15
Distribution System		
Chlorine residual in distribution (mg/L)	365	(0.34 - 2.13) 1.26

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.

<i>Flow Summary</i>	<i>Quantity</i>
Permit to Take Water Limit	1,649 m ³ /d
Municipal Drinking Water License Limit	1,192 m ³ /d
2022 Average Daily Flow	133 m ³ /d
2022 Maximum Daily Flow	295 m ³ /d
2022 Average Monthly Flow	4,117 m ³
2022 Total Amount of Water Supplied	49,406 m ³

A review of the available supply capacity and the anticipated growth forecasted for the community indicates that the system has sufficient capacity over the 20 year planning horizon.

Firm Capacity of this system is rated at 428 m³/day. 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 m³/day if necessary to maintain system integrity. This system comprises of two supply wells. The MDWL limits pumping rate of either well to 1,192 m³/day for Firm Capacity calculations. In the first half of 2022, the Graydon WTF was offline for degasser maintenance and during this event the capacity of the system is reduced to 328 m³/day.

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 June 2022 and the Inspection Report Rating was 95%. During the inspection, a non-compliance was for the summary of the raw water turbidity results not being included in the 2021 Annual Report. Raw water turbidity is not a reportable parameter in groundwater systems but is checked weekly by Water Services staff. The inclusion of raw water turbidity results in the Annual Report has been incorporated for 2022 for all County drinking water systems moving forward. Two other non-compliances for the Mount Elgin DWS were noted for the operations and maintenance manual. At the time of the inspection the operations and maintenance manual needed to be updated to include finalized information for the Graydon Water Treatment facility (commissioned September 2021). A corrective action was issued by

the MECP to provide the updated manual for review. The County provided the updated manual and no further action was required.

6.2 Adverse Results

Any adverse results from bacteriological, chemical samples or observations of operational conditions that indicate adverse water quality are reported as required and corrective actions are taken. There were three adverse or reportable occurrences in 2022 one of which resulted in a precautionary boil water advisory.

A low free chlorine residual of 0.02 mg/L was reported to the MECP and Medical Officer of Health (MOH) on January 24, 2021. The system was subsequently back flushed and the chlorine residual was tested and restored to an acceptable ODWS concentration (above 0.05 mg/L).

Damage to a watermain on February 9, 2022 by a third party contractor resulted in low water pressure in the distribution system and potential impact to secondary disinfection. The incident was reported to the MECP and Medical Officer of Health (MOH). A precautionary BWA was enacted for all residents. Distribution free chlorine residuals were collected immediately and found to be within acceptable levels. Additionally, two sets of bacteriological water samples were collected to confirm that there was no contamination to the drinking water system, and all results were found to be acceptable.

The failure of two high lift pumps during system flushing on October 31, 2022 resulted in potential low distribution pressure at higher elevations. The incident was reported to the MECP and MOH. The system was flushed at all dead ends and high elevations. The chlorine residual was tested and found to be within acceptable ODWS levels (above 0.05 mg/L).

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.

<i>Parameter</i>	<i>Number of Tests</i>	<i>Result Range Min – Max (mg/L)</i>	<i>Average Result (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Nitrite	8	ND	ND	1.0	0.003
Nitrate	8	0.006 – 0.021	0.018	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.

<i>Parameter</i>	<i>Annual Average</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Trihalomethane (THM)	2022	13.3	100	0.37
Haloacetic Acids (HAA)	2022	5.2	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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Sodium	May 28, 2019	21.3	20*	0.01
Fluoride	August 18, 2021	1.62	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.

<i>Parameter</i>	<i>Result Range (Min - Max)</i>	<i>Number of Samples</i>	<i>Acceptable Level</i>
Distribution Alkalinity 2022	184 - 230	4	30 – 500mg/L
Distribution pH 2022	7.80 – 8.12	4	6.5 – 8.5
Distribution Lead 2021	0.13 – 1.19	4	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.

<i>Parameter</i>	<i>Result Value (µg/L)</i>		<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
	<i>Mount Elgin WTF (February 24, 2020)</i>	<i>Graydon WTF (August 18, 2021)</i>		
Antimony	ND	ND	6	0.6
Arsenic	ND	ND	10	0.2
Barium	142	139	1000	0.02
Boron	80	117	5000	2
Cadmium	0.003	0.007	5	0.003
Chromium	0.65	0.27	50	0.08
Mercury	ND	ND	1	0.01
Selenium	ND	ND	50	0.04
Uranium	0.011	0.013	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.

<i>Parameter</i>	<i>Result Value (µg/L)</i>		<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
	<i>Mount Elgin WTF (February 24, 2020)</i>	<i>Graydon WTF (August 18, 2021)</i>		
Alachlor	ND	ND	5	0.02
Atrazine + N-dealkylatedmetabolites	ND	ND	5	0.01
Azinphos-methyl	ND	ND	20	0.05
Benzene	ND	ND	1	0.32
Benzo(a)pyrene	ND	ND	0.01	0.004
Bromoxynil	ND	ND	5	0.33
Carbaryl	ND	ND	90	0.05
Carbofuran	ND	ND	90	0.01
Carbon Tetrachloride	ND	ND	2	0.17
Chlorpyrifos	ND	ND	90	0.02
Chlorpyrifos	ND	ND	90	0.02
Diazinon	ND	ND	20	0.02
Dicamba	ND	ND	120	0.20
1,2-Dichlorobenzene	ND	ND	200	0.41
1,4-Dichlorobenzene	ND	ND	5	0.36
1,2-Dichloroethane	ND	ND	5	0.35
1,1-Dichloroethylene (vinylidene chloride)	ND	ND	14	0.33

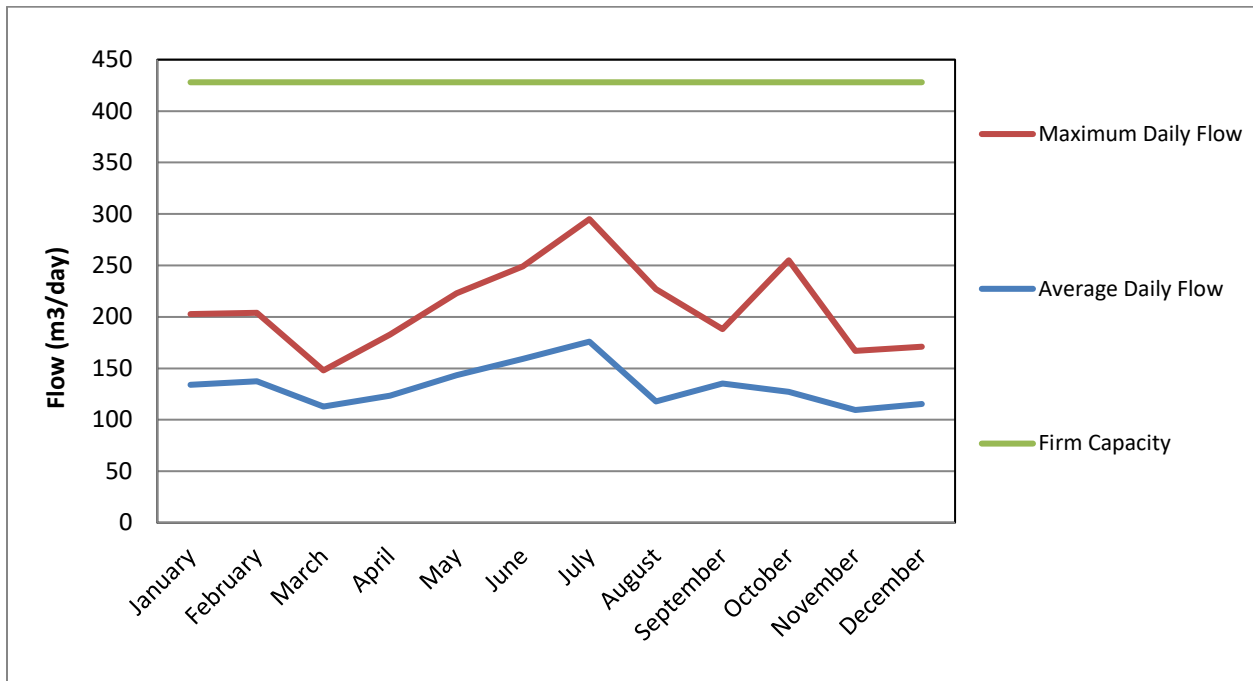
Parameter	Result Value (µg/L)		MAC (µg/L)	MDL (µg/L)
	Mount Elgin WTF (February 24, 2020)	Graydon WTF (August 18, 2021)		
Dichloromethane	ND	ND	50	0.35
2-4 Dichlorophenol	ND	ND	900	0.15
2,4-Dichlorophenoxy acetic acid (2,4-D)	ND	ND	100	0.19
Diclofop-methyl	ND	ND	9	0.40
Dimethoate	ND	ND	20	0.06
Diquat	ND	ND	70	1
Diuron	ND	ND	150	0.03
Glyphosate	ND	ND	280	1
Malathion	ND	ND	190	0.02
2-methyl-4chlorophenoxyacetic acid (MCPA)	ND	ND	100	0.12
Metolachlor	ND	ND	50	0.01
Metribuzin	ND	ND	80	0.02
Monochlorobenzene	ND	ND	80	0.30
Paraquat	ND	ND	10	1
Pentachlorophenol	ND	ND	60	0.15
Phorate	ND	ND	2	0.01
Picloram	ND	ND	190	1
Polychlorinated Biphenyls(PCB)	ND	ND	3	0.04
Prometryne	ND	ND	1	0.03
Simazine	ND	ND	10	0.01
Terbufos	ND	ND	1	0.01
Tetrachloroethylene	ND	ND	10	0.35
2,3,4,6-Tetrachlorophenol	ND	ND	100	0.20
Triallate	ND	ND	230	0.01
Trichloroethylene	ND	ND	5	0.44
2,4,6-Trichlorophenol	ND	ND	5	0.25
Trifluralin	ND	ND	45	0.02
Vinyl Chloride	ND	ND	1	0.17

APPENDIX B: WATER QUANTITY SUMMARY

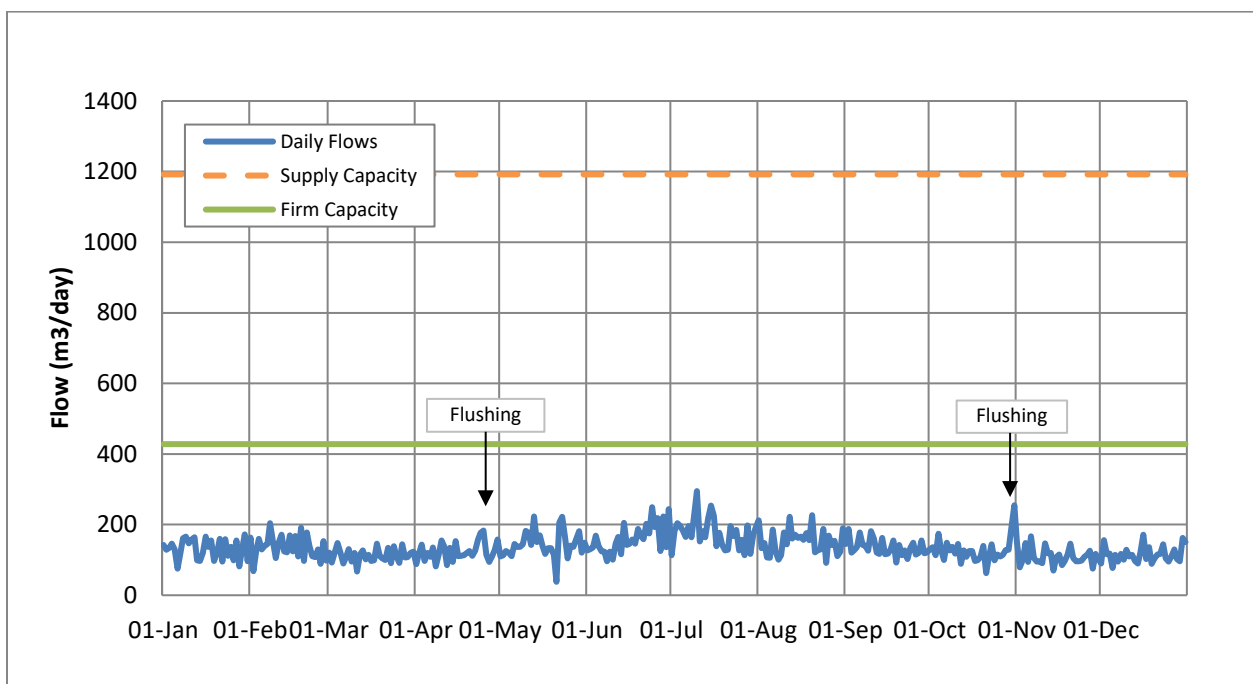
Mount Elgin Drinking Water System Firm Capacity 1,192 m³/ day

Mount Elgin Drinking Water System Supply Capacity 428 m³/ day

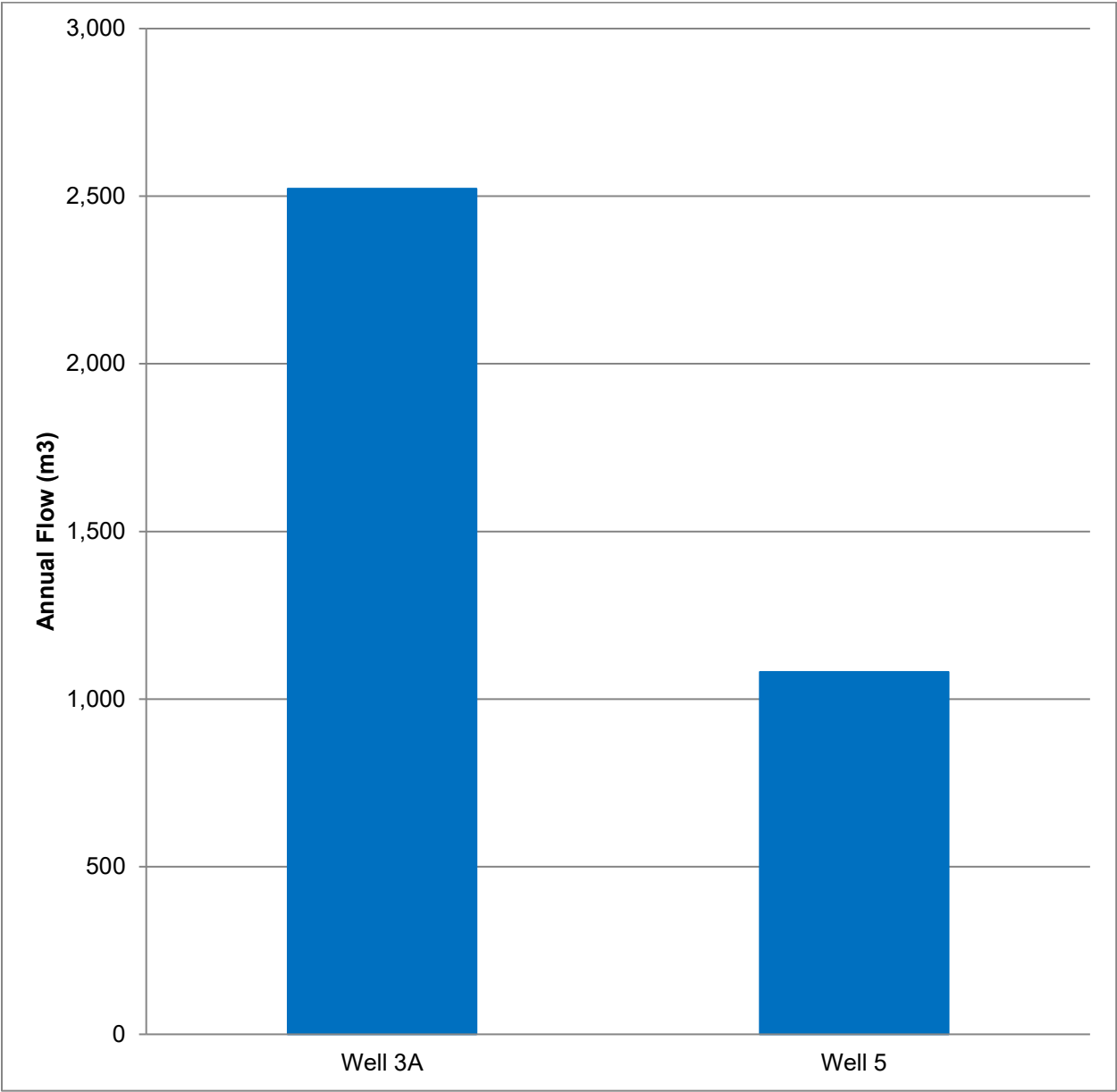
2022 Average vs Maximum Daily Flow Rates



2022 Daily Flow



2022 Total Production by Well



2022 Annual Drinking Water System Summary Report

Oxford South 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:	Oxford South Drinking Water System
Drinking Water System Number:	220000601
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 Oxford South Water System is a Large Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and serves a population of approximately 5,999. Transmission watermains interconnect the communities of Otterville, Springfield, and Norwich.

The system consists of seven secure groundwater wells and four treatment facilities as follows:

<i>Treatment Facility</i>	<i>Location</i>	<i>Wells</i>	<i>Treatment</i>
Pitcher Street	Norwich	N2 and N5	Filtration for iron removal and disinfection with sodium hypochlorite
Main Street	Norwich	N4	Iron sequestering with sodium silicate and disinfection with sodium hypochlorite
Otterville	Otterville	O3 and O4	Disinfection with sodium hypochlorite
Springfield	Springfield	S4 and S5	Disinfection with sodium hypochlorite

The treatment facilities each house high lift pumps, and monitoring and treatment equipment for the supply wells. A 1,818 m³ water tower at Norwich and a 1,440 m³ water tower in Otterville provide storage and maintain pressure in the system.

In 2022, approximately 16,385 L of sodium hypochlorite and 1,230 L of sodium silicate were used in the water treatment process. These chemicals are certified to meet standards set by the Standards Council of Canada or American National Standards Institute.

Standby generators are available at Norwich Pitcher Street and Otterville to run the facilities in the event of a power failure. 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 Oxford South 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 from the raw and treated water at the facility and from 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 sample 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 on the table below. There were no adverse test results from the 500 treated water samples in this reporting period.

	<i>Number of Samples</i>	<i>Range of E. coli Results Min - Max MAC = 0</i>	<i>Range of Total Coliform Results Min - Max MAC = 0</i>
Raw	346	0	0 - 8
Treated	245	0	0
Distribution	255	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 following table.

	<i>Number of Samples</i>	<i>Range of HPC Min - Max</i>
Treated	156	0 - 10
Distribution	56	0 - 3

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 and chemical parameters. 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 Oxford South Drinking Water System is provided below.

3.1 Sodium

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 sodium levels in the Oxford South drinking water system range from 17.9 to 52.5 mg/L.

3.2 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 Springford Water Treatment facility has naturally occurring fluoride levels that average 1.57 mg/L.

3.3 Hardness, Iron, and Manganese

These are aesthetic parameters 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 or treated water. The hardness for the Oxford South system was tested in 2022, the Oxford South system hardness depends on the wells being used.

- Norwich well water is considered very hard. Results ranged from 286 – 328 mg/L (17 – 19 grains/gallon).
- Otterville well water is also considered very hard. Results ranged from 291 – 299 mg/L (17 grains/gallon).
- Springford well water is considered medium hard. Results ranged from 87 – 91 mg/L (5 grains/gallon)

Iron levels less than 0.30 mg/L are not considered to cause aesthetic problems such as discoloured water.

- Iron is less than 0.08 mg/L at the Otterville facility and the Springford facility.
- Iron is removed by filtration at the Norwich Pitcher St. facility.
- Iron is kept in solution at the Norwich Main St. facility by addition of sodium silicate. The Norwich Main St. facility iron levels average 0.43 mg/L.

Manganese is commonly found in conjunction with iron and also causes discoloured water. Currently, levels of manganese under 0.05 mg/L are not considered to cause aesthetic issues. However, a new aesthetic objective of 0.02 mg/L has been proposed though not yet take effect.

- Manganese is less than 0.02 mg/L at the Otterville facility and Norwich Pitcher Street facility.
- The Springford facility manganese was 0.03 mg/L.
- The Norwich Main St. facility manganese levels average 0.03 mg/L.

3.4 Additional Testing Required by MECP

None.

4. OPERATIONAL MONITORING

4.1 Chlorine Residual

Free chlorine levels of the treated water are monitored continuously at the discharge point of the Water Treatment Facility. In the distribution system, free chlorine is checked twice weekly at various locations. 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 below 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.

<i>Parameter</i>	<i>Number of Tests or Monitoring Frequency</i>	<i>Range of Results (Min – Max) and Average</i>
Norwich Main St. E WTF		
Chlorine residual after treatment (mg/L)	Continuous	(0.11 - 4.48) 1.27
Well N4 turbidity before treatment (NTU)	52	(0.10 – 0.73) 0.24
Turbidity after treatment (NTU)	Continuous	(0.04 – 4.00) 0.09
Norwich Pitcher St. WTF		
Chlorine residual after treatment (mg/L)	Continuous	(0.94 - 3.04) 1.38
Well N2 turbidity before treatment (NTU)	51	(0.15 – 2.22) 0.65
Well N5 turbidity before treatment (NTU)	51	(0.12 – 1.40) 0.49
Turbidity after treatment (NTU)	Continuous	(0.02 – 4.00) 0.08
Otterville WTF		
Chlorine residual after treatment (mg/L)	Continuous	(0.47 – 4.00) 1.32
Well O3 turbidity before treatment (NTU)	52	(0.09 – 0.80) 0.24
Well O4 turbidity before treatment (NTU)	52	(0.10 – 1.53) 0.31
Turbidity after treatment (NTU)	Continuous	(0.06 – 4.00) 0.11
Springford WTF		
Chlorine residual after treatment (mg/L)	Continuous	(0.41 - 4.03) 1.17
Well S3 turbidity before treatment (NTU)	43	(0.14 – 1.85) 0.43
Well S4 turbidity before treatment (NTU)	43	(0.09 – 1.93) 0.29
Turbidity after treatment (NTU)	Continuous	(0.04 - 4.03) 0.19
Distribution System		
Chlorine residual in distribution (mg/L)	Continuous	(0.32 - 3.19) 1.19

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.

<i>Flow Summary</i>	<i>Quantity</i>
Permit to Take Water Limit	6,054 m ³ /d
Municipal Drinking Water License Limit	6,054 m ³ /d
2022 Average Daily Flow	1,255 m ³
2022 Maximum Daily Flow	2,686 m ³
2022 Average Monthly Flow	28,778 m ³
2022 Total Amount of Water Supplied	345,333 m ³

A review of the available supply capacity and the anticipated growth forecasted for the community indicates that the system has sufficient capacity over the 20 year planning horizon.

Firm Capacity of this system is rated at 2,454 m³/day. 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 m³/day if necessary to maintain system integrity. This system comprises of seven supply wells with only three active in the Village of Norwich. Wells located in Otterville and Springford are currently operational at this time however are not used in the firm capacity rating as their supply remains unreliable due to elevated nitrate levels (Otterville wells) and water quantity issues (Springford wells).

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 October 2022. There were no non-compliance findings and the 2022 Inspection Report Rating was 100%.

6.2 Adverse Results

Any adverse results from bacteriological, chemical samples or observations of operational conditions that indicate adverse water quality are reported as required and corrective actions are taken. There was one adverse or reportable occurrences in 2022.

- Springford - A treated water sample for fluoride had a concentration of 1.57 mg/L. Although drinking water is considered safe for consumption at fluoride levels up to 2.4 mg/L, levels greater than 1.5 mg/L are required to be reported to the MECP and MOH. A confirmatory resample was taken and also had fluoride concentration of 1.57 mg/L. While Oxford County does not add fluoride to its

municipal drinking water, naturally occurring levels of Fluoride are common in groundwater sources.

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.

<i>Parameter</i>	<i>Number of Tests or monitoring frequency</i>	<i>Result Range (Min – Max) Average (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Nitrite			1.0	0.003
Norwich Main St. WTF	4	ND		
Norwich Pitcher St. WTF	4	ND		
Otterville WTF	16	ND		
Springford WTF	3**	ND		
Nitrate			10.0	0.006
Norwich Main St. WTF	4	(ND – 0.06) 0.02		
Norwich Pitcher St. WTF	4	ND		
Otterville WTF	16	(5.90 – 7.49) 6.72		
Springford WTF	3**	(0.01 – 0.03) 0.02		

*Fewer samples were taken at Springford WTF since offline for long time periods during the summer months.

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.

<i>Parameter</i>	<i>Annual Average</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Trihalomethane (THM)	2022	16	100	0.37
Haloacetic Acids (HAA)	2022	ND	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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Sodium			20.0*	0.01
Norwich Main St. WTF	May 27/2019	17.9		
Norwich Pitcher St. WTF	Feb 19/2019	23.2		
Otterville WTF	May 27/2019	34.0		
Springford WTF	May 30/2022	52.5		
Fluoride			1.5**	0.006
Norwich Main St. WTF	Aug. 16/2021	0.93		
Norwich Pitcher St. WTF	Aug 16/2021	0.89		
Otterville WTF	April 24/2021	0.08		
Springford WT	May 30/2022	1.57		

*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.

<i>Parameter</i>	<i>Result Range (Min - Max)</i>	<i>Number of Samples</i>	<i>Acceptable Level</i>
Distribution Alkalinity 2022	206 – 247	6	30 – 500 mg/L
Distribution pH 2022	7.26 – 7.59	6	6.5 – 8.5
Distribution Lead 2021	0.03 – 1.31	6	10 µg/L MAC

The following Tables summarize the most recent test results for Schedule 23 for each facility. Testing is required every 3 years for secure groundwater wells in large systems.

<i>Parameter</i>	<i>Results (µg/L) Norwich Pitcher St. Dec. 7, 2020</i>	<i>Results (µg/L) Norwich Main St. Dec. 7, 2020</i>	<i>Results (µg/L) Otterville WTF May 7, 2019</i>	<i>Results (µg/L) Springford WTF July 7, 2020</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Antimony	ND	ND	ND	ND	6	0.6
Arsenic	1.1*	1.5	0.2	0.59*	10	0.2
Barium	174	226	35.0	35.0	1000	0.02
Boron	79	51	17	17	5000	2
Cadmium	ND	ND	0.012	0.012	5	0.003
Chromium	0.63	0.80	0.29	0.29	50	0.08
Mercury	ND	ND	ND	ND	1	0.01

<i>Parameter</i>	<i>Results (µg/L) Norwich Pitcher St. Dec. 7, 2020</i>	<i>Results (µg/L) Norwich Main St. Dec. 7, 2020</i>	<i>Results (µg/L) Otterville WTF May 7, 2019</i>	<i>Results (µg/L) Springford WTF July 7, 2020</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Selenium	ND	ND	0.36	0.36	50	0.04
Uranium	0.088	0.386			20	0.002

*Annual average of all samples collected in 2022

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.

<i>Parameter</i>	<i>Results (µg/L) Norwich Pitcher St. Dec. 7, 2020</i>	<i>Results (µg/L) Norwich Main St. Dec. 7, 2020</i>	<i>Results (µg/L) Otterville WTF June 7, 2021</i>	<i>Results (µg/L) Springford WTF July 6, 2020</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Alachlor	ND	ND	ND	ND	5	0.02
Atrazine + N-dealkylated metabolites	ND	ND	ND	ND	5	0.01
Azinphos-methyl	ND	ND	ND	ND	20	0.05
Benzene	ND	ND	ND	ND	1	0.32
Benzo(a)pyrene	ND	ND	ND	ND	0.01	0.004
Bromoxynil	ND	ND	ND	ND	5	0.33
Carbaryl	ND	ND	ND	ND	90	0.05
Carbofuran	ND	ND	ND	ND	90	0.01
Carbon Tetrachloride	ND	ND	ND	ND	2	0.17
Chlorpyrifos	ND	ND	ND	ND	90	0.02
Chlorpyrifos	ND	ND	ND	ND	90	0.02
Diazinon	ND	ND	ND	ND	20	0.02
Dicamba	ND	ND	ND	ND	120	0.20
1,2-Dichlorobenzene	ND	ND	ND	ND	200	0.41
1,4-Dichlorobenzene	ND	ND	ND	ND	5	0.36
1,2-Dichloroethane	ND	ND	ND	ND	5	0.35
1,1-Dichloroethylene (vinylidene chloride)	ND	ND	ND	ND	14	0.33
Dichloromethane	ND	ND	ND	ND	50	0.35
2,4-Dichlorophenol	ND	ND	ND	ND	900	0.15
2,4-Dichlorophenoxy acetic acid (2,4-D)	ND	ND	ND	ND	100	0.19
Diclofop-methyl	ND	ND	ND	ND	9	0.40
Dimethoate	ND	ND	ND	ND	20	0.06
Diquat	ND	ND	ND	ND	70	1
Diuron	ND	ND	ND	ND	150	0.03
Glyphosate	ND	ND	ND	ND	280	1
Malathion	ND	ND	ND	ND	190	0.02

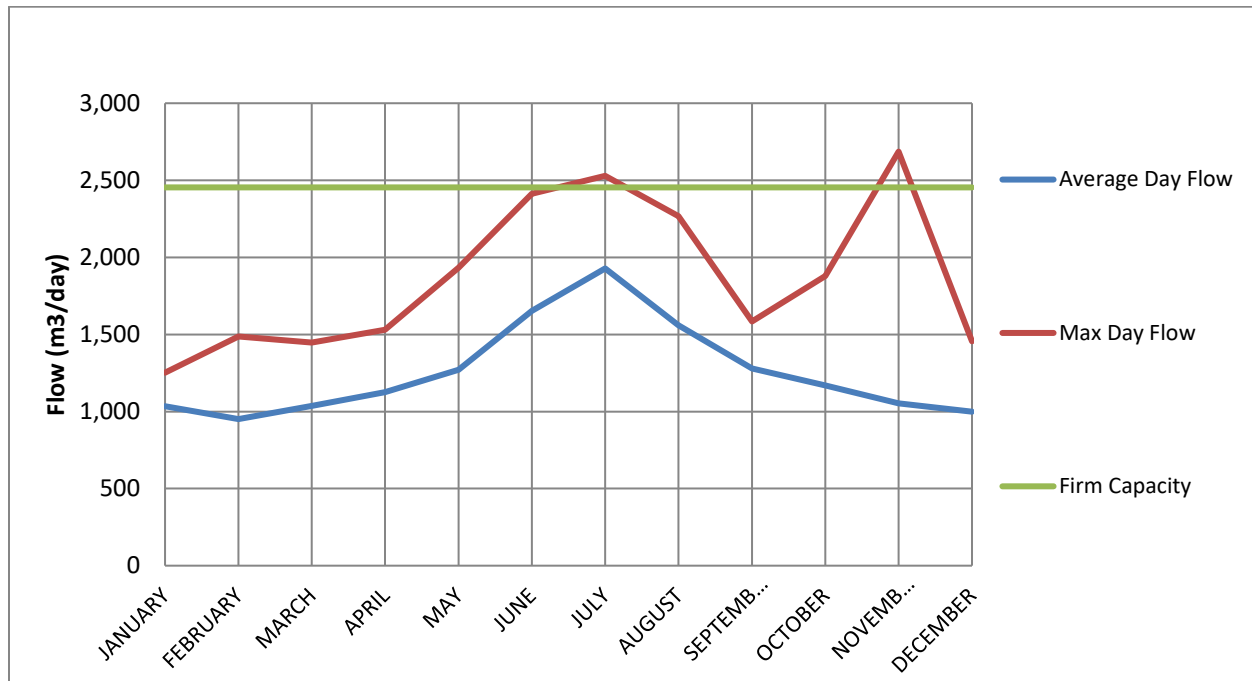
<i>Parameter</i>	<i>Results (µg/L) Norwich Pitcher St. Dec. 7, 2020</i>	<i>Results (µg/L) Norwich Main St. Dec. 7, 2020</i>	<i>Results (µg/L) Otterville WTF June 7, 2021</i>	<i>Results (µg/L) Springford WTF July 6, 2020</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
2-methyl-4chlorophenoxyacetic acid (MCPA)	ND	ND	ND	ND	100	0.12
Metolachlor	ND	ND	ND	ND	50	0.01
Metribuzin	ND	ND	ND	ND	80	0.02
Monochlorobenzene	ND	ND	ND	ND	80	0.30
Paraquat	ND	ND	ND	ND	10	1
Pentachlorophenol	ND	ND	ND	ND	60	0.15
Phorate	ND	ND	ND	ND	2	0.01
Picloram	ND	ND	ND	ND	190	1
Polychlorinated Biphenyls(PCB)	ND	ND	ND	ND	3	0.04
Prometryne	ND	ND	ND	ND	1	0.03
Simazine	ND	ND	ND	ND	10	0.01
Terbufos	ND	ND	ND	ND	1	0.01
Tetrachloroethylene	ND	ND	ND	ND	10	0.35
2,3,4,6-Tetrachlorophenol	ND	ND	ND	ND	100	0.20
Triallate	ND	ND	ND	ND	230	0.01
Trichloroethylene	ND	ND	ND	ND	5	0.44
2,4,6-Trichlorophenol	ND	ND	ND	ND	5	0.25
Trifluralin	ND	ND	ND	ND	45	0.02
Vinyl Chloride	ND	ND	ND	ND	1	0.17

APPENDIX B: WATER QUANTITY SUMMARY

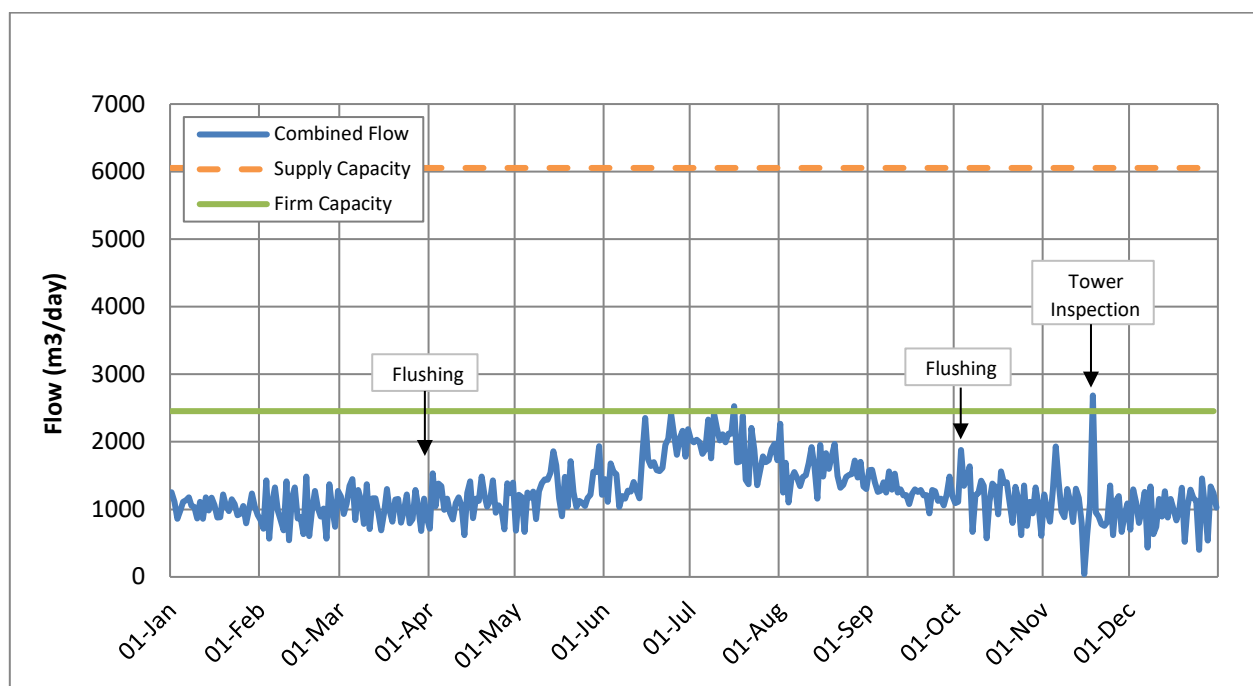
Oxford South Drinking Water System Firm Capacity 2,454 m³/ day

Oxford South Drinking Water System Supply Capacity 6,054 m³/ day

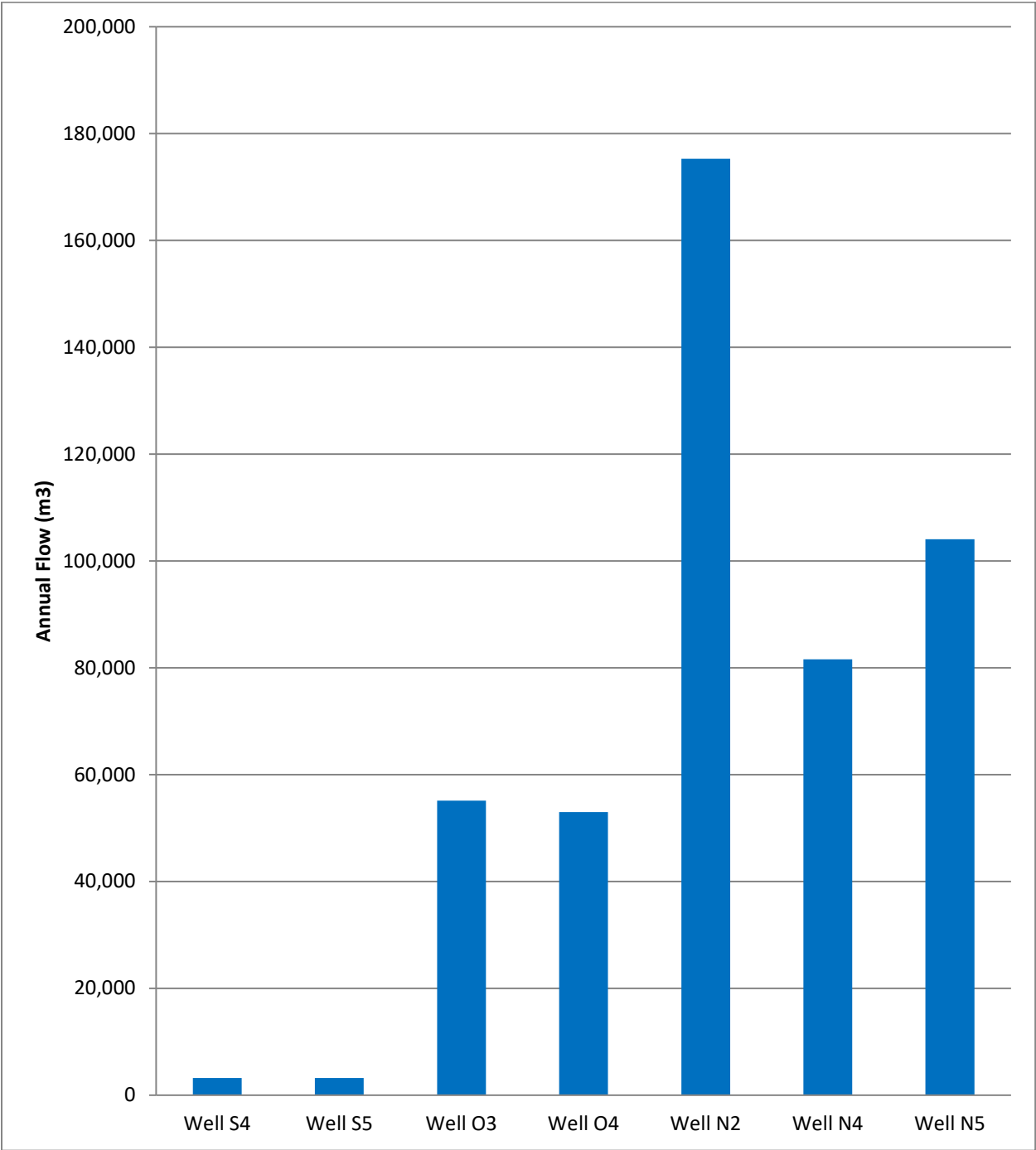
Average vs Maximum Daily Flow Rates



2022 Daily Flow



2022 Total Production by Well





2022 Annual Drinking Water System Summary Report

Plattsville 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:	Plattsville Drinking Water System
Drinking Water System Number:	210001291
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 Plattsville Drinking Water System is a Large Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and serves a population of approximately 1,844. The system consists of two well sources which are secure groundwater wells. The water is treated with sodium hypochlorite for disinfection and sodium silicate to sequester iron.

In 2022, approximately 4305L of sodium hypochlorite and 2,460L of sodium silicate were used in the water treatment process. The chemical is certified to meet standards set by the Standards Council of Canada or American National Standards Institute.

The treatment facility houses pumps and monitoring equipment. A 1,830 m³ water tower provides storage and maintains pressure in the distribution system. A standby generator is available to run the facility in the event of a power failure. 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 Plattsville 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:

- \$228,000 R&M on Wells, Water Pump stations, and Water Treatment Facilities
- \$940,000 distribution replacements
- \$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 from the raw and treated water at the facility and from 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 sample 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 on the table below. There were no adverse test results from 208 treated water samples in this reporting period.

	<i>Number of Samples</i>	<i>Range of E. coli Results Min - Max MAC = 0</i>	<i>Range of Total Coliform Results Min - Max MAC = 0</i>
Raw	104	0	0
Treated	52	0	0
Distribution	156	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.

	<i>Number of Samples</i>	<i>Range of HPC Min - Max</i>
Treated	52	0 - 3
Distribution	39	0 - 16

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 and chemical parameters. 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 Plattsville Drinking Water System is provided below.

3.1 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 the Plattsville Drinking Water System is 21 mg/L.

3.1 Iron, Hardness and Manganese

These are aesthetic parameters that may affect the appearance of the water but are 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 and reduce iron levels. 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 or treated water. The Hardness for the Plattsville Drinking Water System was tested in 2022 and ranged from 1210 – 1660 mg/L (71 – 97 grains/gallon)

Levels of iron less than 0.30 mg/L (ppm) are not considered to cause aesthetic problems such as discoloured water. In Plattsville, sodium silicate is added to help keep iron in suspension.

- The average iron level in 2022 was 0.61 mg/L

Manganese is commonly found in conjunction with iron and also causes discoloured water. Manganese levels in this system are at or above the aesthetic objective of 0.05 mg/L.

- The average manganese level in 2022 was 0.07 mg/L (ppm)

3.2 Additional Testing Required by MECP

None.

4. OPERATIONAL MONITORING

4.1 Chlorine Residual

Free chlorine levels of the treated water are monitored continuously at the discharge point of the Water Treatment Facility. In the distribution system, free chlorine is checked twice weekly at various locations. 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 below 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.

<i>Parameter</i>	<i>Number of Tests or Monitoring Frequency</i>	<i>Range of Results (Min – Max) and Average</i>
Chlorine residual after treatment (mg/L)	Continuous	(0.25 – 2.50) 1.37
Chlorine residual in distribution (mg/L)	Continuous	(0.65 – 1.62) 1.20
Well 1 turbidity before treatment (NTU)	51	(0.09 – 0.78) 0.35
Well 2 turbidity before treatment (NTU)	48	(0.15 – 0.91) 0.39
Turbidity after treatment (NTU)	Continuous	(0.04 – 4.0) 0.19

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.

<i>Flow Summary</i>	<i>Quantity</i>
Permit to Take Water Limit	4,579 m ³ /d
Municipal Drinking Water License Limit	2,290 m ³ /d
2022 Average Daily Flow	386 m ³
2022 Maximum Daily Flow	1,127 m ³
2022 Average Monthly Flow	11,742 m ³
2022 Total Amount of Water Supplied	140,961 m ³

The Plattsville system is currently operated to maximize turnover within the water tower during hot or cold weather in order to minimize temperature change of the water. This operational practice artificially increases the maximum daily flow. A more realistic maximum day is 727 m³/d which averages flow over a three day period to moderate the variance in pumping.

Firm Capacity of this system is rated at 1,296 m³/day. 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 m³/day if necessary to maintain system integrity. This system comprises of two supply wells. The MDWL limits pumping rate of either well to 2,290 m³/day for Firm Capacity calculations.

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 November 2022. There were no non-compliance findings and the 2022 Inspection Report Rating was 100%.

6.2 Adverse Results

Any adverse results from bacteriological, chemical samples or observations of operational conditions that indicate adverse water quality are reported as required and corrective actions are taken. There was one adverse or reportable occurrences in 2022.

- A treated water sample for sodium had a concentration of 21.7 mg/L. Although drinking water is considered safe for consumption at sodium levels up to 200 mg/L, water containing levels greater than 20 mg/L are required to be reported to the MECP and MOH. A confirmatory resample was taken and had sodium concentration of 20.3 mg/L.

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.

<i>Parameter</i>	<i>Number of Tests</i>	<i>Result Range Min – Max (mg/L)</i>	<i>Average Result (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Nitrite	4	ND	ND	1.0	0.003
Nitrate	4	0.072 – 0.274	0.018	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.

<i>Parameter</i>	<i>Annual Average</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Trihalomethane (THM)	2022	15.5	100	0.37
Haloacetic Acids (HAA)	2022	ND	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. In 2022 additional sodium samples were taken from the Plattsville Drinking Water System and found to be above the MAC. The results of these samples were reported to the MECP and MOH and the results are detailed in section 6.2 of this report. The table below summarizes to most recent regulatory sampling results.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Sodium	August 16, 2021	19.1	20*	0.01
Fluoride	August 16, 2021	1.08	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.

<i>Parameter</i>	<i>Result Range (Min - Max)</i>	<i>Number of Samples</i>	<i>Acceptable Level</i>
Distribution Alkalinity 2022	227 - 241	4	30 – 500mg/L
Distribution pH 2022	7.06 – 7.48	4	6.5 – 8.5
Distribution Lead 2021	0.10 – 1.60	4	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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Antimony	May 30, 2022	ND	6	0.6
Arsenic	May 30, 2022	0.3	10	0.2
Barium	May 30, 2022	10.9	1000	0.02
Boron	May 30, 2022	136	5000	2
Cadmium	May 30, 2022	0.008	5	0.003
Chromium	May 30, 2022	0.20	50	0.08
Mercury	May 30, 2022	ND	1	0.01
Selenium	May 30, 2022	0.06	50	0.04
Uranium	May 30, 2022	0.47	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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Alachlor	June 7, 2021	ND	5	0.02
Atrazine + N-dealkylatedmetabolites	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

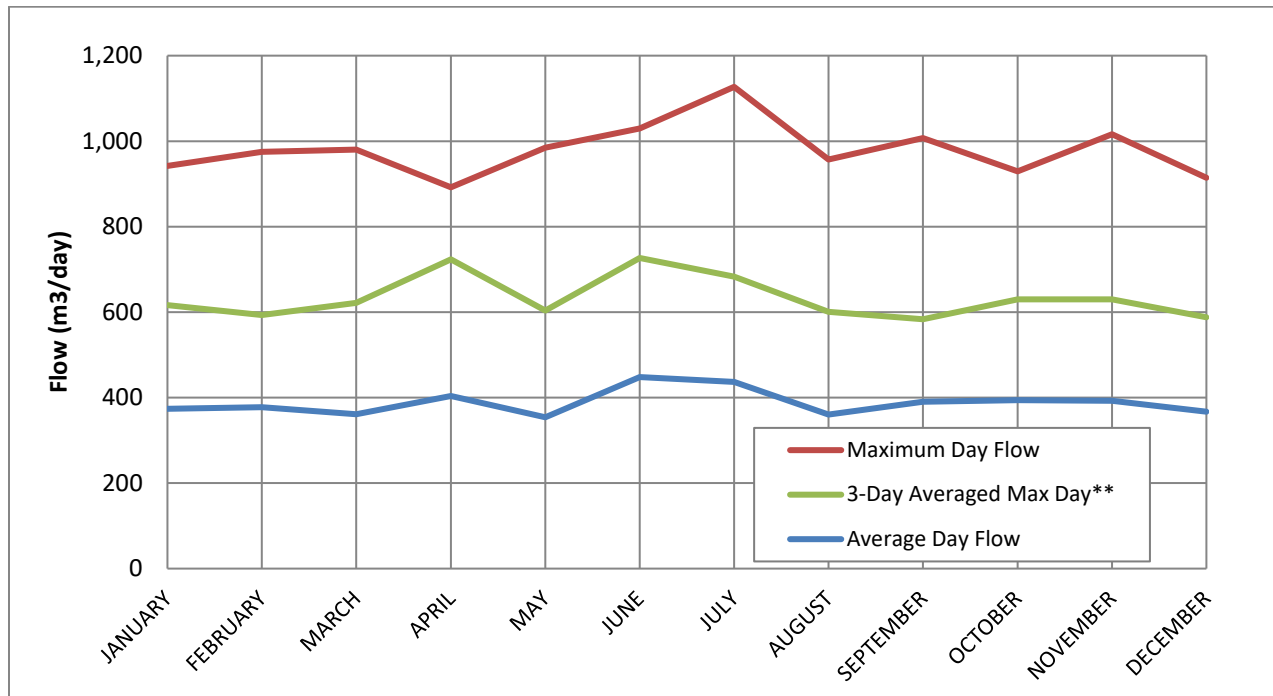
<i>Parameter</i>	<i>Sample Date</i>	<i>Result (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
1,4-Dichlorobenzene	June 7, 2021	ND	5	0.36
1,2-Dichloroethane	June 7, 2021	ND	5	0.35
1,1-Dichloroethylene (vinylidene chloride)	June 7, 2021	ND	14	0.33
Dichloromethane	June 7, 2021	ND	50	0.35
2,4-Dichlorophenol	June 7, 2021	ND	900	0.15
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

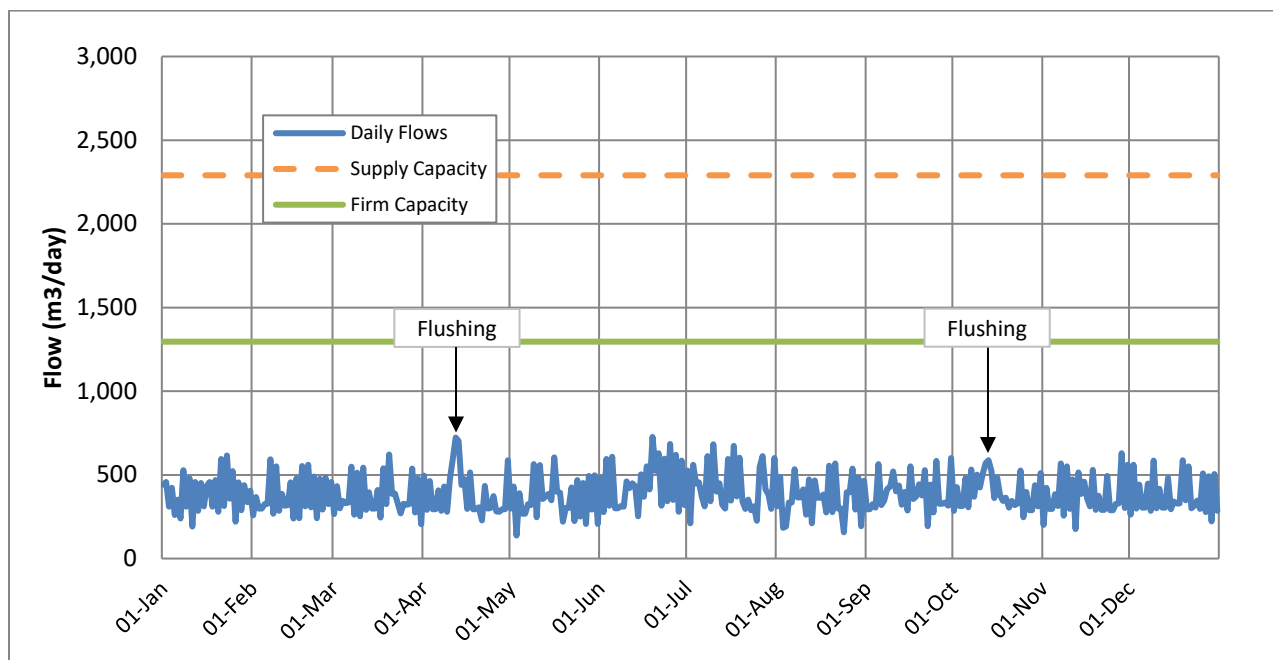
Plattsville Drinking Water System Firm Capacity 1,296 m³/ day

Plattsville Drinking Water System Supply Capacity 2,290 m³/ day

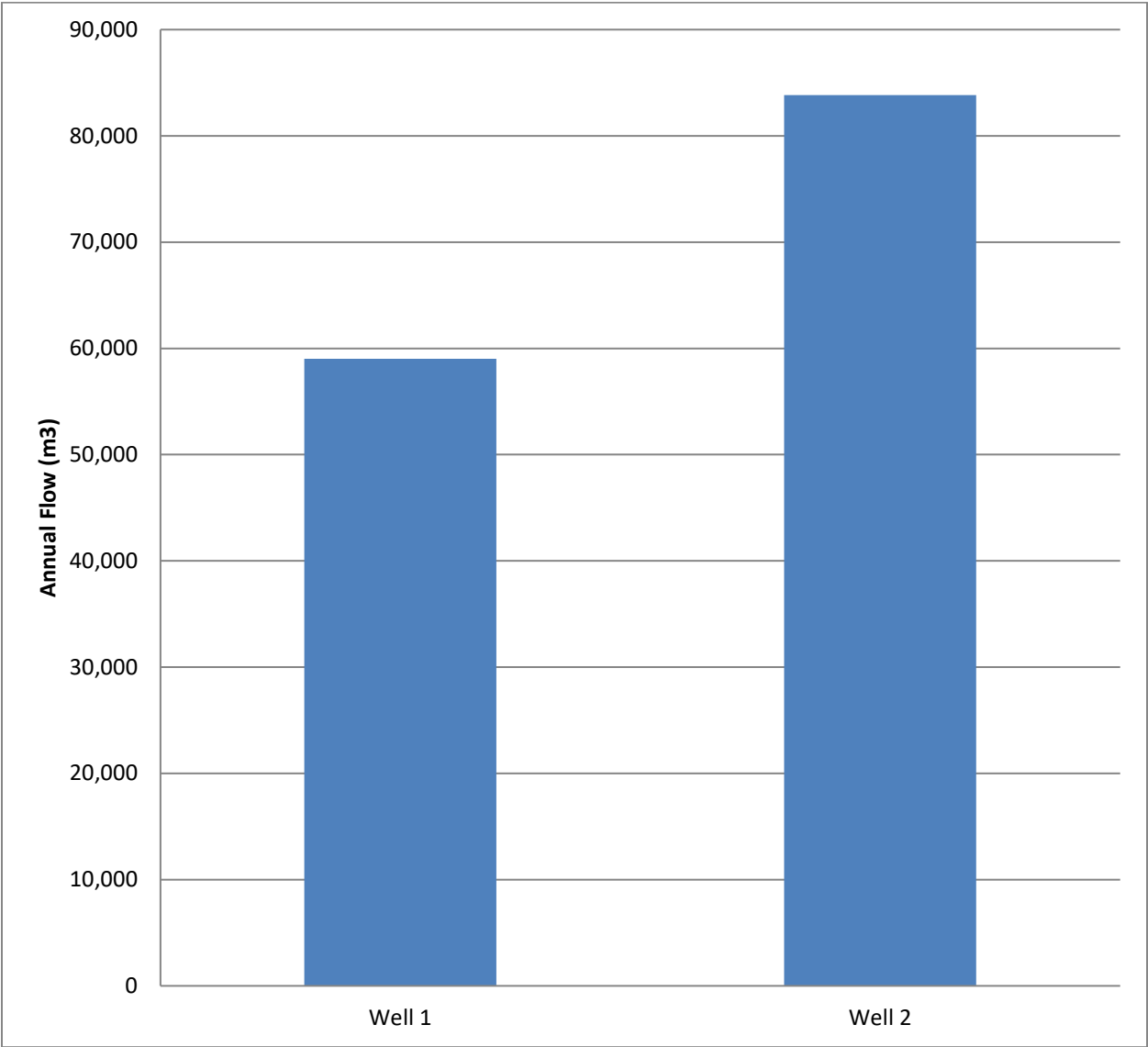
Average vs Maximum Daily Flow Rates



2022 Daily Flow



2022 Total Production by Well



2022 Annual Drinking Water System Summary Report

Tavistock 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:	Tavistock Drinking Water System
Drinking Water System Number:	2200000647
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 Tavistock Water System is a Large Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and serves a population of approximately 3,375. The system consists of three well sources which are secure groundwater wells. The water is treated with sodium hypochlorite for disinfection and sodium silicate to sequester iron which improves water quality. In 2022, approximately 26,855 L of sodium hypochlorite and 13,530L (19,140 kg) of sodium silicate were used in the water treatment process. These chemicals are certified to meet standards set by the Standards Council of Canada or the American National Standards Institute.

The 1,590 m³ water tower provides storage and maintains pressure in the system. The water tower also houses high lift pumps, treatment, and monitoring equipment. A standby generator is available to run the facility in the event of a power failure. 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 Tavistock 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:

- \$228,000 R&M on Wells, Water Pump stations, and Water Treatment Facilities
- \$940,000 distribution replacements
- \$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 from the raw and treated water at the facility and from 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 sample 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 on the table below. There were no adverse test results from 243 treated water samples in this reporting period.

	<i>Number of Samples</i>	<i>Range of E. coli Results Min - Max MAC = 0</i>	<i>Range of Total Coliform Results Min - Max MAC = 0</i>
Raw	139	0	0 - 3
Treated	52	0	0
Distribution	191	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.

	<i>Number of Samples</i>	<i>Range of HPC Min - Max</i>
Treated	52	0 – 3
Distribution	40	0 – 15

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 and chemical parameters. 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 Tavistock Drinking Water System is provided below.

3.1 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. In 2022, a sample over 20 mg/L was reported to the MECP and MOH. The confirmatory resample was below 20 mg/L. The average sodium level for samples collected in the Tavistock Drinking Water System in 2022 is 19.85 mg/L.

3.2 Hardness, Iron, and Manganese

These are aesthetic parameters 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 and reduce iron levels. 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 or treated water. The Hardness for the Tavistock Drinking Water System was tested in 2022 and ranged from 412 – 492 (24 - 29 grains/gallon).

Levels of iron less than 0.30 mg/L (ppm) are not considered to cause aesthetic problems such as discoloured water. In Tavistock sodium silicate is added to keep the iron in suspension.

- The average iron level in 2022 was 0.69 mg/L

Manganese is commonly found in conjunction with iron and also causes discoloured water. A new proposed aesthetic objective of 0.02 mg/L for manganese has been recommended but not yet issued. The current aesthetic objective for manganese is 0.05 mg/L. Tavistock treated water meets the current manganese objective but average concentrations in the system may require additional treatment considerations when the new aesthetic objective takes effect.

- The average manganese level in 2022 was 0.014 mg/L

3.3 Additional Testing Required by MECP

None.

4. OPERATIONAL MONITORING

4.1 Chlorine Residual

Free chlorine levels of the treated water are monitored continuously at the discharge point of the Water Treatment Facility. In the distribution system, free chlorine is checked twice weekly at various locations. 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 below 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.

<i>Parameter</i>	<i>Number of Tests or Monitoring Frequency</i>	<i>Range of Results (Min – Max) and Average</i>
Chlorine residual after treatment (mg/L)	Continuous	(0.39 – 2.49) 1.36
Chlorine residual in distribution (mg/L)	Continuous	(0.58 – 2.05) 1.28
Well 1 turbidity before treatment (NTU)	37	(0.20 – 1.46) 0.47
Well 2 turbidity before treatment (NTU)	51	(0.12 – 2.17) 0.47
Well 3 turbidity before treatment (NTU)	52	(0.05 – 0.91) 0.34
Turbidity after treatment (NTU)	Continuous	(0.03 – 2.86) 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.

<i>Flow Summary</i>	<i>Quantity</i>
Permit to Take Water Limit	5,616 m ³ /d
Municipal Drinking Water License Limit	5,616 m ³ /d
2022 Average Daily Flow	1,493 m ³
2022 Maximum Daily Flow	2,372 m ³
2022 Average Monthly Flow	45,352 m ³
2022 Total Amount of Water Supplied	544,229 m ³

The County is undertaking the Tavistock Well 4 Municipal Class Environmental Assessment to help ensure a reliable and efficient existing water supply for the community, as well as ensure expanded water supply if needed to support future growth and development.

Firm Capacity of this system is rated at 4,061 m³/day. 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 m³/day if necessary to maintain system integrity. This system comprises of three supply wells. The MDWL limits pumping rate of either well to 5,616 m³/day for Firm Capacity calculations.

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 2022 MECP annual inspection of the Tavistock drinking water system took place in November 2022. There was one non-compliance noted during the 2022 inspection indicating that the operations and maintenance manual should include CT calculations for primary disinfection for all operational configurations of the plant. A copy of the updated manual was required to be provided to the MECP by the end of January 2022. The updated manual was provided and no further actions were required. The Inspection Report Rating was not available at the time this report was drafted.

6.2 Adverse Results

Any adverse results from bacteriological, chemical samples or observations of operational conditions that indicate adverse water quality are reported as required and corrective actions are taken. There was one adverse or reportable occurrences in 2022.

- A treated water sample for sodium had a concentration of 21.0 mg/L. Although drinking water is considered safe for consumption at sodium levels up to 200 mg/L, water containing levels greater than 20 mg/L are required to be reported to the MECP and MOH. A confirmatory resample was taken and had a sodium concentration of 18.7 mg/L which is below ODWS limits.

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.

<i>Parameter</i>	<i>Number of Tests</i>	<i>Result Range Min – Max (mg/L)</i>	<i>Average Result (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Nitrite	4	ND	ND	1.0	0.003
Nitrate	4	0.01 – 0.021	0.016	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.

<i>Parameter</i>	<i>Annual Average</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Trihalomethane (THM)	2022	19.3	100	0.37
Haloacetic Acids (HAA)	2022	11.7	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. In 2022 an additional sodium samples taken from the Tavistock Drinking Water System and found to be above the MAC. The results of this sample was reported to the MECP and MOH and is detailed in section 6.2 of this report. The table below summarizes to most recent regulatory sampling results.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Sodium	August 16, 2021	18.3	20*	0.01
Fluoride	August 16, 2021	0.74	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.

<i>Parameter</i>	<i>Result Range (Min - Max)</i>	<i>Number of Samples</i>	<i>Acceptable Level</i>
Distribution Alkalinity 2022	230 - 252	6	30 – 500mg/L
Distribution pH 2022	7.45 – 7.78	6	6.5 – 8.5
Distribution Lead 2021	0.01 – 1.00	4	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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Antimony	May 30, 2022	ND	6	0.6
Arsenic	May 30, 2022	1.4	10	0.2
Barium	May 30, 2022	268	1000	0.02
Boron	May 30, 2022	48	5000	2
Cadmium	May 30, 2022	ND	5	0.003
Chromium	May 30, 2022	0.26	50	0.08
Mercury	May 30, 2022	ND	1	0.01
Selenium	May 30, 2022	ND	50	0.04
Uranium	May 30, 2022	0.09	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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Alachlor	June 7, 2021	ND	5	0.02
Atrazine + N-dealkylatedmetabolites	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

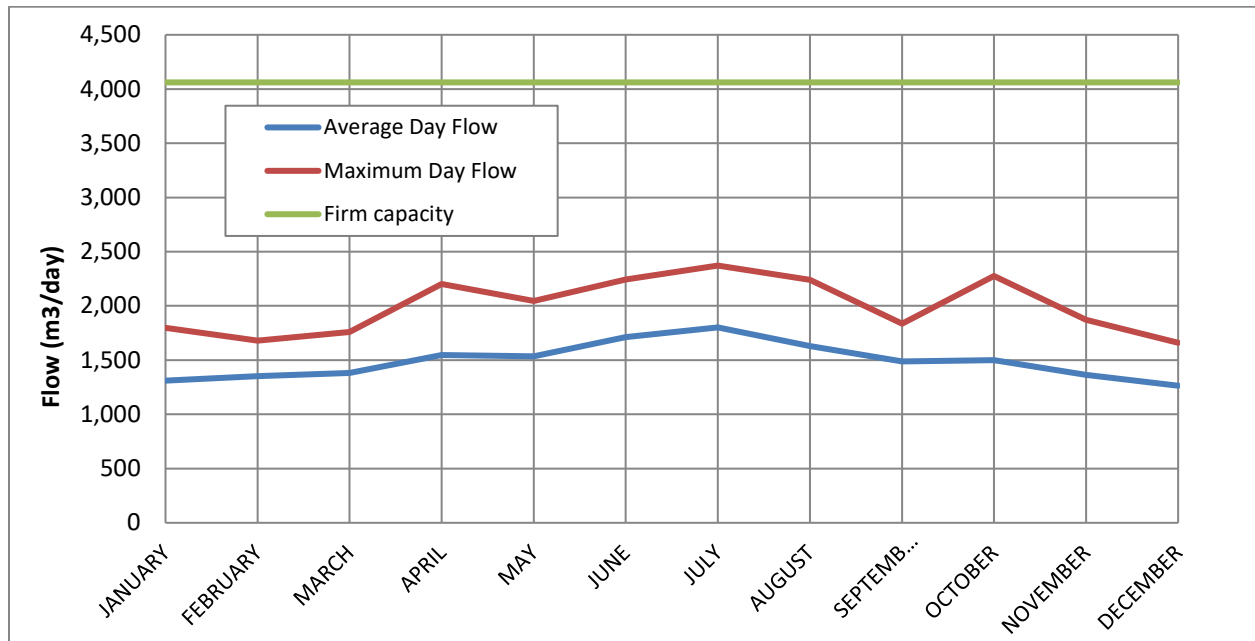
<i>Parameter</i>	<i>Sample Date</i>	<i>Result (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
1,4-Dichlorobenzene	June 7, 2021	ND	5	0.36
1,2-Dichloroethane	June 7, 2021	ND	5	0.35
1,1-Dichloroethylene (vinylidene chloride)	June 7, 2021	ND	14	0.33
Dichloromethane	June 7, 2021	ND	50	0.35
2,4-Dichlorophenol	June 7, 2021	ND	900	0.15
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

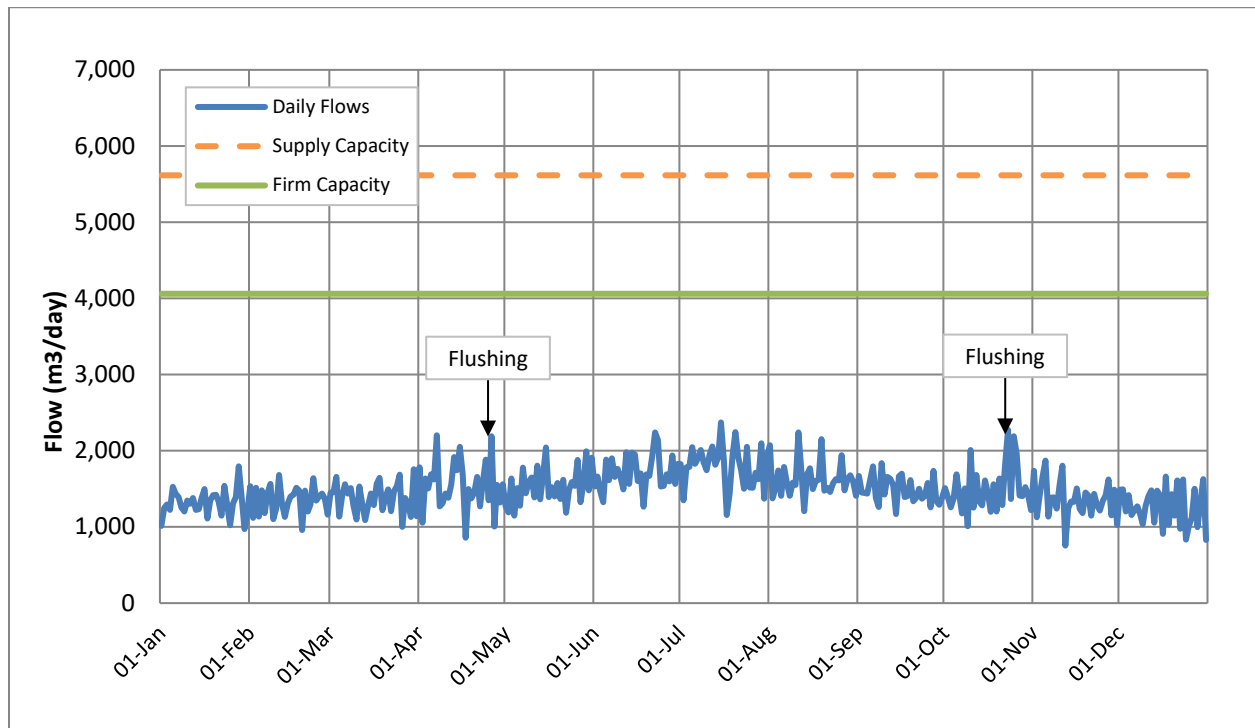
Tavistock Drinking Water System Firm Capacity 4,061 m³/ day

Tavistock Drinking Water System Supply Capacity 5,616 m³/ day

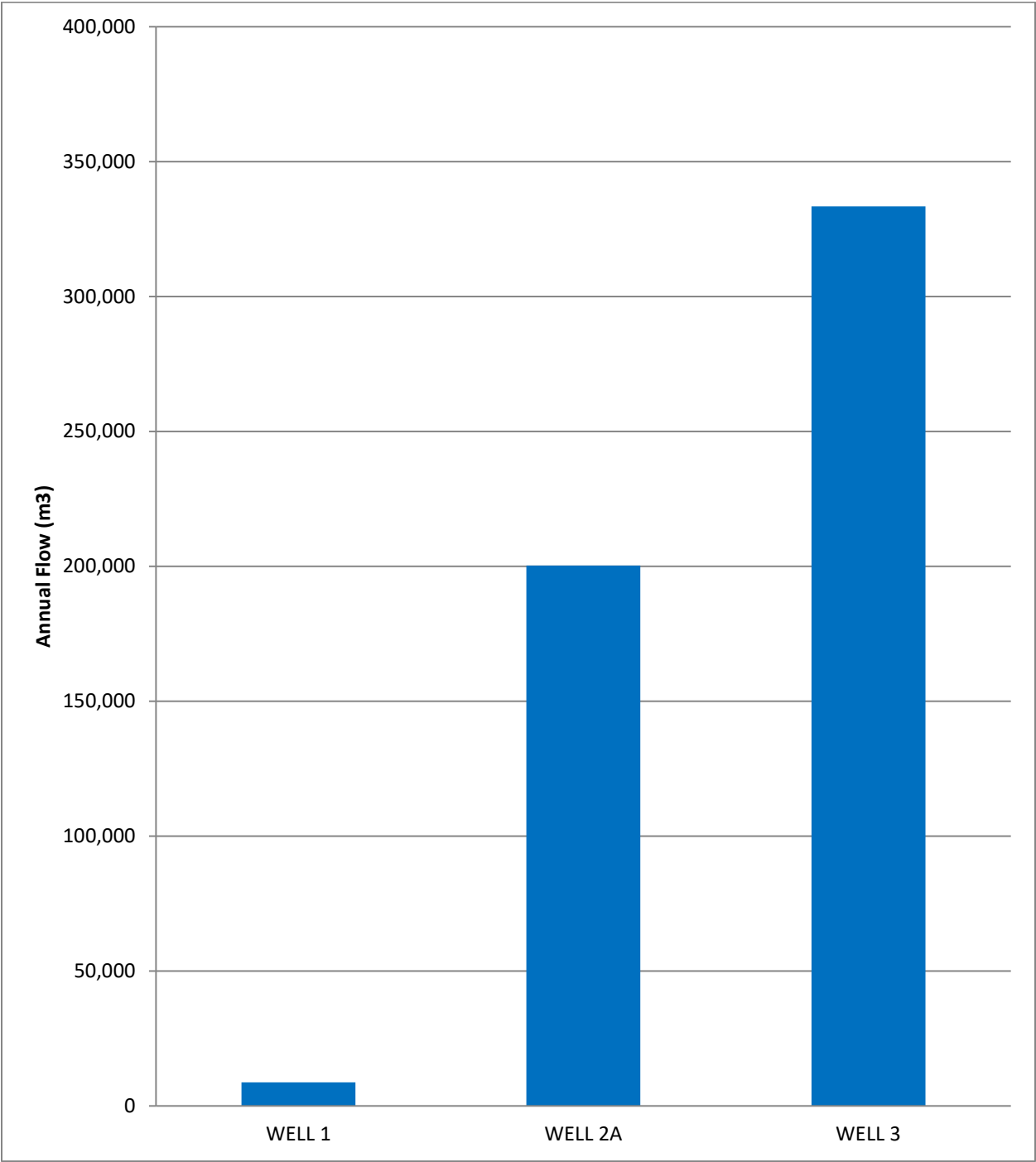
2022 Average vs Maximum Daily Flow Rates



2022 Daily Flow



2022 Total Production by Well



2022 Annual Drinking Water System Summary Report

Thamesford 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:	Thamesford Drinking Water System
Drinking Water System Number:	220000610
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 Thamesford Water System is a Large Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and serves a population of approximately 3000. The system consists of four well sources, Wells 1, 2 and 4 are classified as GUDI (Groundwater Under the Direct Influence of surface water) with effective in-situ filtration. Well 3 is a secure groundwater well. The water is treated by filtration for iron and manganese removal followed by disinfection by Ultra Violet (UV) light and sodium hypochlorite. In 2022, approximately 9,335 L of sodium hypochlorite was used in the water treatment process. The chemical is certified to meet standards set by the Standards Council of Canada or American National Standards Institute.

The 2,050 m³ water tower provides storage and maintains system pressure. A standby generator is available to run the facility in the event of a power failure. 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 Thamesford 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:

- \$228,000 R&M on Wells, Water Pump stations, and Water Treatment Facilities
- \$940,000 distribution replacements
- \$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 from the raw and treated water at the facility and from 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 sample 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 on the table below. There were no adverse test results from 215 treated water samples in this reporting period.

	<i>Number of Samples</i>	<i>Range of E. coli Results Min - Max MAC = 0</i>	<i>Range of Total Coliform Results Min - Max MAC = 0</i>
Raw	208	0	0 - 7
Treated	52	0	0
Distribution	163	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.

	<i>Number of Samples</i>	<i>Range of HPC Min - Max</i>
Treated	52	0 - 31
Distribution	39	0 - 55

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 and chemical parameters. 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 Thamesford Drinking Water System is provided below.

3.1 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, the 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 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 Thamesford is 26.0 mg/L.

3.2 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 Thamesford Drinking Water System was tested in 2022 and ranged from 366 – 402mg/L (21 - 24 grains/gallon)

3.3 Additional Testing Required by MECP

None.

4. OPERATIONAL MONITORING

4.1 Chlorine Residual

Free chlorine levels of the treated water are monitored continuously at the discharge point of the Water Treatment Facility. In the distribution system, free chlorine is checked twice weekly at various locations. 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 below 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.

<i>Parameter</i>	<i>Number of Tests or Monitoring Frequency</i>	<i>Range of Results (Min – Max) and Average</i>
Chlorine residual after treatment (mg/L)	Continuous	(0.84 – 2.41) 1.40
Chlorine residual in distribution (mg/L)	Continuous	(0.72 – 1.66) 1.19
Well 1 turbidity before treatment (NTU)	52	(0.07 – 1.37) 0.43
Well 2 turbidity before treatment (NTU)	52	(0.05 – 1.18) 0.27
Well 3 turbidity before treatment (NTU)	52	(0.08 – 1.60) 0.57
Well 4 turbidity before treatment (NTU)	52	(0.08 – 1.06) 0.32
Turbidity after treatment (NTU)	Continuous	(0.03 – 3.98) 0.04

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.

<i>Flow Summary</i>	<i>Quantity</i>
Permit to Take Water Limit	5,583 m ³ /d
Municipal Drinking Water License Limit	5,391 m ³ /d
2022 Average Daily Flow	685 m ³
2022 Maximum Daily Flow	1,746 m ³
2022 Average Monthly Flow	20,872 m ³
2022 Total Amount of Water Supplied	223,109 m ³

A review of the available supply capacity and the anticipated growth forecasted for the community indicates that the system has sufficient capacity over the 20 year planning horizon.

Firm Capacity of this system is rated at 2,765 m³/day and the GUDI portion of this is 1,468 m³/day. Firm Capacity is defined as the removal of the highest producing well in an emergency or operational / maintenance situation. This system comprises of four supply wells. Firm capacity could increase with confirmation of dam restoration.

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

At the time this report was drafted the results of the 2022 annual inspection by the MECP had not been finalized.

6.2 Adverse Results

Any adverse results from bacteriological, 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.

<i>Parameter</i>	<i>Number of Tests</i>	<i>Result Range Min – Max (mg/L)</i>	<i>Average Result (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Nitrite	4	ND	ND	1.0	0.003
Nitrate	4	1.95 – 3.66	2.86	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.

<i>Parameter</i>	<i>Annual Average</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Trihalomethane (THM)	2022	24.8	100	0.37
Haloacetic Acids (HAA)	2022	10.7	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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Sodium	May 21, 2019	26.0	20*	0.01
Fluoride	May 21, 2019	0.89	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.

<i>Parameter</i>	<i>Result Range (Min - Max)</i>	<i>Number of Samples</i>	<i>Acceptable Level</i>
Distribution Alkalinity 2022	248 – 284	4	30 – 500mg/L
Distribution pH 2022	7.23 – 7.64	4	6.5 – 8.5
Distribution Lead 2021	ND – 1.58	4	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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Antimony	May 30, 2022	ND	6	0.6
Arsenic	May 30, 2022	ND	10	0.2
Barium	May 30, 2022	62.3	1000	0.02
Boron	May 30, 2022	74	5000	2
Cadmium	May 30, 2022	ND	5	0.003
Chromium	May 30, 2022	0.23	50	0.08
Mercury	May 30, 2022	ND	1	0.01
Selenium	May 30, 2022	0.26	50	0.04
Uranium	May 30, 2022	0.35	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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Alachlor	May 30, 2022	ND	5	0.02
Atrazine + N-dealkylatedmetabolites	May 30, 2022	ND	5	0.01
Azinphos-methyl	May 30, 2022	ND	20	0.05
Benzene	May 30, 2022	ND	1	0.32
Benzo(a)pyrene	May 30, 2022	ND	0.01	0.004
Bromoxynil	May 30, 2022	ND	5	0.33
Carbaryl	May 30, 2022	ND	90	0.05
Carbofuran	May 30, 2022	ND	90	0.01
Carbon Tetrachloride	May 30, 2022	ND	2	0.17
Chlorpyrifos	May 30, 2022	ND	90	0.02
Chlorpyrifos	May 30, 2022	ND	90	0.02
Diazinon	May 30, 2022	ND	20	0.02
Dicamba	May 30, 2022	ND	120	0.20
1,2-Dichlorobenzene	May 30, 2022	ND	200	0.41
1,4-Dichlorobenzene	May 30, 2022	ND	5	0.36
1,2-Dichloroethane	May 30, 2022	ND	5	0.35
1,1-Dichloroethylene (vinylidene chloride)	May 30, 2022	ND	14	0.33
Dichloromethane	May 30, 2022	ND	50	0.35
2-4 Dichlorophenol	May 30, 2022	ND	900	0.15
2,4-Dichlorophenoxy acetic acid (2,4-D)	May 30, 2022	ND	100	0.19
Diclofop-methyl	May 30, 2022	ND	9	0.40

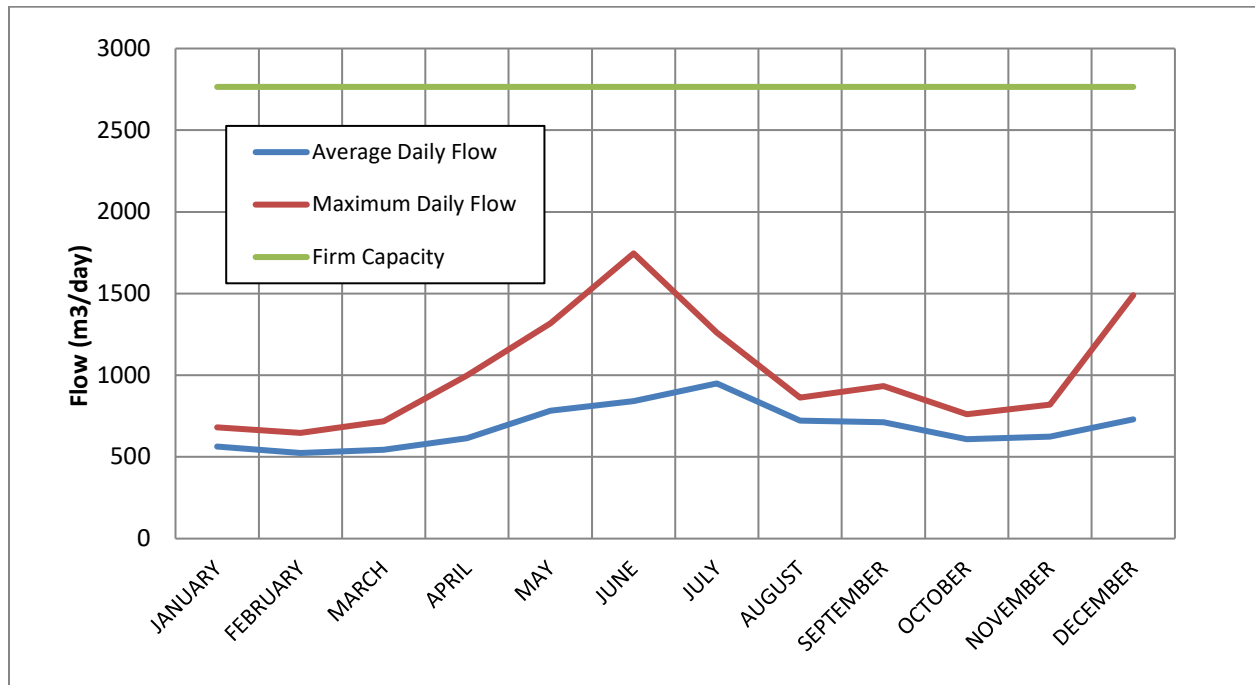
<i>Parameter</i>	<i>Sample Date</i>	<i>Result (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Dimethoate	May 30, 2022	ND	20	0.06
Diquat	May 30, 2022	ND	70	1
Diuron	May 30, 2022	ND	150	0.03
Glyphosate	May 30, 2022	ND	280	1
Malathion	May 30, 2022	ND	190	0.02
2-methyl-4chlorophenoxyacetic acid (MCPA)	May 30, 2022	ND	100	0.12
Metolachlor	May 30, 2022	ND	50	0.01
Metribuzin	May 30, 2022	ND	80	0.02
Monochlorobenzene	May 30, 2022	ND	80	0.30
Paraquat	May 30, 2022	ND	10	1
Pentachlorophenol	May 30, 2022	ND	60	0.15
Phorate	May 30, 2022	ND	2	0.01
Picloram	May 30, 2022	ND	190	1
Polychlorinated Biphenyls(PCB)	May 30, 2022	ND	3	0.04
Prometryne	May 30, 2022	ND	1	0.03
Simazine	May 30, 2022	ND	10	0.01
Terbufos	May 30, 2022	ND	1	0.01
Tetrachloroethylene	May 30, 2022	ND	10	0.35
2,3,4,6-Tetrachlorophenol	May 30, 2022	ND	100	0.20
Triallate	May 30, 2022	ND	230	0.01
Trichloroethylene	May 30, 2022	ND	5	0.44
2,4,6-Trichlorophenol	May 30, 2022	ND	5	0.25
Trifluralin	May 30, 2022	ND	45	0.02
Vinyl Chloride	May 30, 2022	ND	1	0.17

APPENDIX B: WATER QUANTITY SUMMARY

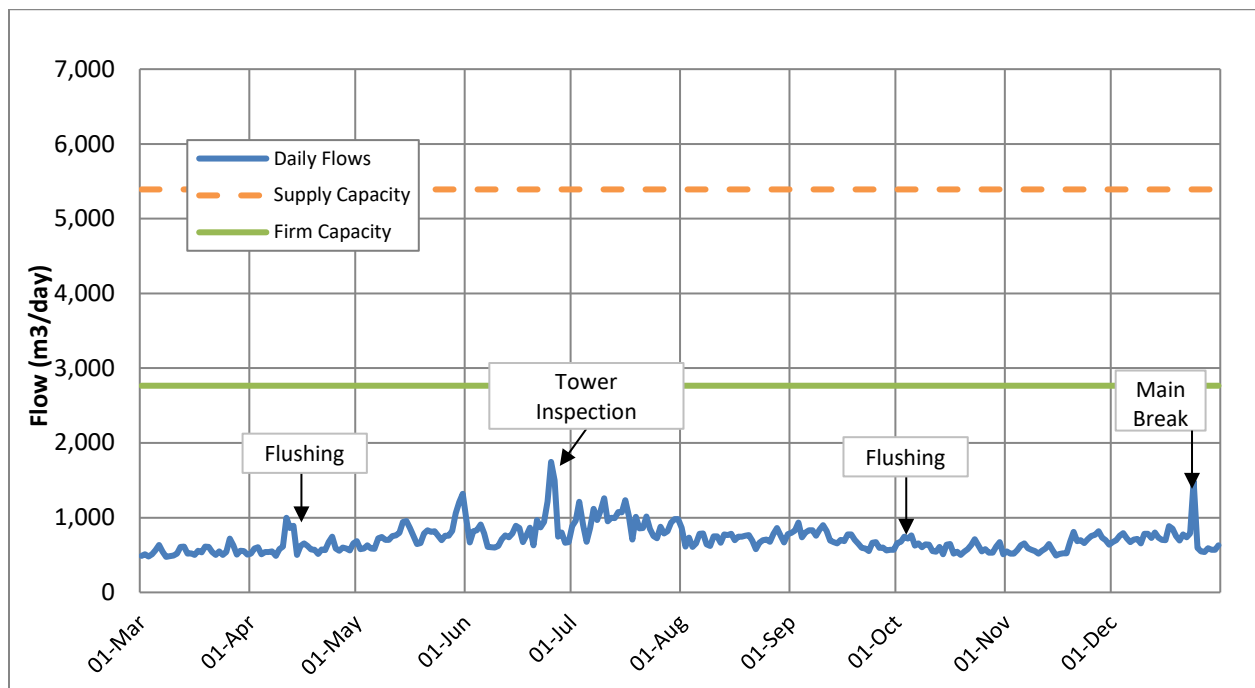
Thamesford Drinking Water System Firm Capacity 5,391 m³/ day

Thamesford Drinking Water System Supply Capacity 2,765 m³/ day

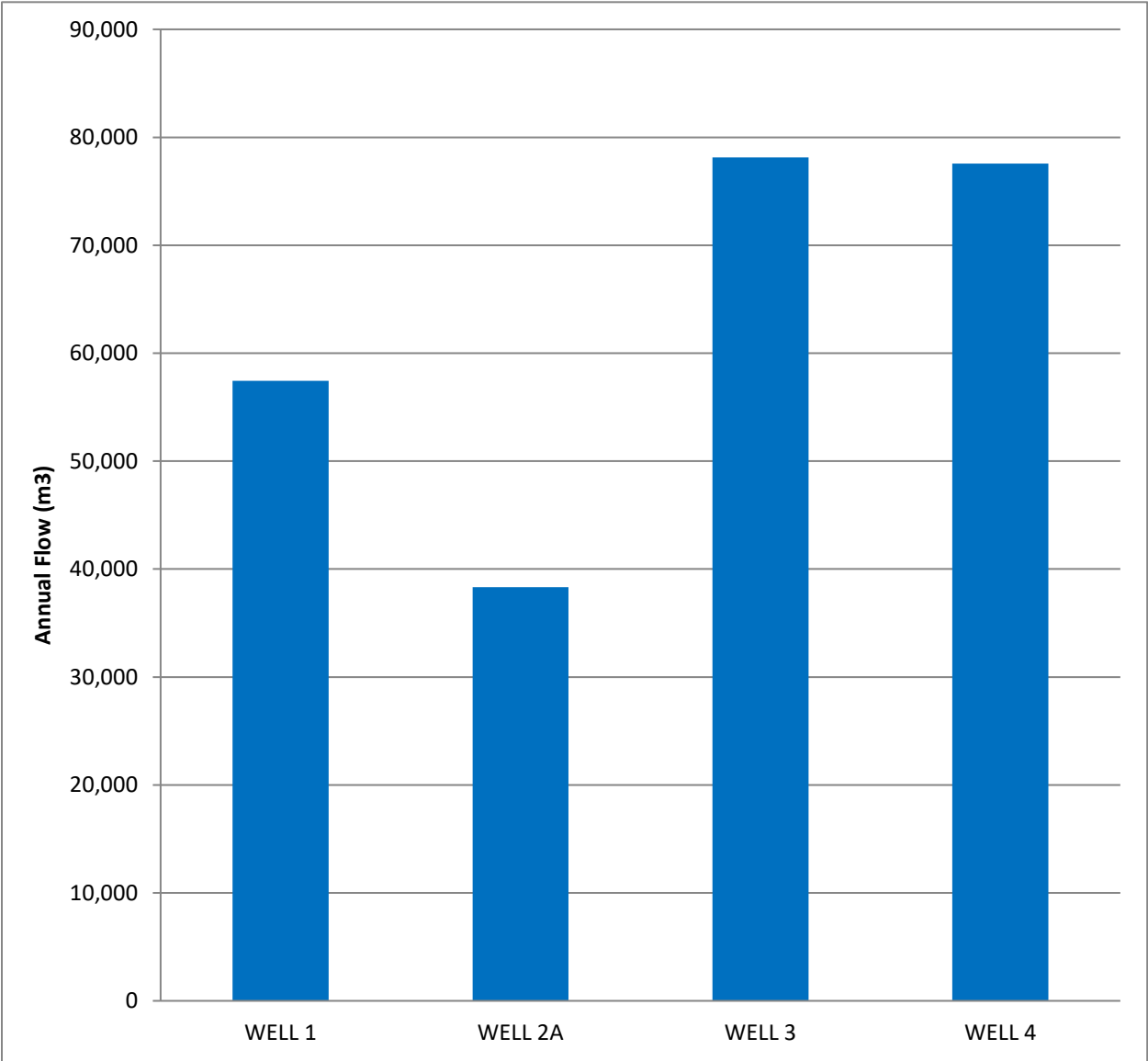
2022 Average vs Maximum Daily Flow Rates



2022 Daily Flow



2022 Total Production by Well



2022 Annual Drinking Water System Summary Report

Tillsonburg 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:	Tillsonburg Drinking Water System
Drinking Water System Number:	220000683
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 Tillsonburg Water System is a Large Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and services a population of approximately 19,120. The system consists of ten well sources, seven of which are classified as GUDI (Groundwater Under Direct Influence of surface water) with effective in-situ filtration (wells 1A, 2, 4, 5, 7A, 9 and 10) and three are secure groundwater wells (wells 6A, 11 and 12). The treatment for each site is summarized below.

<i>Treatment Facility</i>	<i>Wells</i>	<i>Treatment</i>
Mall Rd. WTF	1A & 2	Filtration for iron removal and disinfection with ultraviolet (UV) and chlorine gas.
Fairview WTF	4, 5 & 7A	Disinfection with chlorine gas (Well 4 and Well 5) and sodium hypochlorite (Well 7A), disinfection with UV and secondary disinfection with sodium hypochlorite.
Plank Line WTF	6A	Disinfection with chlorine gas.
Bell Mill Rd. WTF	9, 10 & 11	Filtration for iron removal and disinfection with UV and chlorine gas.
Rokeby Rd. WTF	12	Disinfection with chlorine gas.

The treatment facilities each house high lift pumps, monitoring and treatment equipment for the supply wells. Three standby generators are available to run Mall Rd, Fairview and Bell Mill facilities in the event of a power failure. Water storage and system pressure is provided by a 9,100 m³ reservoir located north of the Town of Tillsonburg. Fairview WTF boosts water to the north service area which is at a higher elevation.

In 2022, approximately 4,556 kg of chlorine gas and 7,800 L of sodium hypochlorite were used in the water treatment process. The chemicals are certified to meet standards set by the Standards Council of Canada or American National Standards Institute.

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 a failure of critical operational requirements.

1.2 Major Expenses

In 2022, the Tillsonburg Drinking Water System had forecasted operating and maintenance expenditures of approximately \$2,800,000.

In addition to regular operational and maintenance expenditures, Capital improvement projects for Tillsonburg totaled \$1,660,000 for improvements to water treatment systems and replacement of distribution mains in the Tillsonburg Drinking Water System.

Town of Tillsonburg Capital improvement projects included:

- \$ 970,000 watermain replacements
- \$ 225,000 well rehabilitations
- \$ 125,000 standby power
- \$ 97,000 boosted pressure watermain
- \$ 73,000 bulk water station

Capital Improvement projects for all County 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 from the raw and treated water at the facility and from 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 sample 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 on the table below. There were no adverse test results from 641 treated water samples in this reporting period.

	<i>Number of Samples</i>	<i>Range of E. coli Results Min - Max MAC = 0</i>	<i>Range of Total Coliform Results Min - Max MAC = 0</i>
Raw	468	0	0
Treated	260	0	0
Distribution	381	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 following table.

	<i>Number of Samples</i>	<i>Range of HPC Min - Max</i>
Treated	260	0 - 12
Distribution	102	0 – 480

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 and chemical parameters. 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 Tillsonburg Drinking Water System is provided below.

3.1 Sodium

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 sodium level in water from the Tillsonburg Fairview WTF is 40.8 mg/L. Well 6A at Plank Line has sodium at 39.3 mg/L, however it was not operational in 2022. All other water treatment facilities water supply is under 20 mg/L.

3.2 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 of the wells was tested in 2022 and ranged from 253 - 377 mg/L (15 - 22 grains/gallon).

3.3 Additional Testing Required by MECP

None.

4. OPERATIONAL MONITORING

4.1 Chlorine Residual

Free chlorine levels of the treated water are monitored continuously at the discharge point of the Water Treatment Facility. In the distribution system, free chlorine is checked twice weekly at various locations. 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 below in section 4.3.

4.2 Nitrate

Nitrate levels are continuously monitored at the discharge point of the Fairview Water Treatment Facility. A nitrate level higher than 10.0 mg/L must be reported and corrective action taken. There were 2 reportable incidents in 2022. Corrective actions taken are summarized in section 6.2. A summary of Fairview facility's nitrate level readings is provided in the table below in section 4.3.

4.3 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 following table.

<i>Parameter</i>	<i>Number of Tests or Monitoring Frequency</i>	<i>Range of Results (Min – Max) and Average</i>
Bell Mill Road WTF		
Chlorine residual after treatment (mg/L)	Continuous	(0.62 - 4.00) 1.49
Well 9 turbidity before treatment (NTU)	50	(0.33 – 22.0) 3.06
Well 10 turbidity before treatment (NTU)	50	(0.51 – 24.1) 5.21
Well 11 turbidity before treatment (NTU)	46	(0.20 – 27.5) 2.67
Turbidity after treatment (NTU)	Continuous	(0.02 – 5.00) 0.09
Fairview WTF		
Chlorine residual after treatment (mg/L)	Continuous	(0.31 – 2.41) 1.22
Nitrate level after treatment (mg/L)	Continuous	(1.76 – 11.18) 5.47
Well 4 turbidity before treatment (NTU)	49	(0.08 – 3.73) 0.41
Well 5 turbidity before treatment (NTU)	49	(0.06 – 1.29) 0.26

<i>Parameter</i>	<i>Number of Tests or Monitoring Frequency</i>	<i>Range of Results (Min – Max) and Average</i>
Well 7A turbidity before treatment (NTU)	50	(0.13 – 6.33) 0.96
Mall Road WTF		
Chlorine residual after treatment (mg/L)	Continuous	(0.90 – 3.11) 1.55
Well 1A turbidity before treatment (NTU)	50	(0.13 – 6.33) 0.77
Well 2 turbidity before treatment (NTU)	49	(0.10 – 3.70) 0.76
Turbidity after treatment (NTU)	Continuous	(0.02 – 4.00) 0.05
Plank Line WTF		
Chlorine residual after treatment (mg/L)	Continuous	Not running in 2022
Well 6A turbidity before treatment (NTU)	NA	Not running in 2022
Turbidity after treatment (NTU)	Continuous	Not running in 2022
Rokeby Road WTF		
Chlorine residual after treatment (mg/L)	Continuous	(0.71 – 2.54) 1.22
Well 12 turbidity before treatment (NTU)	50	(0.09 – 1.25) 0.39
Turbidity after treatment (NTU)	Continuous	(0.03 – 4.00) 0.08
Distribution System		
Chlorine residual in distribution (mg/L)	Continuous	(0.22 – 1.56) 0.93

4.4 Ultra Violet (UV) Disinfection

Supply wells that have been classified as being GUDI require “enhanced disinfection” through ultra violet light (UV) followed by chlorination. A minimum UV dosage of 40 mJ/cm² is maintained to inactivate any microorganisms that may be present from contact with surface water. Insufficient dosage of UV lasting more than 10 minutes must be reported as inadequate disinfection. There were no occurrences of inadequate UV disinfection in 2022.

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.

<i>Flow Summary</i>	<i>Quantity</i>
Permit to Take Water Limit	7,913 m ³ /d
Municipal Drinking Water License Limit	17,440 m ³ /d
2022 Average Daily Flow	5,623 m ³ /d
2022 Maximum Daily Flow	0, 003 m ³ /d
2022 Average Monthly Flow	171,036 m ³
2022 Total Amount of Water Supplied	2,052,427 m ³

A review of the available supply capacity and the anticipated growth forecasted for the community indicates that the system has sufficient capacity over the 20 year planning horizon.

Firm Capacity of this system is rated at 10,627 m³/day. 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 m³/day if necessary to maintain system integrity. This system comprises of 10 supply wells, seven of which are GUDI. The GUDI wells contribute 6,739 m³/day to the firm capacity.

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

At the time this report was drafted, the results of the 2022 annual inspection by the MECP had not been finalized.

6.2 Adverse Results

Any adverse results from bacteriological, chemical samples or observations of operational conditions that indicate adverse water quality are reported as required and corrective actions are taken. Tillsonburg had 2 AWQIs related to nitrate concentrations (greater than 10 mg/L) in the treated water reported to the MECP and MOH in July, 2022. Both AWQIs occurred when the online nitrate analyzer at the Fairview water treatment facility detected a nitrate concentration above acceptable ODWS levels and locked out as designed within two minutes. More conservative lock out procedures were adopted following these incidents to shut down prior to any amount of water exceeding the ODWS level from reaching the analyzer.

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.

<i>Parameter</i>	<i>Number of Tests or monitoring frequency</i>	<i>Result Range (Min – Max) Average (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Nitrite			1.0	0.003
Bell Mill Road WTF	4	ND		
Fairview WTF	44	ND – 0.08 (ND)		
Mall Road WTF	4	ND		
Plank Line WTF +	NA	NA		
Rokeby Road WTF	5	ND		
Nitrate			10.0	0.006
Bell Mill Road WTF	4	(3.38 – 4.44) 3.84		
Fairview WTF	44*	(5.14 – 9.12) 6.41		
Mall Road WTF	4	(2.02 – 2.38) 2.18		
Plank Line WTF +	NA	NA		
Rokeby Road WTF	5	(4.94 – 5.92) 5.42		

*Additional samples are taken at Fairview WTF to confirm accuracy of the continuously monitored nitrate analyzer.
+ Plank Ln. WTF not running in 2022

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.

<i>Parameter</i>	<i>Annual Average</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Trihalomethane (THM)	2022	31.0	100	0.37
Haloacetic Acids (HAA)	2022	5.9	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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Sodium			20*	0.01
Bell Mill Road WTF	August 16, 2021	6.5		
Fairview WTF	May 27, 2019	40.8		
Mall Road WTF	August 16, 2021	11.1		
Plank Line WTF +	August 22, 2016	39.3		
Rokeby Road WTF	August 16, 2021	2.6		
Fluoride			1.5**	0.06
Bell Mill Road WTF	August 16, 2021	0.07		
Fairview WTF	May 27, 2019	0.35		
Mall Road WTF	August 16, 2021	ND		
Plank Line WTF +	August 22, 2016	1.51		
Rokeby Road WTF	August 16, 2021	ND		

*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.

+ Not running in 2022.

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.

<i>Parameter</i>	<i>Result Range (Min - Max)</i>	<i>Number of Samples</i>	<i>Acceptable Level</i>
Distribution Alkalinity 2022	180 - 252	8	30 – 500mg/L
Distribution pH 2022	7.41 – 7.76	8	6.5 – 8.5
Distribution Lead 2021	0.08 – 1.32	8	10 µg/L MAC

Table (A) summarizes 2022 Schedule 23 test results for Bell Mill Rd., Fairview and Mall Rd. Testing is required annually for GUDI wells.

<i>(A) Parameter</i>	<i>Results (µg/L) Bell Mill Rd. WTF (Nov. 21, 2022)</i>	<i>Results (µg/L) Fairview WTF (Nov. 21, 2022)</i>	<i>Results (µg/L) Mall Rd. WTF (Nov. 21, 2022)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Antimony	ND	ND	ND	6	0.6
Arsenic	ND	2.9	0.2	10	0.2
Barium	35.9	210	71.8	1000	0.02
Boron	18	88	18	5000	2
Cadmium	0.005	0.011	0.017	5	0.003
Chromium	0.24	0.3	0.15	50	0.08

(A) Parameter	Results (µg/L) Bell Mill Rd. WTF (Nov. 21, 2022)	Results (µg/L) Fairview WTF (Nov. 21, 2022)	Results (µg/L) Mall Rd. WTF (Nov. 21, 2022)	MAC (µg/L)	MDL (µg/L)
Mercury	ND	ND	ND	1	0.01
Selenium	0.33	0.38	0.31	50	0.04
Uranium	0.664	0.314	2.31	20	0.002

Table (B) summarizes the most recent Schedule 23 test results for Plank Ln. and Rokeby Rd. Testing is required every 3 years for secure, Non-GUDI wells.

(B) Parameter	Results (ug/L) Plank Line WTF June 6/16 +	Results (ug/L) Rokeby Road WTF May 30/22	MAC (µg/L)	MDL (µg/L)
Antimony	ND	ND	6	0.6
Arsenic	10.0	ND	10	0.2
Barium	52.4	26.7	1000	0.02
Boron	153	23	5000	2
Cadmium	ND	0.008	5	0.003
Chromium	3.94	0.68	50	0.08
Mercury	ND	ND	1	0.01
Selenium	0.09	0.39	50	0.04
Uranium	0.185	1.31	20	0.002

+ Plank Ln. WTF not running in 2022

Table (C) summarizes 2022 Schedule 24 Organic parameters test results for Bell Mill Rd., Fairview and Mall Rd. Testing is required annually for GUDI wells.

(C) Parameter	Results (µg/L) Bell Mill Rd. WTF (Nov. 21, 2022)	Results (µg/L) Fairview WTF (Nov. 21, 2022)	Results (µg/L) Mall Rd. WTF (Nov. 21, 2022)	MAC (µg/L)	MDL (µg/L)*
Alachlor	ND	ND	ND	5	0.02
Atrazine + N-dealkylatedmetabolites	ND	ND	ND	5	0.01
Azinphos-methyl	ND	ND	ND	20	0.05
Benzene	ND	ND	ND	1	0.32
Benzo(a)pyrene	ND	ND	ND	0.01	0.004
Bromoxynil	ND	ND	ND	5	0.33
Carbaryl	ND	ND	ND	90	0.05
Carbofuran	ND	ND	ND	90	0.01
Carbon Tetrachloride	ND	ND	ND	2	0.17
Chlorpyrifos	ND	ND	ND	90	0.02
Diazinon	ND	ND	ND	20	0.02
Dicamba	ND	ND	ND	120	0.20
1,2-Dichlorobenzene	ND	ND	ND	200	0.41
1,4-Dichlorobenzene	ND	ND	ND	5	0.36
1,2-Dichloroethane	ND	ND	ND	5	0.35
1,1-Dichloroethylene (vinylidene chloride)	ND	ND	ND	14	0.33
Dichloromethane	ND	ND	ND	50	0.35
2-4 Dichlorophenol	ND	ND	ND	900	0.15

(C) Parameter	Results (µg/L) Bell Mill Rd. WTF (Nov. 21, 2022)	Results (µg/L) Fairview WTF (Nov. 21, 2022)	Results (µg/L) Mall Rd. WTF (Nov. 21, 2022)	MAC (µg/L)	MDL (µg/L)*
2,4-Dichlorophenoxy acetic acid (2,4-D)	ND	ND	ND	100	0.19
Diclofop-methyl	ND	ND	ND	9	0.40
Dimethoate	ND	ND	ND	20	0.06
Diquat	ND	ND	ND	70	1
Diuron	ND	ND	ND	150	0.03
Glyphosate	ND	ND	ND	280	1
Malathion	ND	ND	ND	190	0.02
2-methyl-4chlorophenoxyacetic acid (MCPA)	ND	ND	ND	100	0.12
Metolachlor	ND	ND	ND	50	0.01
Metribuzin	ND	ND	ND	80	0.02
Monochlorobenzene	ND	ND	ND	80	0.30
Paraquat	ND	ND	ND	10	1
Pentachlorophenol	ND	ND	ND	60	0.15
Phorate	ND	ND	ND	2	0.01
Picloram	ND	ND	ND	190	1
Polychlorinated Biphenyls(PCB)	ND	ND	ND	3	0.04
Prometryne	ND	ND	ND	1	0.03
Simazine	ND	ND	ND	10	0.01
Terbufos	ND	ND	ND	1	0.01
Tetrachloroethylene	ND	ND	ND	10	0.35
2,3,4,6-Tetrachlorophenol	ND	ND	ND	100	0.20
Triallate	ND	ND	ND	230	0.01
Trichloroethylene	ND	ND	ND	5	0.44
2,4,6-Trichlorophenol	ND	ND	ND	5	0.25
Trifluralin	ND	ND	ND	45	0.02
Vinyl Chloride	ND	ND	ND	1	0.17

*2022 Method Detection Limit (MDL) Stated

Table (D) and Rokeby Rd. Testing is required every 3 years for secure, Non-GUDI wells. Plank Ln. WTF has not run since 2016.

(D) Parameter	Results (µg/L) Plank Ln. WTF June 6, 2016 +	Results (µg/L) Rokeby Rd. WTF June 7, 2021	MAC (µg/L)	Plank MDL (µg/L)	Rokeby MDL (µg/L)
Alachlor	ND	ND	5	0.02	0.02
Atrazine + N-dealkylatedmetabolites	ND	0.02	5	0.01	0.01
Azinphos-methyl	ND	ND	20	0.01	0.05
Benzene	ND	ND	1	0.32	0.32
Benzo(a)pyrene	ND	ND	0.01	0.004	0.004
Bromoxynil	ND	ND	5	0.33	0.33
Carbaryl	ND	ND	90	0.05	0.05
Carbofuran	ND	ND	90	0.01	0.01
Carbon Tetrachloride	ND	ND	2	0.16	0.17

<i>(D) Parameter</i>	<i>Results (µg/L) Plank Ln. WTF June 6, 2016 +</i>	<i>Results (µg/L) Rokeby Rd. WTF June 7, 2021</i>	<i>MAC (µg/L)</i>	<i>Plank MDL (µg/L)</i>	<i>Rokeby MDL (µg/L)</i>
Chlorpyrifos	ND	ND	90	0.002	0.02
Diazinon	ND	ND	20	0.02	0.02
Dicamba	ND	ND	120	0.02	0.20
1,2-Dichlorobenzene	ND	ND	200	0.20	0.41
1,4-Dichlorobenzene	ND	ND	5	0.41	0.36
1,2-Dichloroethane	ND	ND	5	0.36	0.35
1,1-Dichloroethylene (vinylidene chloride)	ND	ND	14	0.35	0.33
Dichloromethane	ND	ND	50	0.33	0.35
2,4 Dichlorophenol	ND	ND	900	0.35	0.15
2,4-Dichlorophenoxy acetic acid (2,4-D)	ND	ND	100	0.15	0.19
Diclofop-methyl	ND	ND	9	0.19	0.40
Dimethoate	ND	ND	20	0.40	0.06
Diquat	ND	ND	70	0.03	1
Diuron	ND	ND	150	1	0.03
Glyphosate	ND	ND	280	0.03	1
Malathion	ND	ND	190	1	0.02
2-methyl- 4chlorophenoxyacetic acid (MCPA) *	*	ND	100	0.02	0.12
Metolachlor	ND	ND	50	0.12	0.01
Metribuzin	ND	ND	80	0.01	0.02
Monochlorobenzene	ND	ND	80	0.02	0.30
Paraquat	ND	ND	10	0.30	1
Pentachlorophenol	ND	ND	60	1	0.15
Phorate	ND	ND	2	0.15	0.01
Picloram	ND	ND	190	0.01	1
Polychlorinated Biphenyls(PCB)	ND	ND	3	1	0.04
Prometryne	ND	ND	1	0.04	0.03
Simazine	ND	ND	10	0.03	0.01
Terbufos	ND	ND	1	0.01	0.01
Tetrachloroethylene	ND	ND	10	0.01	0.35
2,3,4,6-Tetrachlorophenol	ND	ND	100	0.35	0.20
Triallate	ND	ND	230	0.14	0.01
Trichloroethylene	ND	ND	5	0.01	0.44
2,4,6-Trichlorophenol	ND	ND	5	0.43	0.25
Trifluralin	ND	ND	45	0.25	0.02
Vinyl Chloride	ND	ND	1	0.02	0.17

+ Plank Ln. WTF not running in 2022

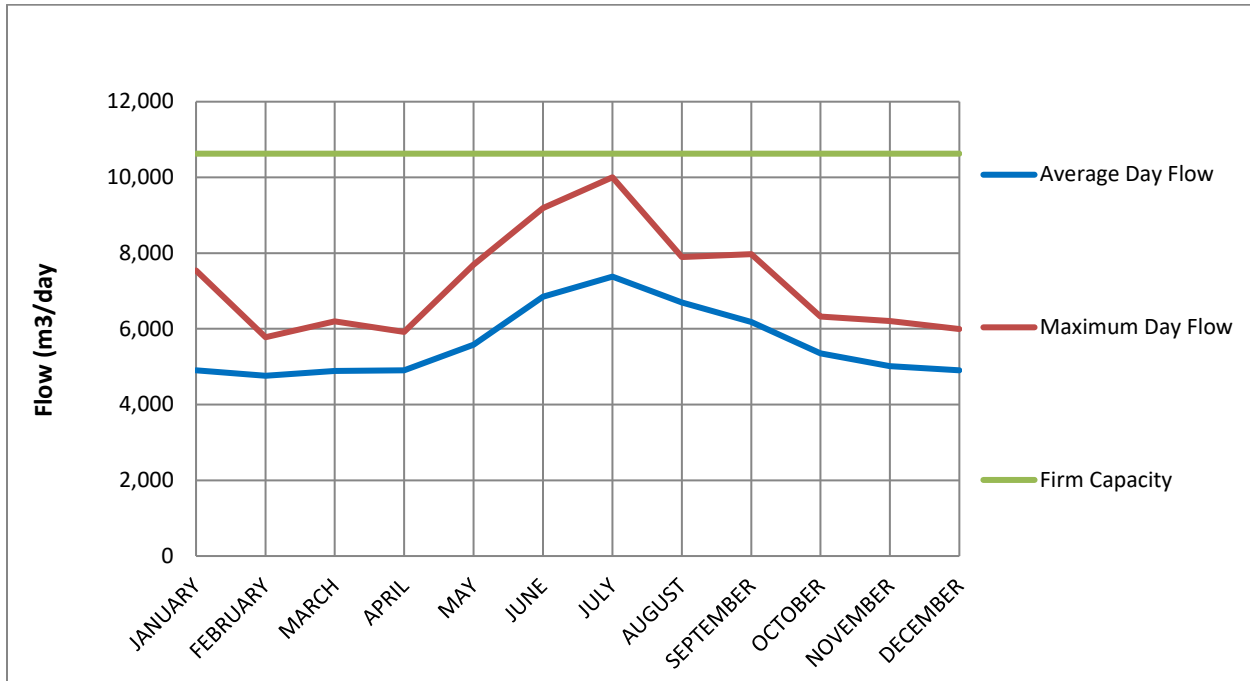
* MCPA was added in 2017

APPENDIX B: WATER QUANTITY SUMMARY

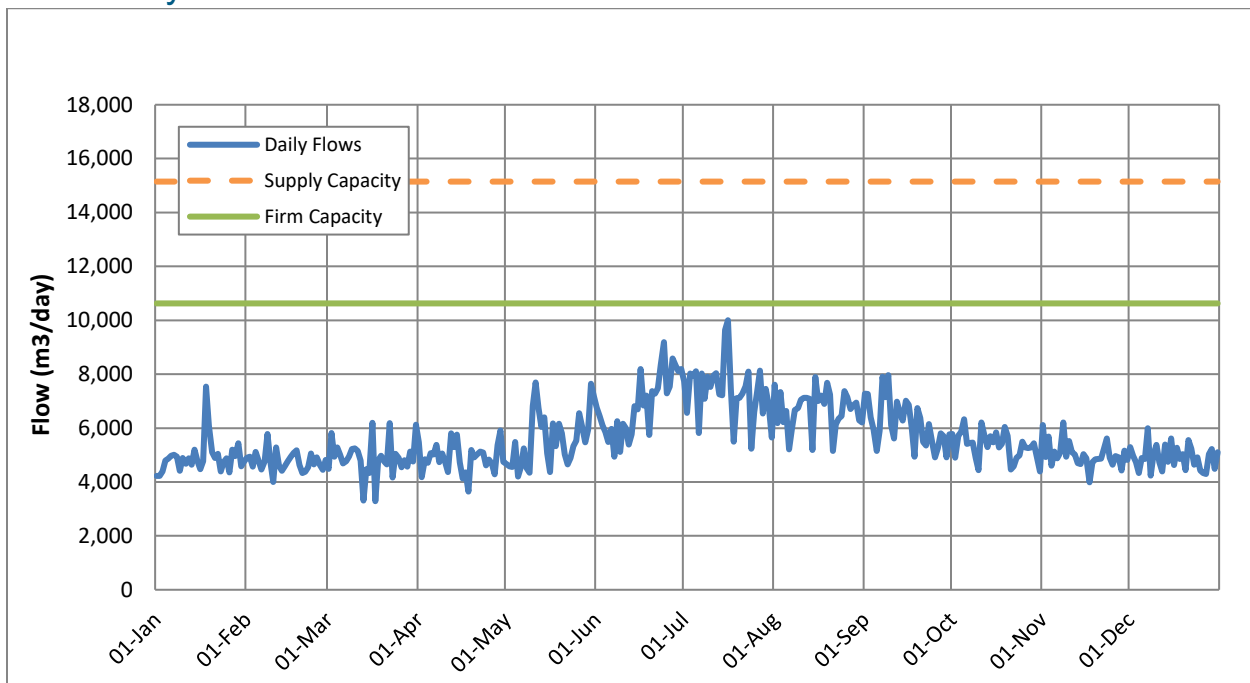
Tillsonburg Drinking Water System Firm Capacity 10,627 m³/ day

Tillsonburg Drinking Water System Supply Capacity 15,300 m³/ day

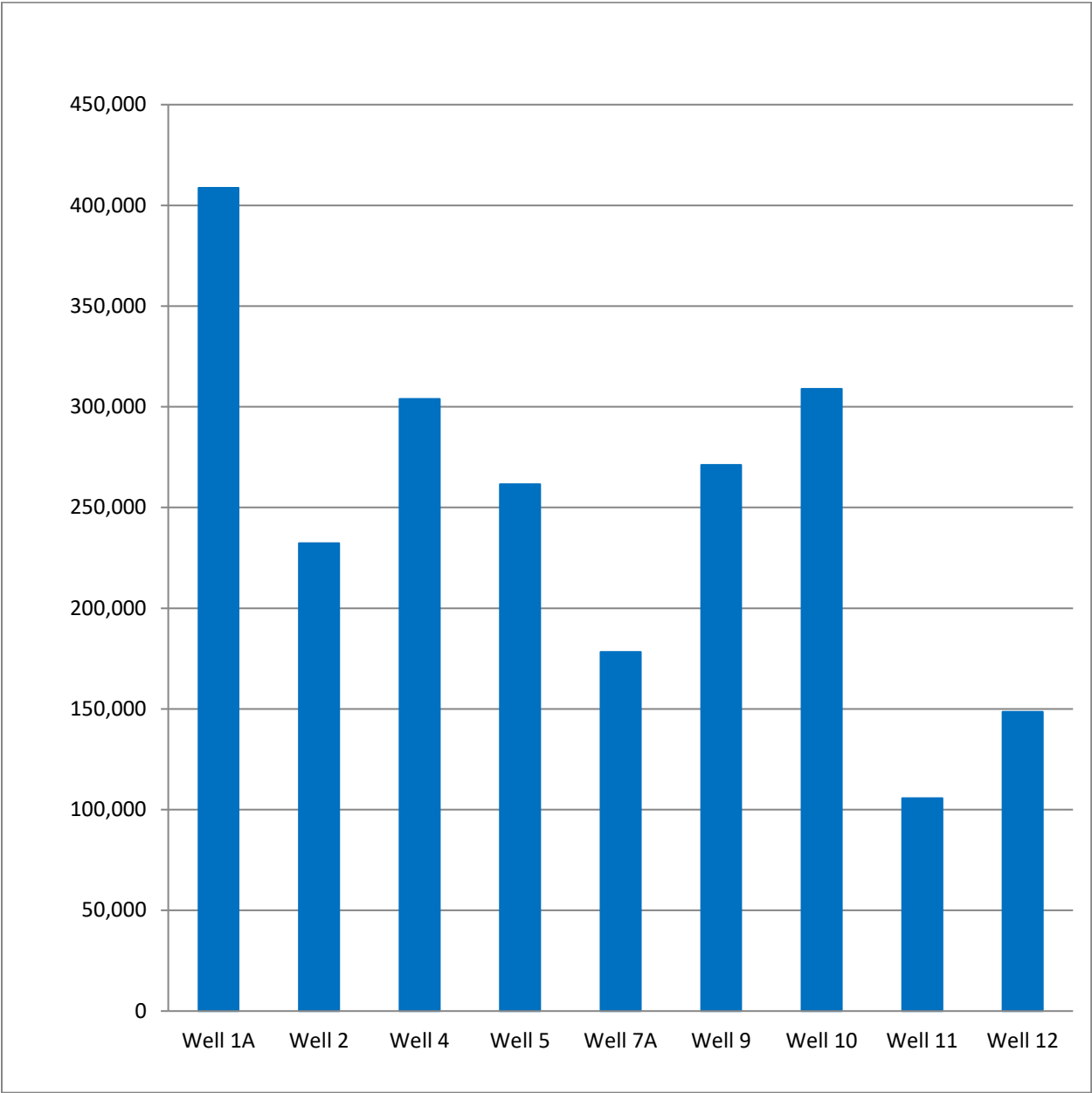
Average vs Maximum Daily Flow Rates



2022 Daily Flow



2022 Total Production by Well





2022 Annual Drinking Water System Summary Report

Woodstock 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:	Woodstock Drinking Water System
Drinking Water System Number:	220000709
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 Woodstock Drinking Water System is a Large Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and serves a population of approximately 48,722. The system consists of 11 well sources, six of which are classified as GUDI (Groundwater Under Direct Influence of surface water) with effective in-situ filtration (wells 1, 2, 3, 4, 5 and 8) and five which are secure groundwater wells (wells 6, 7, 9, 11, 12).

The Woodstock Water System consists of four water treatment facilities (WTF), as follows:

Treatment Facility	Wells	Treatment
Thornton WTF	1, 2, 3, 4, 5, 8 & 11	Ultra violet (UV) light and gas chlorination for disinfection.
Southside WTF	6 & 9	Disinfection with gas chlorination & sodium hypochlorite respectively.
Sutherland WTF	7	Filtration for iron removal and disinfection with gas chlorination.
Trillium Line WTF	12	Disinfection with sodium hypochlorite.

The treatment facilities each house high lift pumps, monitoring equipment, and treatment equipment for the supply wells. In 2022, approximately 10,540 kg of chlorine gas and 3,600 L of sodium hypochlorite was used in the water treatment process. Chlorine gas and sodium hypochlorite are certified to meet standards set by the Standards Council of Canada or American National Standards Institute.

Approximately 32,745 m³ of water storage is provided within the Bower Hill and Southside Park reservoirs and the Northwest and East water towers. There are pressure boosting stations on Athlone Street, Nellis Street, County Road 17, and Universal Road that maintains pressure and monitors chlorine residual in segments of the distribution system.

1.2 Major Expenses

In 2022 the Woodstock Drinking Water System had operating and maintenance expenditures of approximately \$5,300,000.

Operations and maintenance expenditures included:

In addition to regular operational and maintenance expenditures, Capital Improvement Woodstock Drinking Water System totaled \$11,202,000 for improvements to water treatment systems and replacement of distribution mains in the Woodstock System.

Woodstock Capital Improvement Projects included:

- \$ 4,400,000 CR4 & Lansdowne watermain
- \$ 4,000,000 CR17 watermain design/construction
- \$ 1,640,000 watermain replacements
- \$ 300,000 Thornton feedermain assessment

Capital Improvement projects for all County 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 from the raw and treated water at the facility and from 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 sample 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 on the table below. There were no adverse test results from 1,343 treated water samples in this reporting period.

	<i>Number of Samples</i>	<i>Range of E. coli Results Min - Max MAC = 0</i>	<i>Range of Total Coliform Results Min - Max MAC = 0</i>
Raw	573	0	0 - 4
Treated	395	0	0
Distribution	948	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.

	<i>Number of Samples</i>	<i>Range of HPC Min - Max</i>
Treated	208	0 - 310
Distribution	185	0 - 145

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 and chemical parameters. 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 Woodstock Drinking Water System is provided below.

3.1 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 the 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 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 to control their sodium intake.

Elevated sodium levels are common in water from the Woodstock's Sutherland WTF which averaged 83.3 mg/L from samples collected in 2021.

3.2 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 of the wells was tested in 2022 and ranged from 324 - 693 mg/L (19 - 41 grains/gallon).

3.3 Additional Testing Required by MECP

Weekly nitrate samples of the treated water from Thornton WTF are required by the Municipal Drinking Water License issued June 9, 2020. Nitrate concentrations must be less than 10.0 mg/L in drinking water. The 2022 weekly nitrate results from the Thornton WTF ranged from 4.96 to 6.97 mg/L.

4. OPERATIONAL MONITORING

4.1 Chlorine Residual

Free chlorine levels of the treated water are monitored continuously at the discharge point of the Water Treatment Facility. In the distribution system, free chlorine is checked twice weekly at various locations. 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 below in section 4.2.

4.2 Turbidity

Turbidity of treated water is continuously monitored at the treatment facilities 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.

<i>Parameter</i>	<i>Number of Tests or Monitoring Frequency</i>	<i>Range of Results (Min – Max) and Average</i>
Thornton WTF after treatment		
Chlorine residual after treatment (mg/L)	Continuous	(0.50 – 1.62) 1.31
Well 1 Turbidity (NTU)	52	(0.03 – 0.64) 0.19
Well 2 Turbidity (NTU)	52	(0.04 – 1.22) 0.21
Well 3 Turbidity (NTU)	52	(0.03 – 0.98) 0.20
Well 4 Turbidity (NTU)	52	(0.04 – 0.95) 0.20
Well 5 Turbidity (NTU)	49	(0.02 – 0.64) 0.29
Well 8 Turbidity (NTU)	52	(0.04 – 0.58) 0.19
Well 11 Turbidity (NTU)	52	(0.01 – 1.12) 0.18
Turbidity after treatment (NTU)	Continuous	(0.01 – 4.00) 0.02
Southside WTF		
Chlorine residual after treatment (mg/L)	Continuous	(0.29 – 1.99) 1.27
Well 6 Turbidity (NTU)	52	(0.15 – 0.72) 0.39
Well 9 Turbidity (NTU)	52	(0.07 – 0.90) 0.27
Turbidity after treatment (NTU)	Continuous	(0.03 - 1.75) 0.05
Sutherland WTF		

<i>Parameter</i>	<i>Number of Tests or Monitoring Frequency</i>	<i>Range of Results (Min – Max) and Average</i>
Chlorine residual after treatment (mg/L)	Continuous	(0.15 – 2.20) 1.19
Well 7 Turbidity (NTU)	53	(0.14 – 0.94) 0.49
Turbidity after treatment (NTU)	Continuous	(0.05 – 4.00) 0.08
Trillium Line WTF		
Chlorine residual after treatment (mg/L)	Continuous	(0.49 – 3.8) 1.33
Well 12 Turbidity (NTU)	52	(0.11 – 3.39) 0.41
Turbidity after treatment (NTU)	Continuous	(0.03 – 5.00) 0.07
Distribution System		
Distribution chlorine residual (mg/L)	Continuous	(0.71 – 2.43) 1.11

4.3 Ultra Violet (UV) Disinfection

Supply wells that have been classified as being GUDI require “enhanced disinfection” through ultra violet light (UV) followed by chlorination. A minimum UV dosage of 40 mJ/cm² is maintained to inactivate any microorganisms that may be present from contact with surface water. Insufficient dosage of UV lasting more than 10 minutes must be reported as inadequate disinfection. There were no occurrences of inadequate UV disinfection in 2022.

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.

<i>Flow Summary</i>	<i>Quantity</i>
Permit to Take Water Limit	57,775 m ³ /d
Municipal Drinking Water License Limit	56,325 m ³ /d
2022 Average Daily Flow	15,246 m ³ /d
2022 Maximum Daily Flow	22,840 m ³ /d
2022 Average Monthly Flow	463,737 m ³
2022 Total Amount of Water Supplied	5,564,839 m ³

A review of the available supply capacity and the anticipated growth forecasted for the community indicates that the system has sufficient capacity over the 20 year planning horizon.

Firm Capacity of this system is rated at 45,533 m³/day. Firm Capacity is defined as the removal of the highest producing well in an emergency or operational / maintenance situation. This system comprises of 11 supply wells, 6 of which are GUDI. The GUDI wells contribute 30,772 m³/day of the Firm Capacity.

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

At the time that this report was drafted the annual MECP drinking water system inspection had not yet been conducted.

6.2 Adverse Results

Any adverse results from bacteriological, 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.

<i>Parameter</i>	<i>Number of Tests or monitoring frequency</i>	<i>Result Range Min – Max (average) (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Nitrite			1.0	0.003
Thornton WTF	Weekly	ND – 0.01 (ND)		
Southside WTF	4	ND		
Sutherland WTF	4	ND		
Trillium Line WTF	4	ND		
Nitrate			10.0	0.006
Thornton WTF	Weekly	4.96 – 6.97 (5.81)		
Southside WTF	4	4.35 – 5.02 (4.79)		
Sutherland WTF	4	0.009 – 0.366 (0.101)		
Trillium Line WTF	4	1.94 – 2.12 (2.00)		

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.

<i>Parameter</i>	<i>Annual Average</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Trihalomethane (THM)	2022	7.1	100	0.37
Haloacetic Acids (HAA)	2022	ND	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.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Sodium			20*	0.01
Thornton WTF	May 27, 2019	14.4		
Southside WTF	March 12, 2018	17.0		
Sutherland WTF	August 16, 2021 +	88.3 +		
Trillium Line WTF	August 16, 2021	19.9		
Fluoride			1.5**	0.06
Thornton WTF	May 27, 2019	0.27		
Southside WTF	March 12, 2018	0.41		
Sutherland WTF	August 16, 2021	0.98		
Trillium Line WTF	August 17, 2021	0.41		

*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.

+ Average result, the date indicates the date the first sample was taken

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.

<i>Parameter</i>	<i>Result Range (Min - Max)</i>	<i>Number of Samples</i>	<i>Acceptable Level</i>
Distribution Alkalinity 2022	253 - 286	8	30 – 500mg/L
Distribution pH 2022	7.20 – 7.66	8	6.5 – 8.5
Distribution Lead 2021	0.08 – 1.32	8	10 µg/L MAC

The following Table summarizes the most recent test results for Schedule 23. Testing is required annually for GUDI wells at Thornton. Testing is required every 3 years for secure, Non-GUDI wells at Southside, Sutherland and Trillium Line.

<i>Parameter</i>	<i>Results (µg/L) Thornton WTF Nov. 21, 2022</i>	<i>Results (µg/L) Southside WTF (Nov. 21, 2022)</i>	<i>Results (µg/L) Sutherland WTF (June 7, 2021)</i>	<i>Results (µg/L) Trillium Line WTF (Feb. 28, 2022)</i>	<i>MAC (µg/L)</i>	<i>MDL* (µg/L)</i>
Antimony	ND	ND	ND	ND	6	0.6
Arsenic	0.2	0.2	0.4	ND	10	0.2
Barium	63.3	55.9	172	82.9	1000	0.02
Boron	15	40	77	11	5000	2
Cadmium	0.012	0.011	ND	0.005	5	0.003
Chromium	0.25	0.39	0.21	0.34	50	0.08
Mercury	ND	ND	ND	ND	1	0.01
Selenium	0.51	0.34	ND	0.16	50	0.04
Uranium	0.937	0.823	0.142	1.22	20	0.002

*2022 Method Detection Limit (MDL) Stated

The following Table summarizes the Organic parameters in Schedule 24 sampled during this reporting period or the most recent sample results. Testing is required annually for GUDI wells at Thornton. Testing is required annually every 3 years for secure, Non-GUDI wells at Southside, Sutherland and Trillium Line.

<i>Parameter</i>	<i>Results (µg/L) Thornton WTF (Nov. 21, 2022)</i>	<i>Results (µg/L) Southside WTF (Nov. 21, 2022)</i>	<i>Results (µg/L) Sutherland WTF (June 7, 2021)</i>	<i>Results (µg/L) Trillium Line WTF (Feb. 22, 2022)</i>	<i>MAC (µg/L)</i>	<i>MDL* (µg/L)</i>
Alachlor	ND	ND	ND	ND	5	0.02
Atrazine + N-dealkylatedmetabolites	ND	ND	ND	ND	5	0.01
Azinphos-methyl	ND	ND	ND	ND	20	0.05
Benzene	ND	ND	ND	ND	1	0.32
Benzo(a)pyrene	ND	ND	ND	ND	0.01	0.004
Bromoxynil	ND	ND	ND	ND	5	0.33
Carbaryl	ND	ND	ND	ND	90	0.05
Carbofuran	ND	ND	ND	ND	90	0.01
Carbon Tetrachloride	ND	ND	ND	ND	2	0.17
Chlorpyrifos	ND	ND	ND	ND	90	0.02
Chlorpyrifos	ND	ND	ND	ND	90	0.02
Diazinon	ND	ND	ND	ND	20	0.02
Dicamba	ND	ND	ND	ND	120	0.20
1,2-Dichlorobenzene	ND	ND	ND	ND	200	0.41
1,4-Dichlorobenzene	ND	ND	ND	ND	5	0.36
1,2-Dichloroethane	ND	ND	ND	ND	5	0.35
1,1-Dichloroethylene (vinylidene chloride)	ND	ND	ND	ND	14	0.33
Dichloromethane	ND	ND	ND	ND	50	0.35
2-4 Dichlorophenol	ND	ND	ND	ND	900	0.15
2,4-Dichlorophenoxy acetic acid (2,4-D)	ND	ND	ND	ND	100	0.19
Diclofop-methyl	ND	ND	ND	ND	9	0.40
Dimethoate	ND	ND	ND	ND	20	0.06
Diquat	ND	ND	ND	ND	70	1
Diuron	ND	ND	ND	ND	150	0.03
Glyphosate	ND	ND	ND	ND	280	1
Malathion	ND	ND	ND	ND	190	0.02
2-methyl- 4chlorophenoxyacetic acid (MCPA)	ND	ND	ND	ND	100	0.12
Metolachlor	ND	ND	ND	ND	50	0.01
Metribuzin	ND	ND	ND	ND	80	0.02
Monochlorobenzene	ND	ND	ND	ND	80	0.30
Paraquat	ND	ND	ND	ND	10	1
Pentachlorophenol	ND	ND	ND	ND	60	0.15
Phorate	ND	ND	ND	ND	2	0.01
Picloram	ND	ND	ND	ND	190	1
Polychlorinated Biphenyls(PCB)	ND	ND	ND	ND	3	0.04
Prometryne	ND	ND	ND	ND	1	0.03
Simazine	ND	ND	ND	ND	10	0.01

<i>Parameter</i>	<i>Results (µg/L) Thornton WTF (Nov. 21, 2022)</i>	<i>Results (µg/L) Southside WTF (Nov. 21, 2022)</i>	<i>Results (µg/L) Sutherland WTF (June 7, 2021)</i>	<i>Results (µg/L) Trillium Line WTF (Feb. 22, 2022)</i>	<i>MAC (µg/L)</i>	<i>MDL* (µg/L)</i>
Terbufos	ND	ND	ND	ND	1	0.01
Tetrachloroethylene	ND	ND	0.85	ND	10	0.35
2,3,4,6-Tetrachlorophenol	ND	ND	ND	ND	100	0.20
Triallate	ND	ND	ND	ND	230	0.01
Trichloroethylene	ND	ND	ND	ND	5	0.44
2,4,6-Trichlorophenol	ND	ND	ND	ND	5	0.25
Trifluralin	ND	ND	ND	ND	45	0.02
Vinyl Chloride	ND	ND	ND	ND	1	0.17

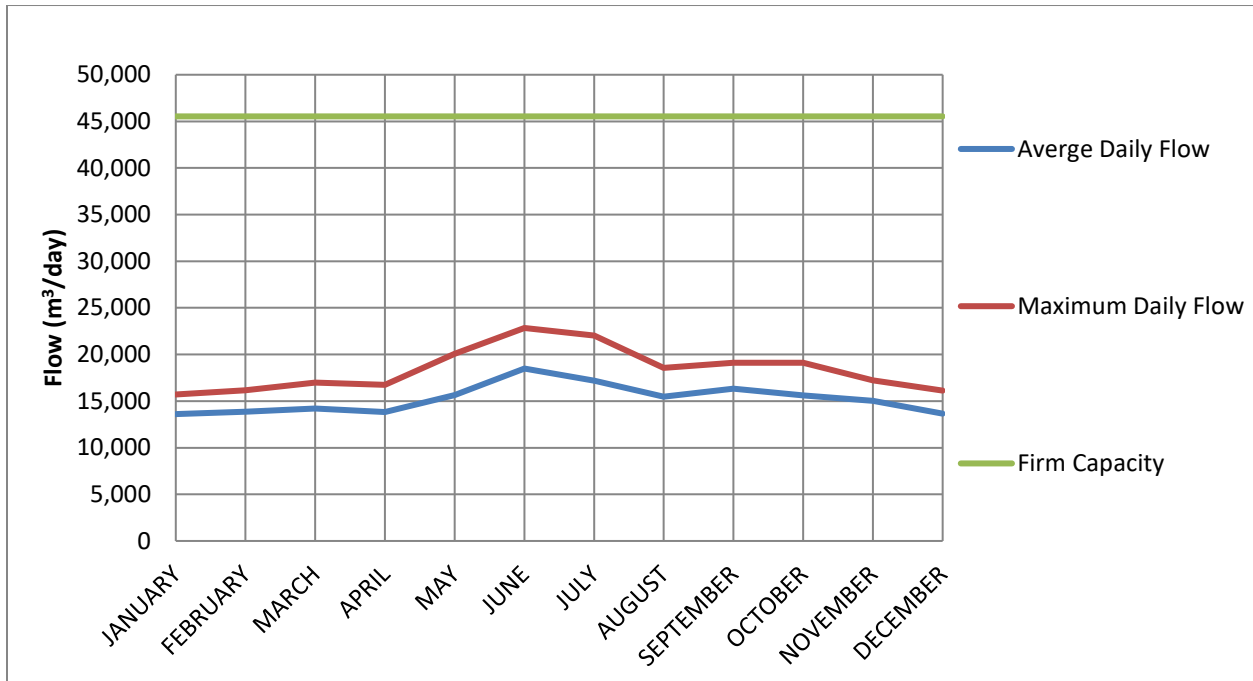
*2022 Method Detection Limit (MDL) Stated

APPENDIX B: WATER QUANTITY SUMMARY

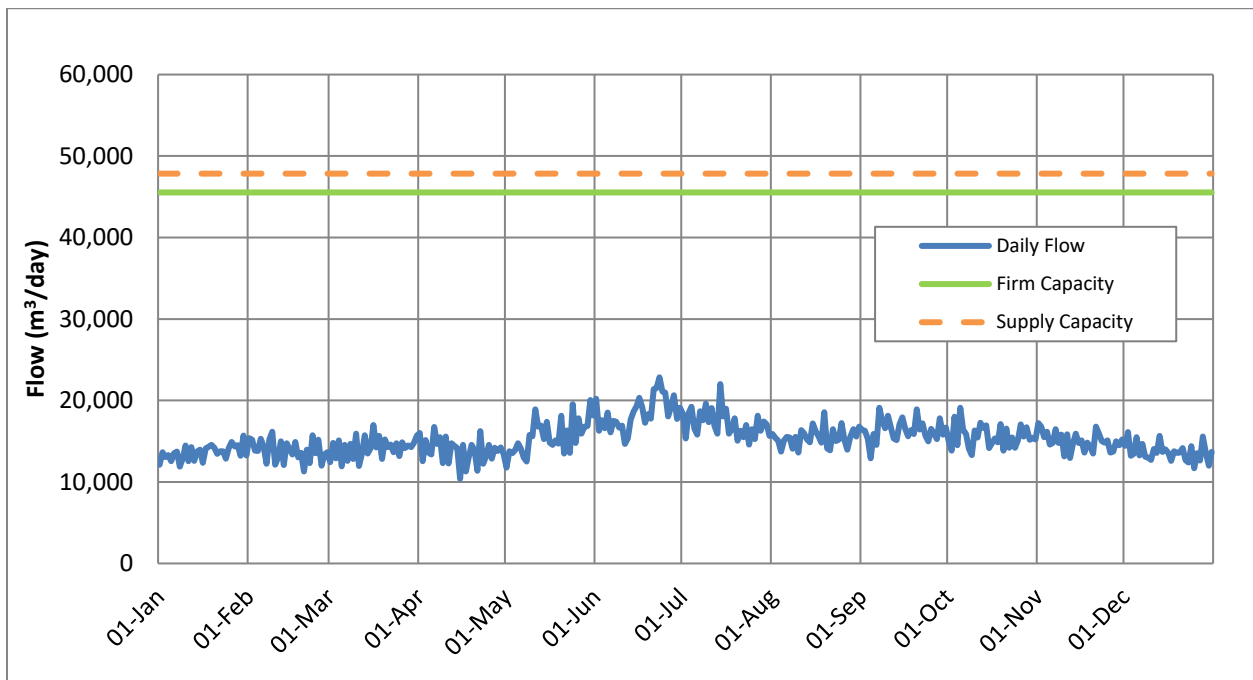
Woodstock Drinking Water System Firm Capacity 45,553 m³/ day

Woodstock Drinking Water System Supply Capacity 47,842 m³/ day

2022 Average vs Maximum Daily Flow Rates



2022 Daily Flow



2022 Total Production by Well (m³)

