Growing stronger together

2021 ANNUAL DRINKING WATER SYSTEM SUMMARY REPORT
Beachville 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 publicworks@oxfordcounty.ca

Drinking Water System:	Beachville Water System
Drinking Water System Number:	2200000674
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: publicworks@oxfordcounty.ca
Reporting Period:	January 1, 2021 – December 31, 2021

1.1. System Description

The Beachville Water System is a Small Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and serves a population of approximately 207. The system consists of one well that is secure groundwater. The water is treated with sodium hypochlorite for disinfection and in 2021 approximately 268 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 m^3 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 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 2021 had an operating and maintenance expenditures of approximately $3,000,000.

Operations and maintenance expenditures included:

- $175,000 for the replacement of general operating equipment and well rehabilitations

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Townships systems totaled $1,500,000 for improvements to water treatment systems and replacement of distribution mains in the Township System.

Township Capital Improvement Projects included:

- $65,000 groundwater modeling
- $350,000 for facilities improvements

Capital Improvement projects for all systems included:

- $720,000 to develop Countywide SCADA Master Plan for all water systems
- $14,000 for updated water systems modeling

2. MICROBIOLOGICAL TESTING

2.1. *E. coli and Total Coliform*

Bacteriological tests for *E. coli* and total coliforms are 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 2021 sampling program are shown on the table below. There were no adverse test results from 88 treated water samples in this reporting period.

	Number of Samples	*Range of E. coli Results Min - Max MAC = 0*	*Range of Total Coliform Results Min - Max MAC = 0*
Raw	52	0	0
Distribution	52	0	0
Treated	36	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 2021 results are shown in the table below.

	Number of Samples	*Range of HPC Min - Max*
Distribution	52	0 - 420

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 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 or treated water. The average hardness for the Beachville Drinking Water System is 307 mg/L (18 grains/gallon) based on samples collected from 2006 to 2019.

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 2021. 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. The turbidity of untreated water from the well is checked weekly. Turbidity is measured in nephelometric turbidity units (NTU). Under O.Reg. 170/03 turbidity in groundwater 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 2021 is provided in the table below.

Parameter	*Number of Tests or Monitoring Frequency*	*Range of Results (Min – Max) and Average*
Chlorine residual in distribution (mg/L)	103	(0.23 – 0.91) 0.51
Chlorine residual after treatment (mg/L)	Continuous	(0.70 – 1.39) 1.14
Turbidity after treatment (NTU)	Continuous	(0.22 – 4.00) 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 2021 flows are provided in the table below and presented graphically in Appendix B.

Flow Summary	*Quantity*
Permit to Take Water Limit	657 m^3/d
Municipal Drinking Water License Limit	656 m^3/d
2021 Average Daily Flow	32 m^3/d
2021 Maximum Daily Flow	85 m^3/d
2021 Average Monthly Flow	986 m^3
2021 Total Amount of Water Supplied	11,834 m^3

Firm Capacity is defined as the removal of the highest producing well in an emergency or operational / maintenance situation with the ability to transport a maximum of 100 m^3/day to maintain system integrity. Since this system comprises of only one supply well Firm Capacity restricts further growth and is rated at 100 m^3/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 2021. There were no non-compliance findings and the 2021 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 2021.

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 at https://cvc.ca/wp-content/uploads/2011/03/std01_079707.pdf PSIB 4449e01 titled "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines".

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

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

Parameter	*Result Range* Min – Max *(mg/L)*	*Average Result (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Nitrite	ND	ND	1.0	0.003
Nitrate	1.69 – 2.12	1.95	10.0	0.006

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

Parameter	*Annual Average*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Trihalomethane (THM)	2021	15.2	100	0.37
Haloacetic Acids (HAA)	2021	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.

Parameter	*Sample Date*	*Result Value (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Sodium	August 16, 2021	15.7	20.0*	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.

Parameter	*Result Range (Min - Max)*	*Number of Samples*	*Acceptable Level*
Distribution Alkalinity	232 - 239	2	30 – 500mg/L
Distribution pH	7.58 – 7.62	2	6.5 – 8.5
Distribution Lead 2019	0.34	1	10 ug/L MAC

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

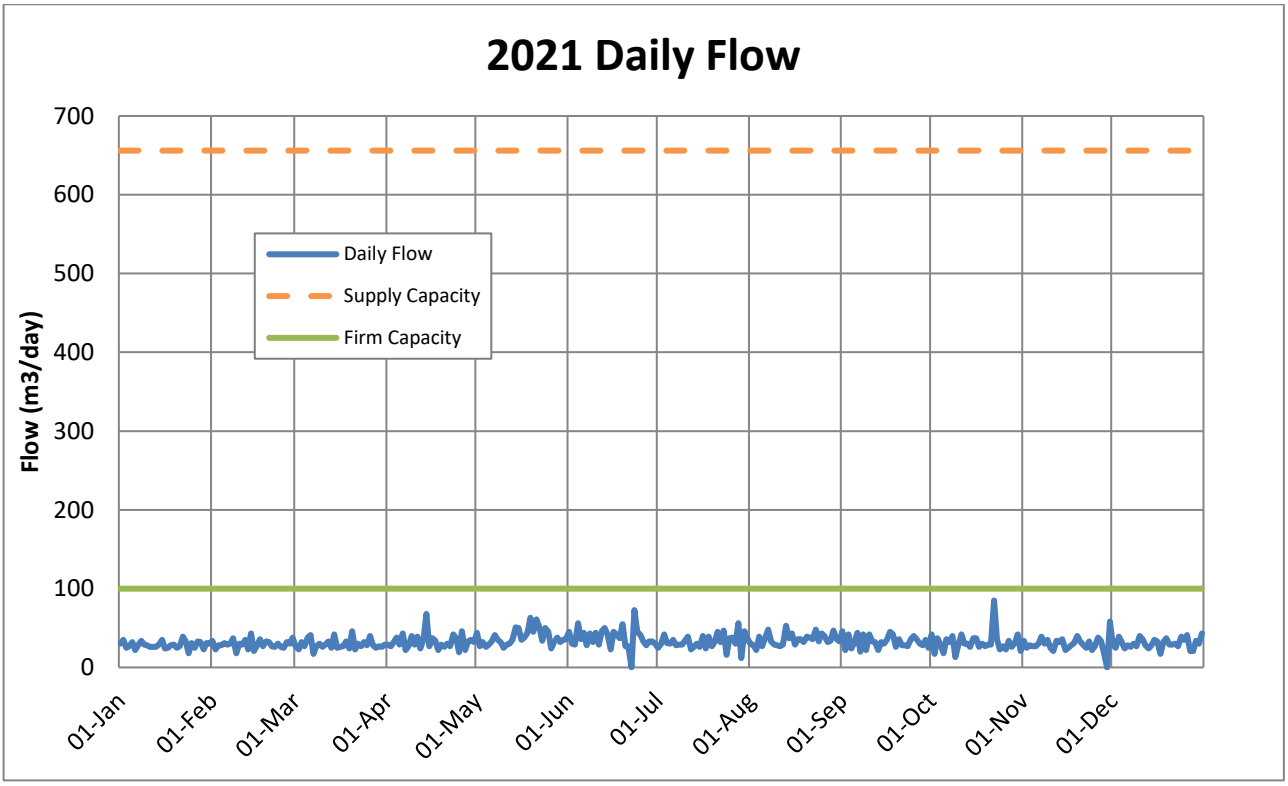
Parameter	*Sample Date*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Antimony	June 11/19	ND	6	0.09
Arsenic	"	1.0	10	0.2
Barium	"	78.2	1000	0.02
Boron	"	43.0	5000	2
Cadmium	"	0.032	5	0.003

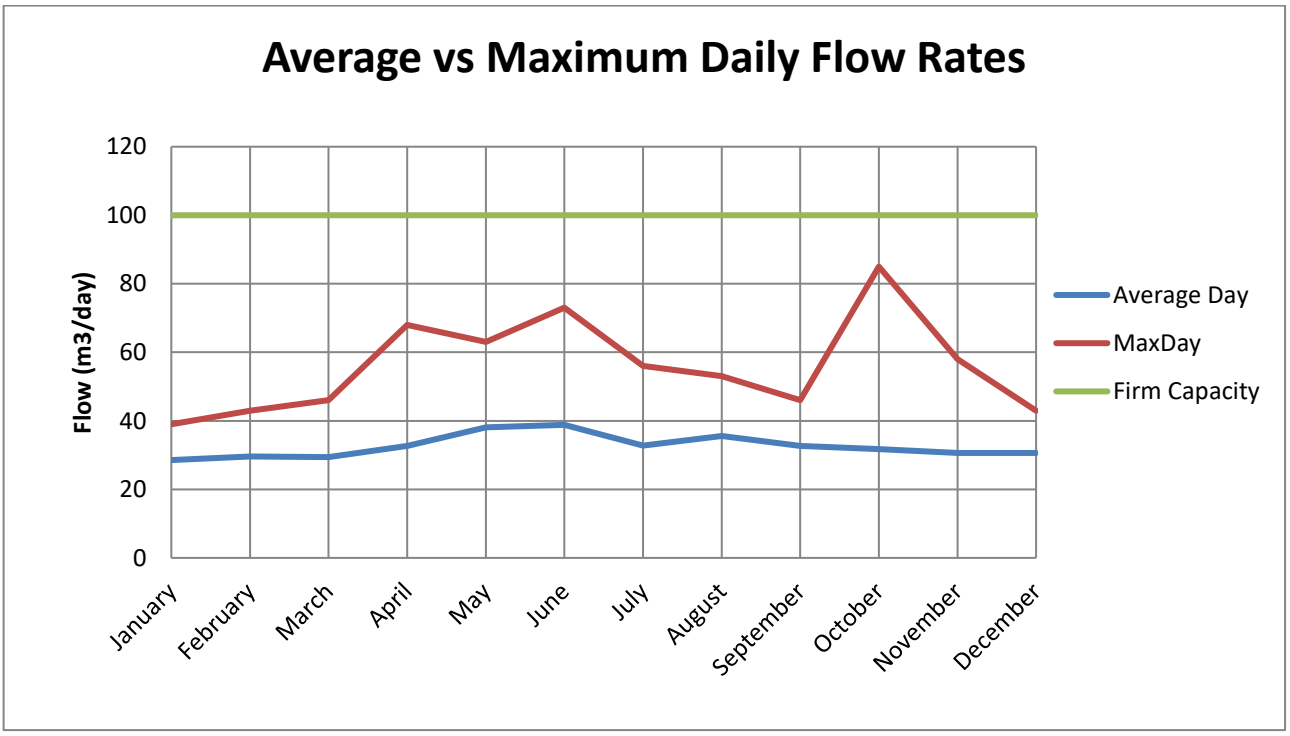
Chromium	“	0.25	50	0.08
Mercury	“	ND	1	0.01
Selenium	“	0.45	50	0.04
Uranium	“	0.716	20	0.002

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

Parameter	*Sample Date*	*Result (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Alachlor	June 7, 2021	ND	5	0.02
Atrazine + N-dealkylatedmetobolites	“	ND	5	0.01
Azinphos-methyl	“	ND	20	0.01
Benzene	“	ND	1	0.32
Benzo(a)pyrene	“	ND	0.01	0.004
Bromoxynil	“	ND	5	0.33
Carbaryl	“	ND	90	0.05
Carbofuran	“	ND	90	0.02
Carbon Tetrachloride	“	ND	2	0.17
Chlorpyrifos	“	ND	90	0.02
Chlorpyrifos	“	ND	90	0.02
Diazinon	“	ND	20	0.02
Dicamba	“	ND	120	0.20
1,2-Dichlorobenzene	“	ND	200	0.41
1,4-Dichlorobenzene	“	ND	5	0.36
1,2-Dichloroethane	“	ND	5	0.35
1,1-Dichloroethylene (vinylidene chloride)	“	ND	14	0.33
Dichloromethane	“	ND	50	0.35
2-4 Dichlorophenol	“	ND	900	0.15
2,4-Dichlorophenoxy acetic acid (2,4-D)	“	ND	100	0.19
Diclofop-methyl	“	ND	9	0.40
Dimethoate	“	ND	20	0.06
Diquat	“	ND	70	1
Diuron	“	ND	150	0.03
Glyphosate	“	ND	280	1
Malathion	“	ND	190	0.01
2-methyl-4chlorophenoxyacetic acid (MCPA)	“	ND	100	0.12
Metolachlor	“	ND	50	0.01
Metribuzin	“	ND	80	0.02
Monochlorobenzene	“	ND	80	0.30
Paraquat	“	ND	10	1
Pentachlorophenol	“	ND	60	0.15
Phorate	“	ND	2	0.01
Picloram	“	ND	190	1
Polychlorinated Biphenyls(PCB)	“	ND	3	0.04
Prometryne	“	ND	1	0.03
Simazine	“	ND	10	0.01
Terbufos	“	ND	1	0.01
Tetrachloroethylene	“	ND	10	0.35
2,3,4,6-Tetrachlorophenol	“	ND	100	0.20
Triallate	“	ND	230	0.01
Trichloroethylene	“	ND	5	0.44
2,4,6-Trichlorophenol	“	ND	5	0.25
Trifluralin	“	ND	45	0.02
Vinyl Chloride	“	ND	1	0.17

APPENDIX B: WATER QUANTITY SUMMARY





Beachville Water System Firm Capacity 100 m^3/ day
Beachville Water System Supply Capacity 656 m^3/ day

2021 ANNUAL DRINKING WATER SYSTEM SUMMARY REPORT
Bright 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 publicworks@oxfordcounty.ca

Drinking Water System:	Bright Water System
Drinking Water System Number:	220009050
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: publicworks@oxfordcounty.ca
Reporting Period:	January 1, 2021 – December 31, 2021

1.1. System Description

The Bright 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 well sources which are secure groundwater wells. The water is treated with sodium hypochlorite for disinfection and sodium silicate to sequester iron. In 2021, approximately 820 L of sodium hypochlorite and 820 L (1,160 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 and American National Standards Institute.

The well facility houses pumps and treatment equipment. A separate pumping station houses high lift pumps, monitoring equipment, an 86 m^3 in-ground reservoir and a 180 m^3 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 Water System is one of 14 water systems that have revenues and expenses pooled for the economy of scale purposes. The systems are combined into the Township Water financial system and in 2021 had operating and maintenance expenditures of approximately $3,000,000.

Operations and maintenance expenditures included:

- $175,000 for the replacement of general operating equipment and well rehabilitations

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Townships systems totaled $1,500,000 for improvements to water treatment systems and replacement of distribution mains in the Township Systems.

Township Capital Improvement Projects included:

- $65,000 groundwater modeling
- $350,000 for facilities improvements

Capital Improvement projects for all systems included:

- $720,000 to develop Countywide SCADA Master Plan for all water systems
- $14,000 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 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 2021 sampling program are shown on the table below. There were no adverse test results from 164 treated water samples in this reporting period.

	Number of Samples	*Range of E. coli Results Min - Max MAC = 0*	*Range of Total Coliform Results Min - Max MAC = 0*
Raw	104	0	0
Treated	52	0	0
Distribution	112	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. 2021 results are shown in the table below.

	Number of Samples	*Range of HPC Min - Max*
Treated	52	0 - 10
Distribution	26	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 Bright 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 maintain 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 Bright is 62.7 mg/L.

3.2. 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. 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

- Samples for hardness are collected at a minimum every 3 years from raw or treated water. The average hardness for the Bright Drinking Water System is 425 mg/L (25 grains/gallon) based on samples collected from 2006 to 2019.
- Iron level was measured at 0.492 mg/L (ppm) in 2021
- Manganese level is 0.04 mg/L (ppm) in 2021

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 2021. 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. The turbidity of untreated water from the well is checked weekly. Turbidity is measured in nephelometric turbidity units (NTU). Under Regulation 170/03 turbidity in groundwater 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 2021 is provided in the table below.

Parameter	*Number of Tests or Monitoring Frequency*	*Range of Results (Min – Max) and Average*
Chlorine residual in distribution (mg/L)	Continuous	(0.70 – 2.10) 1.19
Chlorine residual after treatment (mg/L)	Continuous	(0.69 – 1.75) 1.30
Turbidity after treatment (NTU)	Continuous	(0.24 – 4.00) 0.50

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 2021 flows are provided in the Table below and presented graphically in Appendix B.

Flow Summary	*Quantity*
Permit to Take Water Limit	327 m^3/d
Municipal Drinking Water License Limit	589 m^3/d
2021 Average Daily Flow	70 m^3/d
2021 Maximum Daily Flow	185 m^3/d
2021 Average Monthly Flow	2,142 m^3
2021 Total Amount of Water Supplied	25,699 m^3

While the PTTW for the system is 327 m^3/day though the wells are not capable of producing this quantity. A more realistic maximum capacity of the system is approximately 296 m^3/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 m^3/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 m^3/day. Firm Capacity of this system is rated at 186 m^3/day with storage capacity of 266 m^3.

6. NON-COMPLIANCE FINDINGS AND ADVERSE RESULTS

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

6.1. Non-Compliance Findings

The annual MECP inspection for 2021 took place in August 2021. There were no non-compliance findings and the 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 is reported as required and corrective actions are taken. Below is a summary of the one adverse/reportable occurrence for 2021 along with the corresponding resolution.

Operational Incident: Low Pressure Event and Precautionary Boil Water Advisory		
Prolonged low pressure following a watermain break on September 29, 2021. The watermain was damaged by a third party contractor who was working in the area.	A precautionary boil water advisory for all residents was enacted while bacteriological samples were collected to confirm that there was no contamination to the drinking water system.	All samples were acceptable on October 1, 2021.

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 at https://cvc.ca/wp-content/uploads/2011/03/std01_079707.pdf PSIB 4449e01 titled "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines".

Results are shown as concentrations with units of either milligrams per litre (mg/L) or micrograms per litre (ug/L). 1 mg/L is equal to 1000 ug/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 (MDL). In the event that some samples results are ND, and other results are above the MDL, the value of the MDL will be used in place of the ND where an average result must be calculated. Where all collected samples are ND the average sample result will be assumed to be ND.

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

Parameter	*Result Range* Min – Max *(mg/L)*	*Average Result (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Nitrite	ND	ND	1.0	0.003
Nitrate	0.65-0.73	0.70	10.0	0.006

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

Parameter	*Annual Average*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Trihalomethane (THM)	2021	20.8	100	0.37
Haloacetic Acids (HAA)	2021	5.83	80	5.3

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

Parameter	*Sample Date*	*Result Value (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Sodium	May 21/19	66.2	20.0*	0.01
Fluoride	"	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.

Parameter	*Result Range (Min - Max)*	*Number of Samples*	*Acceptable Level*
Distribution Alkalinity	331 - 378	2	30 – 500mg/L
Distribution pH	7.45 -7.53	2	7.5 – 7.53
Distribution Lead 2021	1.01 – 1.90	2	10 ug/L MAC

The following Table summarizes the most recent test results for Schedule 23. Testing is required every 3 years for secure groundwater wells.

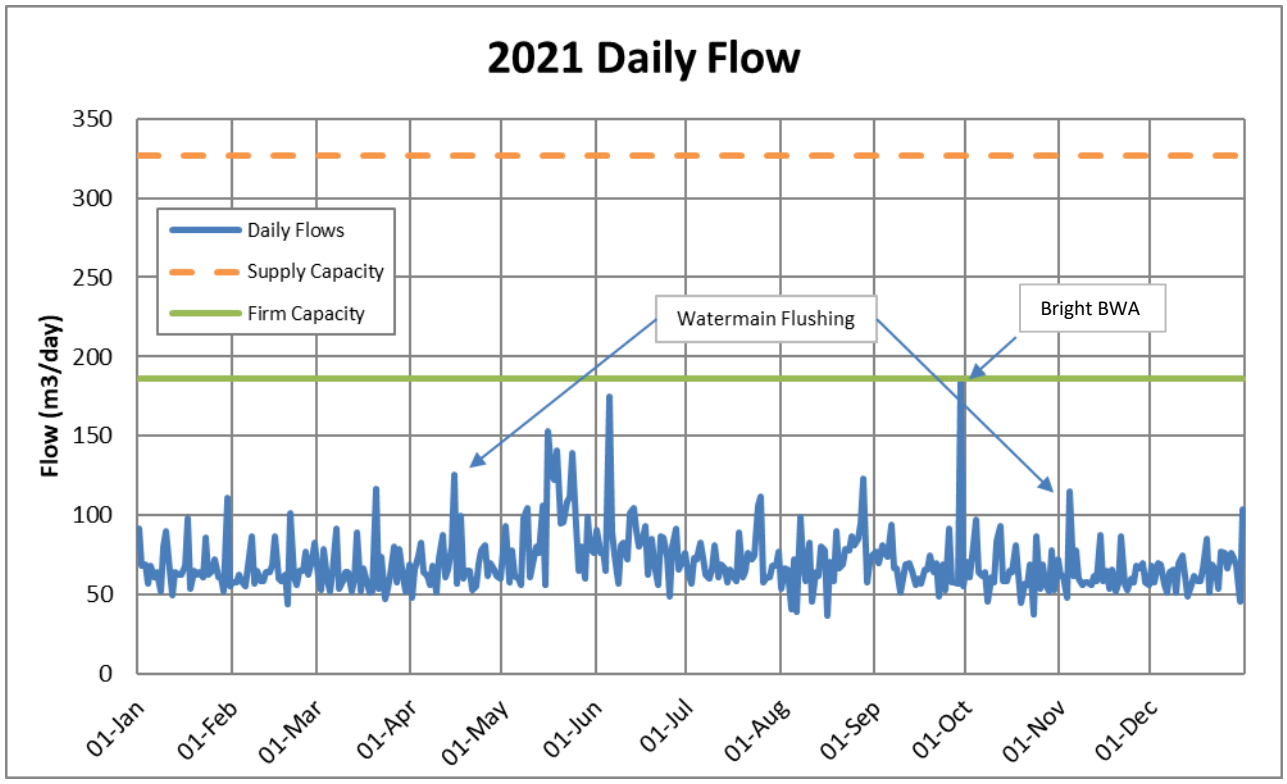
Parameter	*Sample Date*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Antimony	May 21/19	ND	6	0.09
Arsenic	"	1.9	10	0.2
Barium	"	135	1000	0.01
Boron	"	48	5000	2
Cadmium	"	0.014	5	0.003
Chromium	"	0.13	50	0.03
Mercury	"	ND	1	0.01

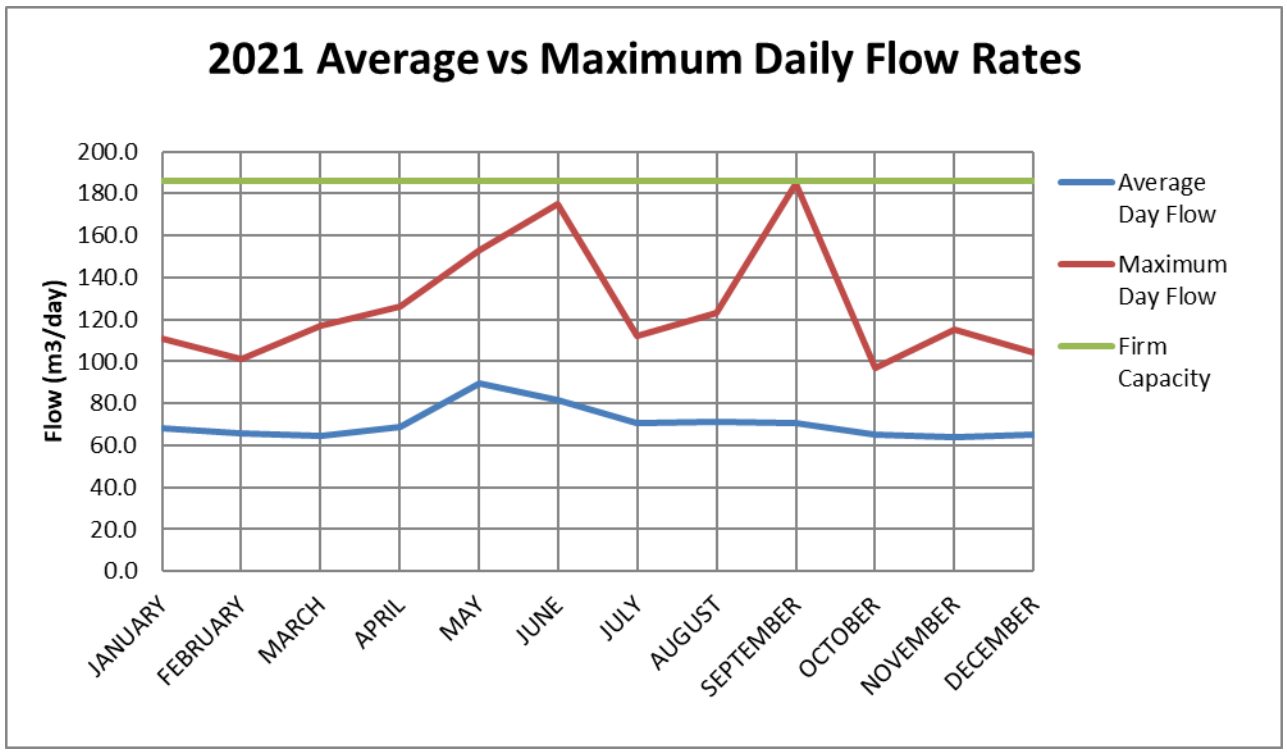
Parameter	*Sample Date*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Selenium	“	0.15	5	0.04
Uranium	“	2.02	20	0.002

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

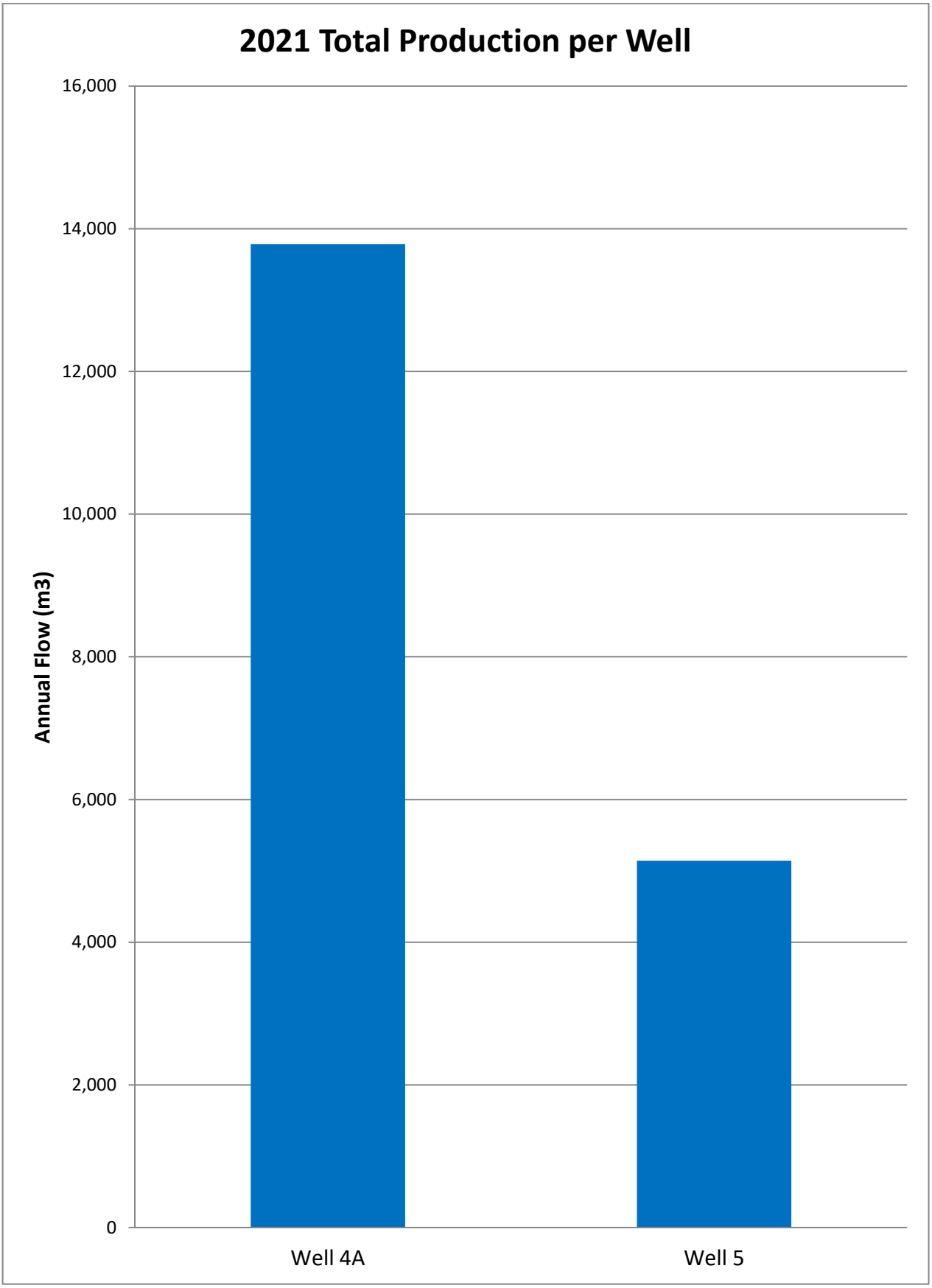
Parameter	*Sample Date*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Alachlor	June 7, 2021	ND	5	0.02
Atrazine + N-dealkylatedmetobolites	“	ND	5	0.01
Azinphos-methyl	“	ND	20	0.05
Benzene	“	ND	1	0.32
Benzo(a)pyrene	“	ND	0.01	0.004
Bromoxynil	“	ND	5	0.33
Carbaryl	“	ND	90	0.05
Carbofuran	“	ND	90	0.01
Carbon Tetrachloride	“	ND	2	0.17
Chlorpyrifos	“	ND	90	0.02
Diazinon	“	ND	20	0.02
Dicamba	“	ND	120	0.20
1,2-Dichlorobenzene	“	ND	200	0.41
1,4-Dichlorobenzene	“	ND	5	0.21
1,2-Dichloroethane	“	ND	5	0.36
1,1-Dichloroethylene(vinylidene chloride)	“	ND	14	0.35
Dichloromethane	“	ND	50	0.35
2-4 Dichlorophenol	“	ND	900	0.15
2,4-Dichlorophenoxy acetic acid (2,4-D)	“	ND	100	0.19
Diclofop-methyl	“	ND	9	0.40
Dimethoate	“	ND	20	0.06
Diquat	“	ND	70	1
Diuron	“	ND	150	0.03
Glyphosate	“	ND	280	1
Malathion	“	ND	190	0.02
Metolachlor	“	ND	50	0.01
2-methyl-4chlorophenoxyacetic acid (MCPA)	“	ND	100	0.12
Metribuzin	“	ND	80	0.02
Monochlorobenzene	“	ND	80	0.3
Paraquat	“	ND	10	1
Pentachlorophenol	“	ND	60	0.01
Phorate	“	ND	2	0.01
Picloram	“	ND	190	1
Polychlorinated Biphenyls(PCB)	“	ND	3	0.04
Prometryne	“	ND	1	0.03
Simazine	“	ND	10	0.01
Terbufos	“	ND	1	0.01
Tetrachloroethylene	“	ND	10	0.35
2,3,4,6-Tetrachlorophenol	“	ND	100	0.20
Triallate	“	ND	230	0.01
Trichloroethylene	“	ND	5	0.44
2,4,6-Trichlorophenol	“	ND	5	0.20
Trifluralin	“	ND	45	0.02
Vinyl Chloride	“	ND	1	0.17

APPENDIX B: WATER QUANTITY SUMMARY





Bright Water System Firm Capacity 186 m^3/ day
Bright Water System Supply Capacity 327 m^3 /day



Bright Water System Firm Capacity 186 m^3/ day
Bright Water System Supply Capacity 327 m^3 /day

2021 ANNUAL DRINKING WATER SYSTEM SUMMARY REPORT
Brownsville 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 publicworks@oxfordcounty.ca

Drinking Water System:	Brownsville Water System
Drinking Water System Number:	220000638
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: publicworks@oxfordcounty.ca
Reporting Period:	January 1, 2021 – December 31, 2021

1.1. System Description

The Brownsville Water System is a Large Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and serves a population of approximately 505. The system consists of two well sources that are secure groundwater wells. The water is treated with sodium hypochlorite for disinfection and in 2021 approximately 1,236 L of sodium hypochlorite was used. The chemical is certified to meet standards set by the Standards Council of Canada or American National Standards Institute.

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

1.2. Major Expenses

The Brownsville Water System is one of 14 water systems that have revenues and expenses pooled for the economy of scale purposes. The systems are combined into the Township Water financial system and in 2021 had operating and maintenance expenditures of approximately $3,000,000.

Operations and maintenance expenditures included:

- $175,000 for the replacement of general operating equipment and well rehabilitations

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Townships systems totaled $1,500,000 for improvements to water treatment systems and replacement of distribution mains in the Township System.

Township Capital Improvement Projects included:

- $65,000 groundwater modeling
- $350,000 for facilities improvements

Capital Improvement projects for all systems included:

- $720,000 to develop Countywide SCADA Master Plan for all water systems
- $14,000 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 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 2021 sampling program are shown on the table below. There were no adverse test results from 162 treated water samples in this reporting period.

	Number of Samples	*Range of E. coli Results Min - Max MAC = 0*	*Range of Total Coliform Results Min - Max MAC = 0*
Raw	103	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. 2021 results are shown in the table below.

	Number of Samples	*Range of HPC Min - Max*
Treated	52	0 - 4
Distribution	26	0 - 74

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. 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

3.2. 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 Brownsville system has naturally occurring fluoride levels that average 1.73 mg/L.

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. In Oxford County, many households have water softeners to help reduce white calcium deposits and improve the efficiency of soaps. Samples for hardness are collected at a minimum every 3 years from raw or treated water. The average hardness for the Brownsville Drinking Water System is 74 mg/L (4 grains/gallon) based on samples collected from 2006 to 2019. Water in the Brownsville System is of medium hardness and a water softener should not be needed.

3.4. Additional Testing Required by MECP

The Maximum Allowable Concentration (MAC) for arsenic was reduced from 25 ug/L to 10 ug/L in 2018. In Brownsville, an increased testing frequency of once every three months is required as the average arsenic level is above 5 ug/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 2021. 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 pumping station, as a change in turbidity can indicate an operational problem. The turbidity of untreated water from each well is checked weekly. Turbidity is measured in nephelometric turbidity units (NTU). Under O. Reg. 170/03 turbidity in groundwater 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 2021 is provided in the table below.

Parameter	*Number of Tests or Monitoring Frequency*	*Range of Results (Min – Max) and Average*
Chlorine residual in distribution (mg/L)	Continuous	(0.62 – 3.51) 1.18
Chlorine residual after treatment (mg/L)	Continuous	(0.19 – 2.21) 1.20
Turbidity after treatment (NTU)	Continuous	(0.07 – 4.00) 0.16

5. WATER QUANTITY

Continuous monitoring of flowrates from supply wells 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 2021 flows are provided in the table below and presented graphically in Appendix B.

Flow Summary	
Permit to Take Water Limit	378 m^3/d
Municipal Drinking Water License Limit	366 m^3/d
2021 Average Daily Flow	78 m^3/d
2021 Maximum Daily Flow	159 m^3/d
2021 Average Monthly Flow	2,386 m^3
2021 Total Amount of Water Supplied	28,627 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 is defined as the removal of the highest producing well in an emergency or operational / maintenance situation with the ability to transport a maximum of 100 m^3/day if necessary 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 m^3/day. Firm Capacity of this system is rated at 281 m^3/day. Reservoir storage capacity is 188 m^3.

6. NON-COMPLIANCE FINDINGS AND ADVERSE RESULTS

This section documents any known incidents of non-compliance or adverse results and the associated correction actions taken to resolve the issue. Non-compliance issues are typically identified by either the Operating Authority or the MECP Drinking Water Inspectors. The issues and associated required actions are documented by the Inspectors in the system's Annual Inspection Report.

All non-compliance issues are investigated, corrective actions taken and documented using the County's Drinking Water Quality Management System (DWQMS) procedures.

6.1. Non-Compliance Findings

The Annual MECP Inspection for the Brownsville Drinking Water System took place in July 2021. There were no noncompliance findings and the 2021 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 2021.

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 at https://cvc.ca/wp-content/uploads/2011/03/std01_079707.pdf PSIB 4449e01 titled "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines".

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

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

Parameter	*Result/Range Min – Max(mg/L)*	*Average Result (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Nitrite	ND	ND	1.0	0.003
Nitrate	0.006 – 0.009	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.

Parameter	*Annual Average*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Trihalomethane (THM)	2021	66.5	100	0.37
Total Haloacetic Acids (HAA)	2021	22.8	80	5.3

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

Parameter	*Sample Date*	*Result Value (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Sodium	May 28 /19	81.6	20.0*	0.01
Fluoride	May 28 /19	1.77	1.5**	0.06

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

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

Parameter	*Result Range (Min – Max)*	*Number of Samples*	*Acceptable Level*
Distribution Alkalinity	147 - 158	2	30 – 500 mg/L
Distribution pH	7.87 - 8.18	2	6.5 – 8.5
Distribution Lead 2021	0.11 - 0.23	2	10 ug/L MAC

The following Table summarizes the most recent test results for Schedule 23. Testing is required every 3 years for secure groundwater wells.

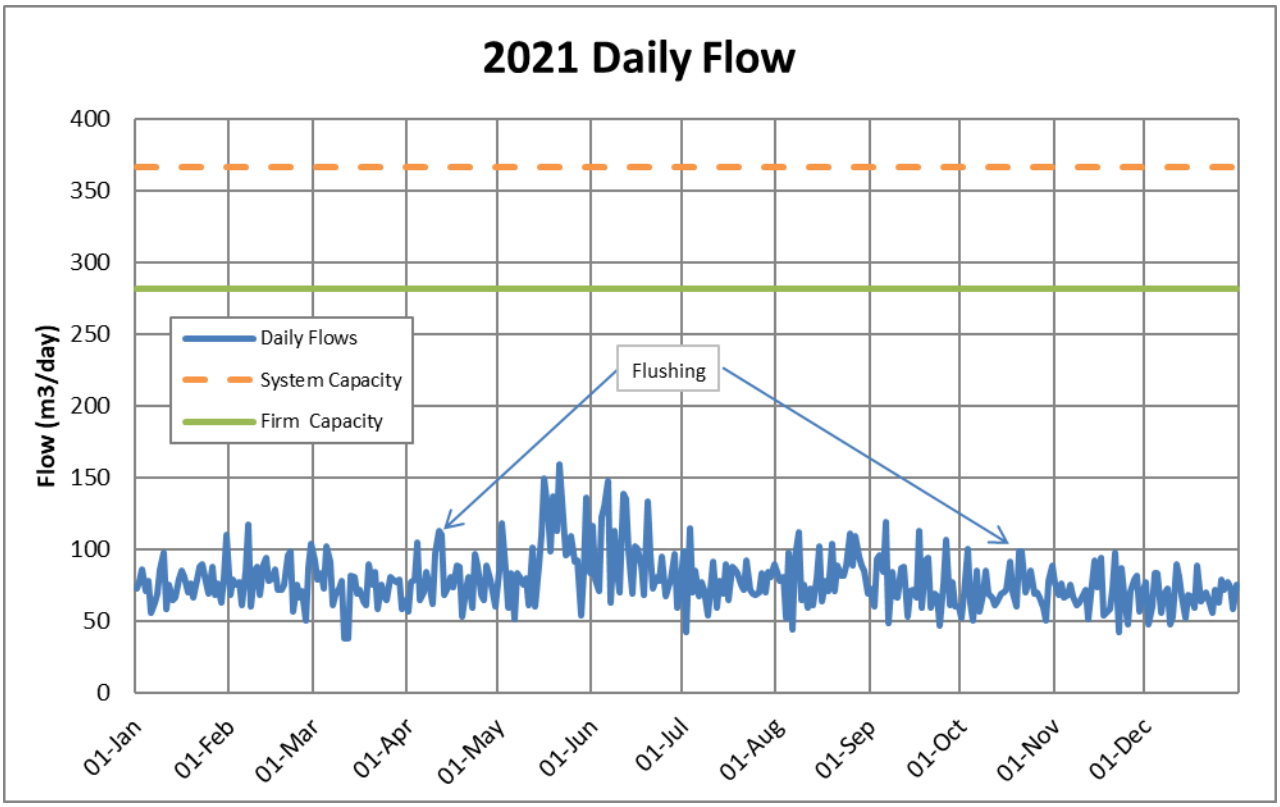
Parameter	*Sample Date*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Antimony	May 28/19	ND	6	0.09
Arsenic	Annual average	5.64	10	0.2
Barium	May 28/19	32.6	1000	0.01
Boron	"	259	5000	2
Cadmium	"	ND	5	0.003
Chromium	"	0.12	50	0.03
Mercury	"	ND	1	0.01

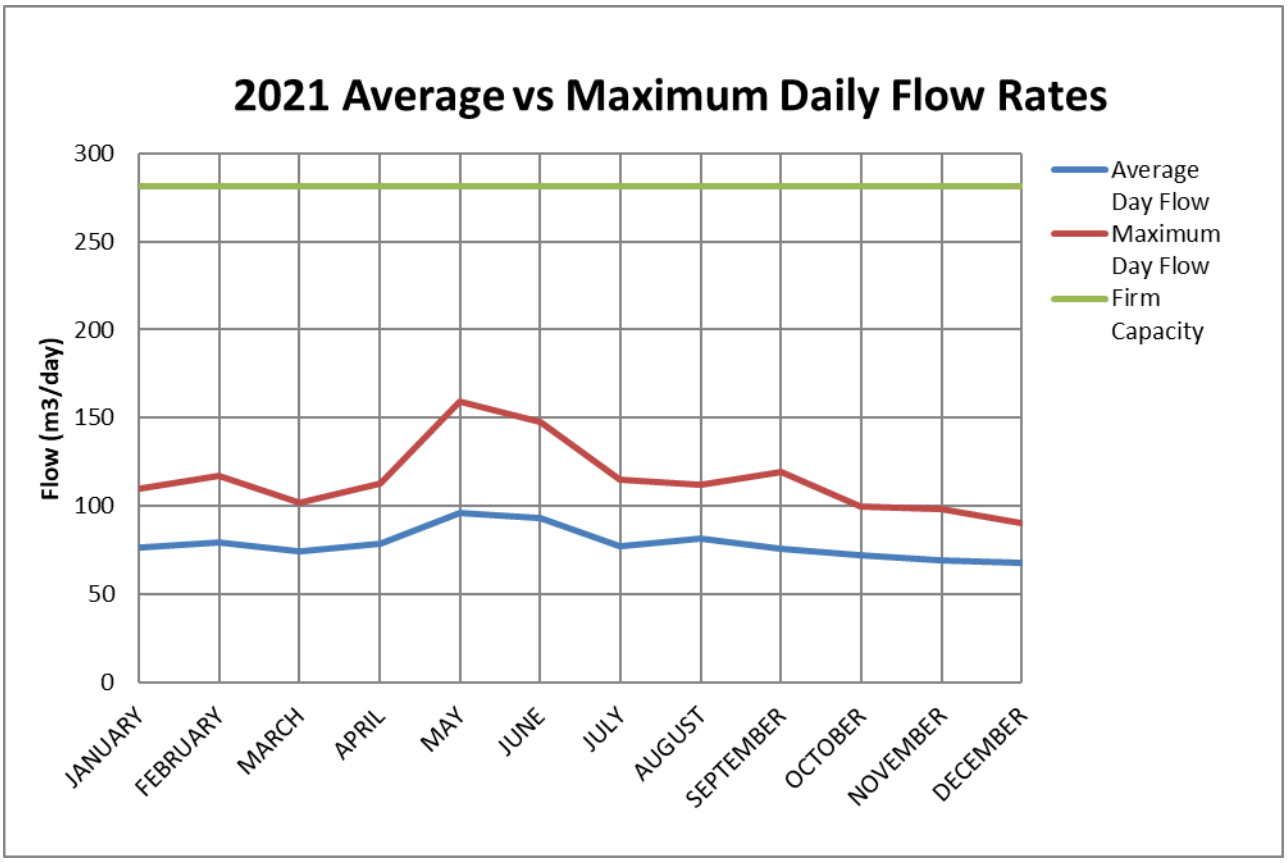
Parameter	*Sample Date*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Selenium	“	ND	5	0.04
Uranium	“	0.046	20	0.002

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

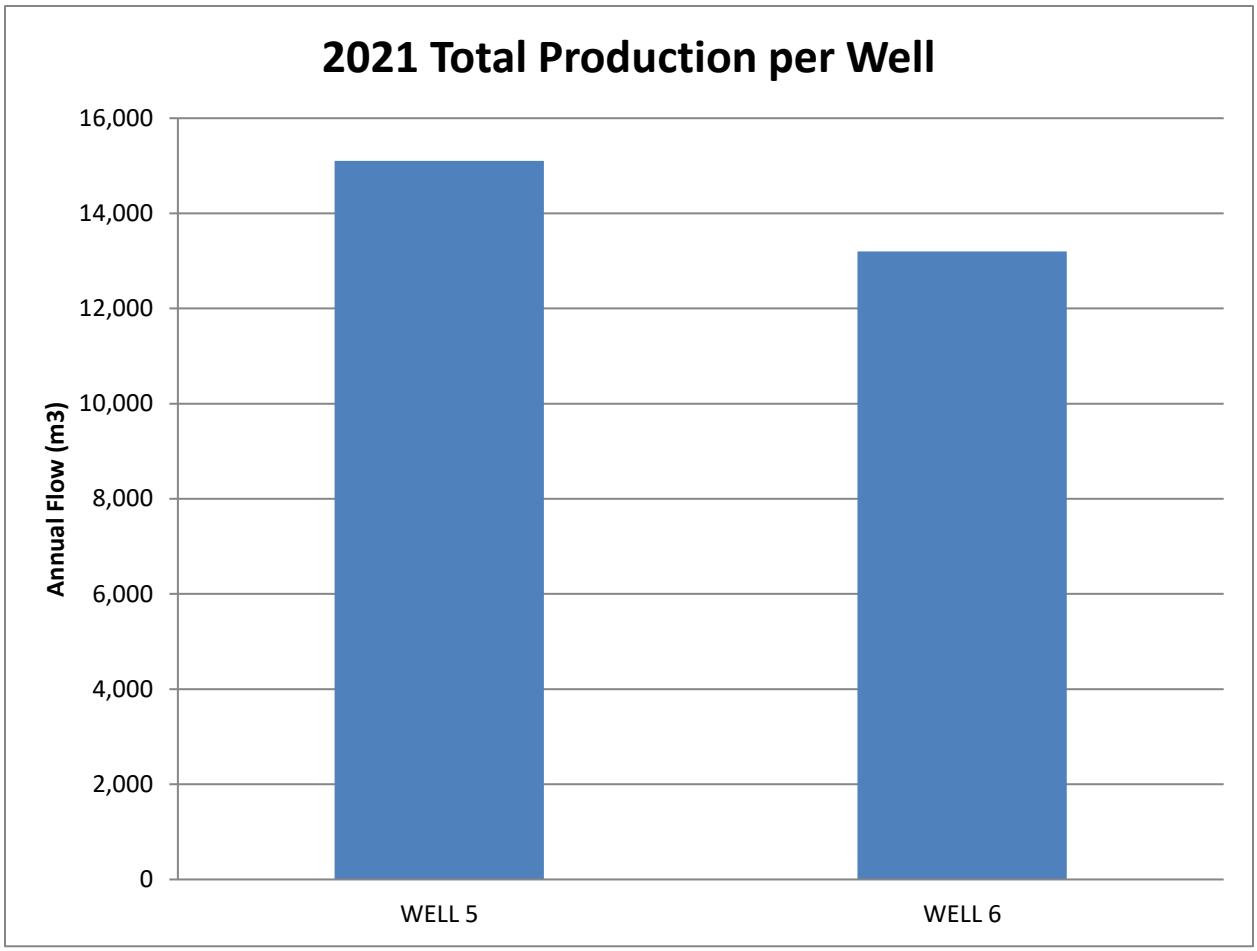
Parameter	Sample Date	Result Value (ug/L)	MAC (ug/L)	MDL (ug/L)
Alachlor	June 7, 2021	ND	5	0.02
Atrazine + N-dealkylatedmetobolites	“	ND	5	0.01
Azinphos-methyl	“	ND	20	0.05
Benzene	“	ND	1	0.32
Benzo(a)pyrene	“	ND	0.01	0.004
Bromoxynil	“	ND	5	0.33
Carbaryl	“	ND	90	0.05
Carbofuran	“	ND	90	0.01
Carbon Tetrachloride	“	ND	2	0.17
Chlorpyrifos	“	ND	90	0.02
Diazinon	“	ND	20	0.02
Dicamba	“	ND	120	0.20
1,2-Dichlorobenzene	“	ND	200	0.41
1,4-Dichlorobenzene	“	ND	5	0.36
1,2-Dichloroethane	“	ND	5	0.35
1,1-Dichloroethylene(vinylidene chloride)	“	ND	14	0.33
Dichloromethane	“	ND	50	0.35
2-4 Dichlorophenol	“	ND	900	0.15
2,4-Dichlorophenoxy acetic acid (2,4-D)	“	ND	100	0.19
Diclofop-methyl	“	ND	9	0.40
Dimethoate	“	ND	20	0.06
Diquat	“	ND	70	1
Diuron	“	ND	150	0.03
Glyphosate	“	ND	280	1
Malathion	“	ND	190	0.02
Metolachlor	“	ND	50	0.01
2-methyl-4chlorophenoxyacetic acid (MCPA)	“	ND	100	0.12
Metribuzin	“	ND	80	0.02
Monochlorobenzene	“	ND	80	0.03
Paraquat	“	ND	10	1
Pentachlorophenol	“	ND	60	0.15
Phorate	“	ND	2	0.01
Picloram	“	ND	190	0.25
Polychlorinated Biphenyls(PCB)	“	ND	3	0.04
Prometryne	“	ND	1	0.03
Simazine	“	ND	10	0.01
Terbufos	“	ND	1	0.01
Tetrachloroethylene	“	ND	10	0.35
2,3,4,6-Tetrachlorophenol	“	ND	100	0.20
Triallate	“	ND	230	0.01
Trichloroethylene	“	ND	5	0.44
2,4,6-Trichlorophenol	“	ND	5	0.25
Trifluralin	“	ND	45	0.02
Vinyl Chloride	“	ND	1	0.17

APPENDIX B: WATER QUANTITY SUMMARY





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



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

2021 ANNUAL DRINKING WATER SYSTEM SUMMARY REPORT
Dereham Centre 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 publicworks@oxfordcounty.ca

Drinking Water System:	Dereham Centre Water System
Drinking Water System Number:	220001510
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: publicworks@oxfordcounty.ca
Reporting Period:	January 1, 2021 – December 31, 2021

1.1. System Description

The Dereham Centre Water System is a Small Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and serves a population of approximately 48. The system consists of one groundwater well and a treatment facility. The water is treated with sodium hypochlorite for disinfection and sodium silicate to sequester iron. In spring 2021, an arsenic removal filtration system had been approved at the facility, treating a portion of the supplied water. Effective May 28, 2021, a dual filter arsenic removal system was placed online, fully treating all the supplied water.

In 2021, approximately 130 L of sodium hypochlorite and 61 L of sodium silicate was 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. Upgrades to the water treatment facility have suspended the use of sodium silicate for iron sequestration. Iron is now removed through the filtration process.

The treatment facility houses pumps, MD-80 filters, treatment and monitoring equipment and a 37 m^3 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 Water System is one of 14 water systems that have revenues and expenses pooled for the economy of scale purposes. The systems are combined into the Township Water financial system and in 2021 had operating and maintenance expenditures of approximately $3,000,000.

Operations and maintenance expenditures included:

- $175,000 for the replacement of general operating equipment and well rehabilitations

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Townships systems totaled $1,500,000 for improvements to water treatment systems and replacement of distribution mains in the Township System.

Township Capital Improvement Projects included:

- $150,000 for Dereham Centre filter upgrades
- $65,000 groundwater modeling
- $350,000 for facilities improvements

Capital Improvement projects for all systems included:

- $720,000 to develop Countywide SCADA Master Plan for all water systems
- $14,000 for updated water systems modelling

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 2021 sampling program are shown in the table below. There was one adverse result from 105 treated water samples in this reporting period the corrective actions for this are discussed in section 6.2.

	Number of Samples	*Range of E. coli Results Min - Max MAC = 0*	*Range of Total Coliform Results Min - Max MAC = 0*
Raw	52	0	0
Distribution	62	0	0-8
Treated	43	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. 2021 results are shown in the table below.

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

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 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. Levels of iron less than 0.30 mg/L (ppm) are not considered to cause problems such as discoloured water. In Dereham Centre sodium silicate was added to keep iron in suspension for the first half of 2021. New filter upgrades that came into service June 2021 mean that iron will be removed from the drinking water through the filtration process.

- Samples for hardness are collected at a minimum every 3 years from raw or treated water. The average hardness for the Dereham Centre Drinking Water System is 258 mg/L (15 grains/gallon) based on samples collected from 2006 to 2019.
- The average iron concentration in the treated drinking water for 2021 is 0.35 mg/L

3.2. Additional Testing Required by MECP

In January of 2018, the Maximum Allowable Concentration (MAC) for arsenic was reduced from 25 ug/L to 10 ug/L. In Dereham Centre, the average arsenic concentrations in the raw well water are naturally above 10 ug/L. In 2021 arsenic concentrations in the treated water ranged from 0.6 to 55.3 ug/L and averaged 4.5 ug/L over the whole year. Filter treatment is now required to manage arsenic levels in the treated drinking water. Treated water samples for arsenic were collected weekly during the commissioning and following the installation of the permanent filtration system. The weekly samples were used to monitor the efficacy of the filtration system and the effect of various operations such as before and after backwash cycles. The MECP approved quarterly sampling for arsenic after reviewing these results and successful removal had been demonstrated. Arsenic in treated drinking water following the implementation of the new filter ranges from 0.06 – 3.4 ug/L. The average arsenic concentration in the treated drinking water is now 2.1ug/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 2021. 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. The turbidity of untreated water from the well is checked weekly. Turbidity is measured in nephelometric turbidity units (NTU). Under O. Reg. 170/03 turbidity in groundwater 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 2021 is provided in the table below.

Parameter	*Number of Tests or Monitoring Frequency*	*Range of Results (Min – Max) and Average*
Chlorine residual in distribution (mg/L)	104	(1.03 – 2.10) 1.47
Chlorine residual after treatment (mg/L)	Continuous	(0.60– 3.81) 1.49
Turbidity after treatment (NTU)	Continuous	(0.10 – 4.07) 0.13

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 2021 flows are provided in the Table below and presented graphically in Appendix B.

Flow Summary	*Quantity*
Water Taking Limit	50 m^3/d
Municipal Drinking Water License Limit	78 m^3/d
2021 Average Daily Flow	8 m^3/d
2021 Maximum Daily Flow	44 m^3/d
2021 Average Monthly Flow	233 m^3
2021 Total Amount of Water Supplied	2,791 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 m^3/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 m^3/day. When this well is not in service 50 m^3/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 of this report, an inspection into non-compliance findings of the Dereham Centre Drinking Water System had not been undertaken in 2021.

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 taken. Below is a summary of the four adverse/reportable occurrences for 2021 along with the corresponding resolution.

Incident / Date	*Corrective Action*	*Resolution / Date*
Treated Water Sample with Chemistry Exceedance		
April 26, 2021 Arsenic of 10.9 ug/L taken at the Dereham Centre WTF	Reported on May 3, 2021 resamples collected May 3 & 4, 2021 for confirmation	May 3, 2021 resample result was reported adverse on May 7, 2021
May 3, 2021 Arsenic of 11.7 ug/L taken at the Dereham Centre WTF	Reported on May 7, 2021, moved Sodium silicate injection to post filter, trucked in water and resampled.	May 4, 2021 resample result was also reported adverse on May 11, 2021.
May 4, 2021 Arsenic of 11.8 ug/L taken at the Dereham Centre WTF	Reported on May 11, 2021 after trucked water and May 7, 2021 resample taken.	May 7, 2021 resample result was reported as adverse, trucked water had disturbed sediment in the reservoir causing the arsenic sample result to increase.
May 7, 2021 Arsenic of 55.3 ug/L taken at the Dereham Centre WTF	Reported on May 12, 2021, samples collected on May 12 & 13, 2021 for confirmation.	Samples taken on May 12 & 13, 2021 were acceptable
Treated or Distribution Water Sample with Positive Test for *E.Coli* or *Total Coliform* Bacteria		
July 21, 2021 8 TC cfu/100mL in a treated distribution sample result. The free chlorine at the time of the sample was 1.41 mg/L.	Reported and resamples were taken.	Resample results acceptable July 23, 2021.

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 at https://cvc.ca/wp-content/uploads/2011/03/std01_079707.pdf PSIB 4449e01titled "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines".

Results are shown as concentrations with units of either milligrams per litre (mg/L) or micrograms per litre (ug/L). 1 mg/L is equal to 1000 ug/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 where an average result must be calculated. Where all collected samples are ND the average sample result will be assumed to be ND.

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

Parameter	*Result Range* Min – Max *(mg/L)*	*Average Result (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Nitrite	ND – 0.013	0.006	1.0	0.003
Nitrate	0.009 – 0.013	0.011	10.0	0.006

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

Parameter	*Annual Average*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Trihalomethane (THM)	2021	9.3	100	0.37
Haloacetic Acids (HAA)	2021	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.

Parameter	*Sample Date*	*Result Value (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Sodium	August 16, 2021	11.6	20.0*	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.

Parameter	*Result Range (Min - Max)*	*Number of Samples*	*Acceptable Level*
Distribution Alkalinity	223 – 228	2	30 – 500mg/L
Distribution pH	7.78 – 8.21	2	7.7 – 8.0
Distribution Lead 2021	0.22 – 0.41	2	10 ug/L MAC

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

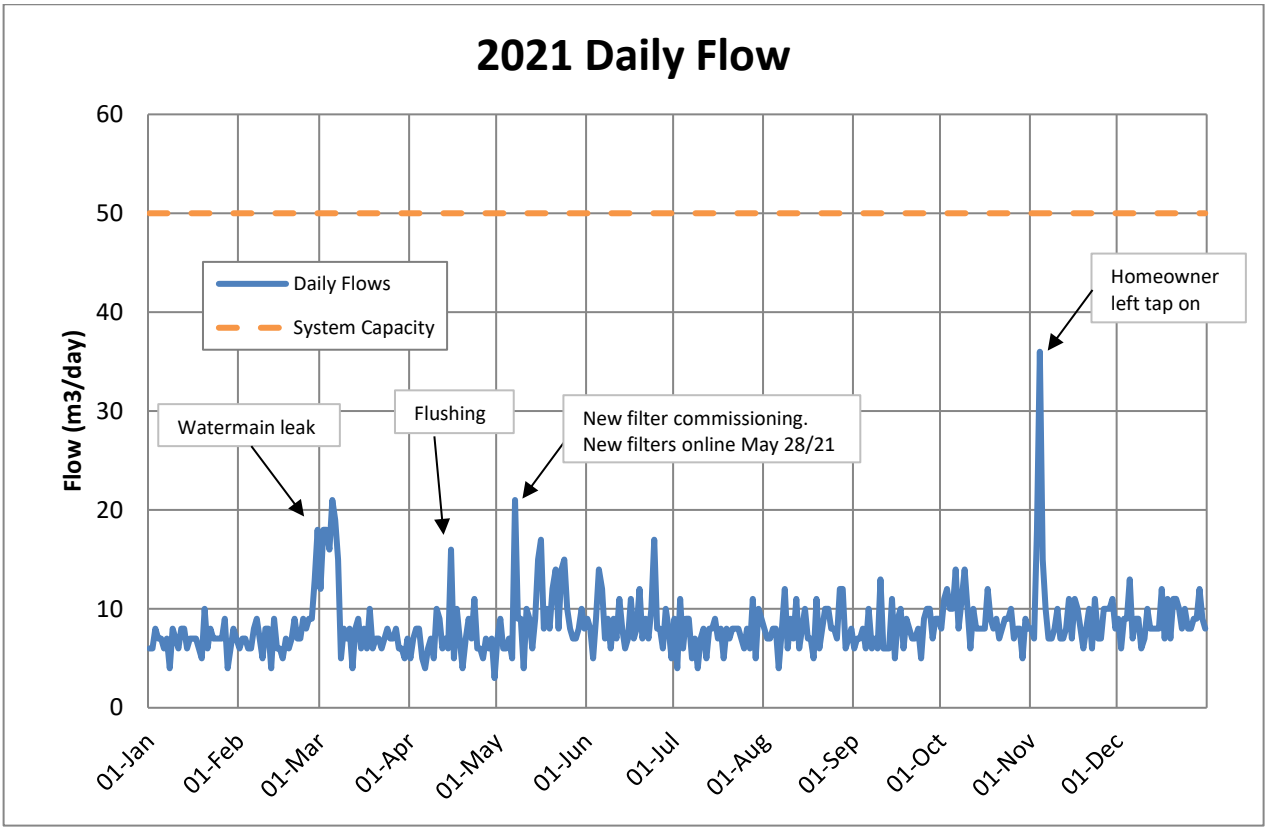
Parameter	*Sample Date*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Antimony	Dec 2/19	ND	6	0.09
Arsenic	Annual Average	4.5	10	0.2
Barium	Dec 2/19	239	1000	0.01
Boron	"	29	5000	0.2
Cadmium	"	ND	5	0.003

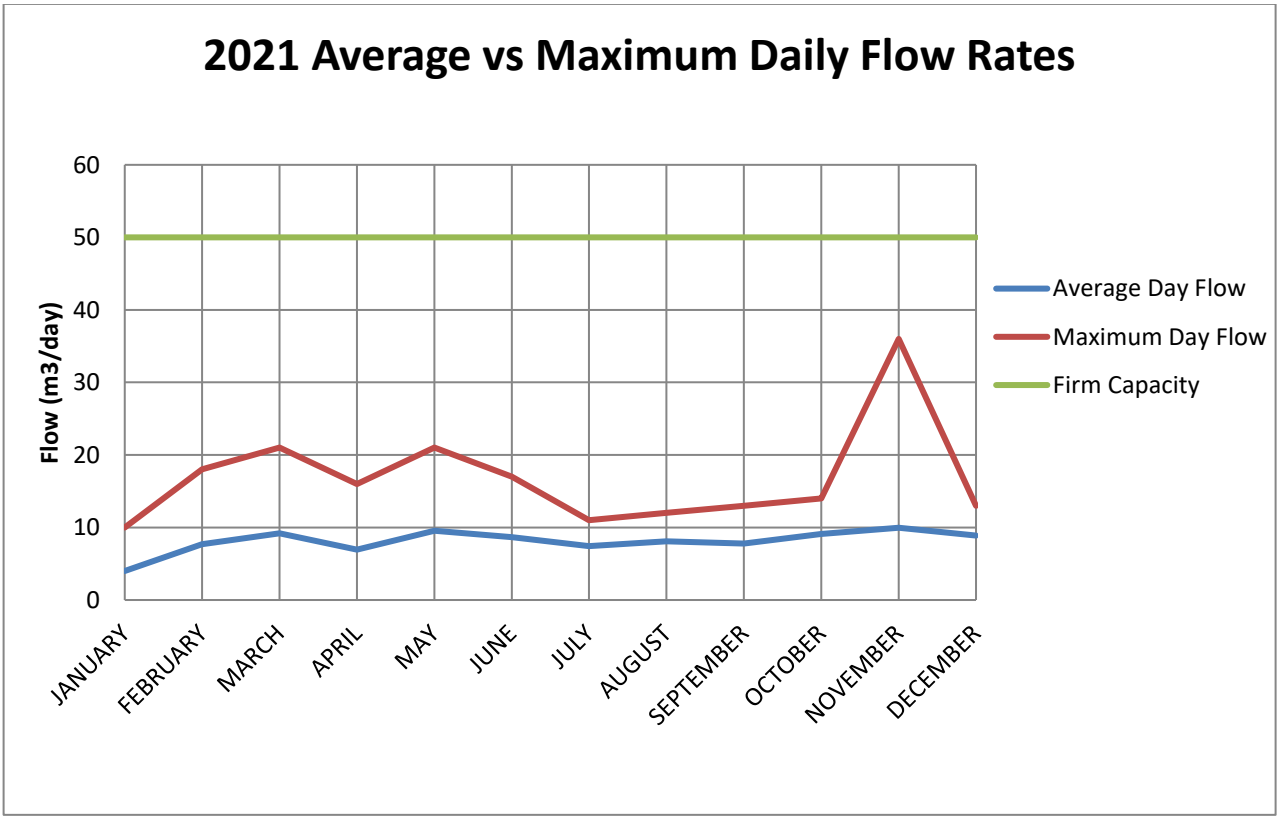
Parameter	*Sample Date*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Chromium	“	0.10	50	0.5
Mercury	“	0.01	1	0.02
Selenium	“	ND	5	1
Uranium	“	0.112	20	0.001

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

Parameter	Sample Date	Result Value (ug/L)	MAC (ug/L)	MDL (ug/L)
Alachlor	Dec 2/19	ND	5	0.02
Atrazine + N-dealkylatedmetobolites	“	ND	5	0.01
Azinphos-methyl	“	ND	20	0.05
Benzene	“	ND	1	0.32
Benzo(a)pyrene	“	ND	0.01	0.004
Bromoxynil	“	ND	5	0.33
Carbaryl	“	ND	90	0.05
Carbofuran	“	ND	90	0.01
Carbon Tetrachloride	“	ND	2	0.17
Chlorpyrifos	“	ND	90	0.02
Diazinon	“	ND	20	0.02
Dicamba	“	ND	120	0.20
1,2-Dichlorobenzene	“	ND	200	0.41
1,4-Dichlorobenzene	“	ND	5	0.36
1,2-Dichloroethane	“	ND	5	0.35
1,1-Dichloroethylene(vinylidene chloride)	“	ND	14	0.33
Dichloromethane	“	ND	50	0.35
2-4 Dichlorophenol	“	ND	900	0.15
2,4-Dichlorophenoxy acetic acid (2,4-D)	“	ND	100	0.19
Diclofop-methyl	“	ND	9	0.40
Dimethoate	“	ND	20	0.06
Diquat	“	ND	70	1
Diuron	“	ND	150	0.03
Glyphosate	“	ND	280	1
Malathion	“	ND	190	0.02
Metolachlor	“	ND	50	0.01
2-methyl-4chlorophenoxyacetic acid (MCPA)	“	ND	100	0.12
Metribuzin	“	ND	80	0.02
Monochlorobenzene	“	ND	80	0.3
Paraquat	“	ND	10	1
Pentachlorophenol	“	ND	60	0.15
Phorate	“	ND	2	0.01
Picloram	“	ND	190	0.1
Polychlorinated Biphenyls(PCB)	“	ND	3	0.04
Prometryne	“	ND	1	0.03
Simazine	“	ND	10	0.01
Terbufos	“	ND	1	0.01
Tetrachloroethylene	“	ND	10	0.45
2,3,4,6-Tetrachlorophenol	“	ND	100	0.25
Triallate	“	ND	230	0.01
Trichloroethylene	“	ND	5	0.44
2,4,6-Trichlorophenol	“	ND	5	0.25
Trifluralin	“	ND	45	0.19
Vinyl Chloride	“	ND	1	0.17

APPENDIX B: WATER QUANTITY SUMMERY





Dereham Centre Firm Capacity 50 m^3/day
Dereham Centre Water Supply Capacity 50 m^3 /day

Growing stronger together

2021 ANNUAL DRINKING WATER SYSTEM SUMMARY REPORT
Drumbo-Princeton 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 publicworks@oxfordcounty.ca

Drinking Water System:	Drumbo-Princeton Water System
Drinking Water System Number:	220007515
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: publicworks@oxfordcounty.ca
Reporting Period:	January 1, 2021 – December 31, 2021

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 1,573.

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. 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 2021, approximately 3,690 L of sodium hypochlorite and 2255 L (3190 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 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 Water System is one of 14 water systems that have revenues and expenses pooled for the economy of scale purposes. The systems are combined into the Township Water financial system and in 2021 had operating and maintenance expenditures of approximately $3,000,000.

Operations and maintenance expenditures included:

- $175,000 for the replacement of general operating equipment and well rehabilitations

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Townships systems totaled $1,500,000 for improvements to water treatment systems and replacement of distribution mains in the Township System.

Township Capital Improvement Projects included:

- $65,000 groundwater modeling
- $350,000 for facilities improvements

Capital Improvement projects for all systems included:

- $720,000 to develop Countywide SCADA Master Plan for all water systems
- $14,000 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 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 2021 sampling program are shown on the table below. There were no adverse test results from 206 treated water samples in this reporting period.

	Number of Samples	*Range of E. coli Results Min - Max MAC = 0*	*Range of Total Coliform Results Min - Max MAC = 0*
Raw	152	0	0-1
Treated	52	0	0
Distribution	154	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. 2021 results are shown in the table below.

	Number of Samples	*Range of HPC Min - Max*
Treated	52	0-8
Distribution	38	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 Drumbo-Princeton 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 soap efficiency 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 average hardness for the Drumbo-Princeton Drinking Water System is 300 mg/L (18 grains/gallon) based on samples collected from 2006 to 2019.

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.

- The average iron level in 2021 was 0.395 mg/L (ppm)

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 manganese level in 2021 was 0.031 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 2021. A summary of the chlorine residual readings is provided in the table below. 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. The turbidity of untreated water from the well is checked weekly. Turbidity is measured in nephelometric turbidity units (NTU). Under O.Reg. 170/03 turbidity in groundwater 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 2021 is provided in the table below.

Parameter	*Number of Tests or Monitoring Frequency*	*Range of Results (Min – Max) and Average*
Chlorine residual in distribution (mg/L)	Continuous	(0.52 – 2.57) 1.33
Chlorine residual after treatment (mg/L)	Continuous	(0.20 – 1.97) 1.36
Turbidity after treatment (NTU)	Continuous	(0.10 – 4.00) 0.29

5. WATER QUANTITY

Continuous monitoring of flowrates from supply wells 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 2021 flows are provided in the Table below and presented graphically in Appendix B.

Flow Summary	*Quantity*
Permit to Take Water Limit	1,329 m^3/d
Municipal Drinking Water License Limit	1,329 m^3/d
2021 Average Daily Flow	286 m^3/d
2021 Maximum Daily Flow	565 m^3
2021 Average Monthly Flow	8,699 m^3
2021 Total Amount of Water Supplied	104,391 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 m^3/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 m^3/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 m^3/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 inspection of the Drumbo-Princeton Drinking Water System took place on December 16, 2021. The final report and inspection rating were 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 were no adverse or reportable occurrences in 2021.

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 at https://cvc.ca/wp-content/uploads/2011/03/std01_079707.pdf PSIB 4449e01.titled "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines".

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

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

Parameter	*Result Range* Min – Max *(mg/L)*	*Average Result (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Nitrite	ND	ND	1.0	0.003
Nitrate	0.360 – 0.728	0.538	10.0	0.006

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

Parameter	*Annual Average*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Trihalomethane (THM)	2021	15.5	100	0.37
Haloacetic Acids (HAA)	2021	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.

Parameter	*Sample Date*	*Result Value (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Sodium	August 16, 2021	11.4	20.0*	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.

Parameter	*Result Range (Min - Max)*	*Number of Samples*	*Acceptable Level*
Distribution Alkalinity	243 – 248	4	30 – 500mg/L
Distribution pH	7.67 -7.78	4	6.5 – 8.5
Distribution Lead 2018	0.10 – 0.16	4	10 ug/L MAC

The following Table summarizes the most recent test results for Schedule 23. Testing is required every 3 years for secure groundwater wells.

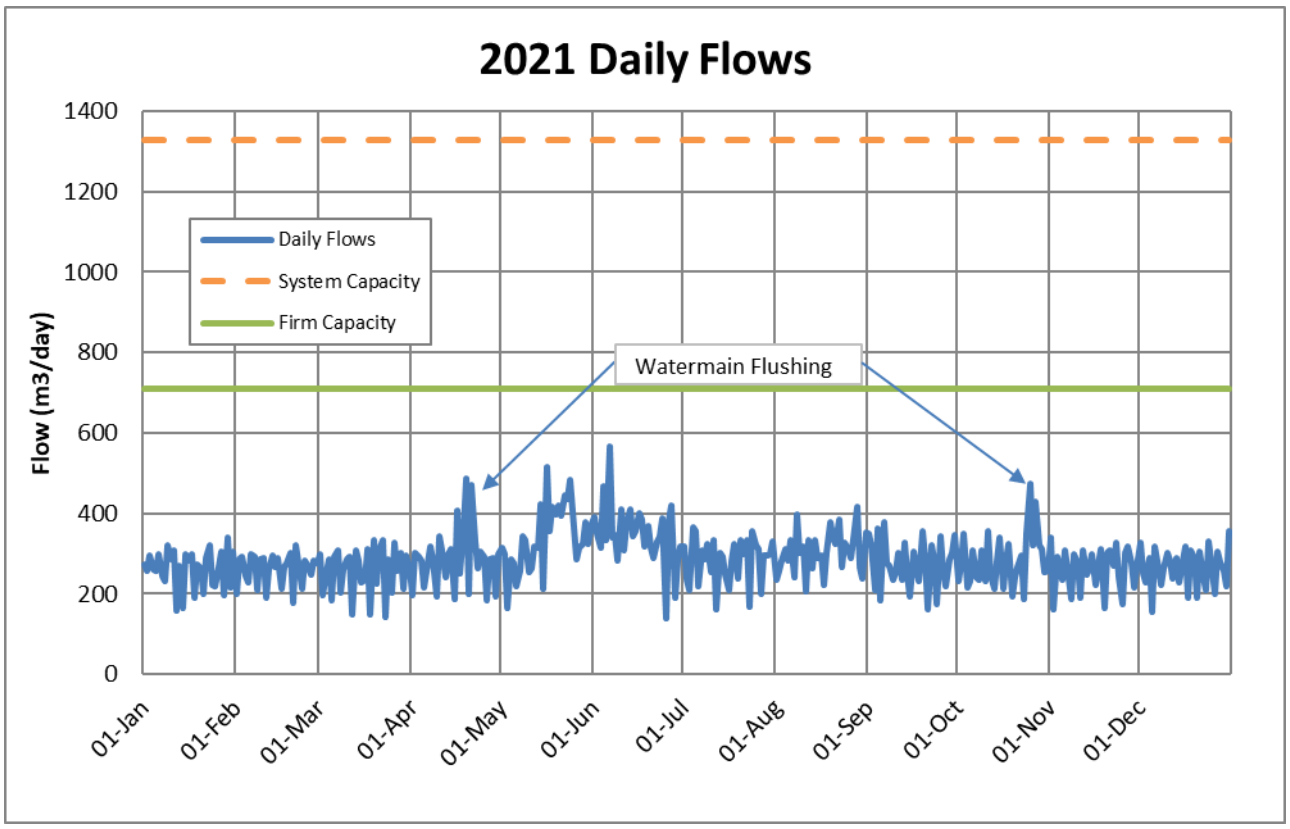
Parameter	*Sample Date*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Antimony	May 21/19	ND	6	0.09
Arsenic	"	1.0	10	0.2
Barium	"	175	1000	0.01
Boron	"	18	5000	2
Cadmium	"	0.009	5	0.003

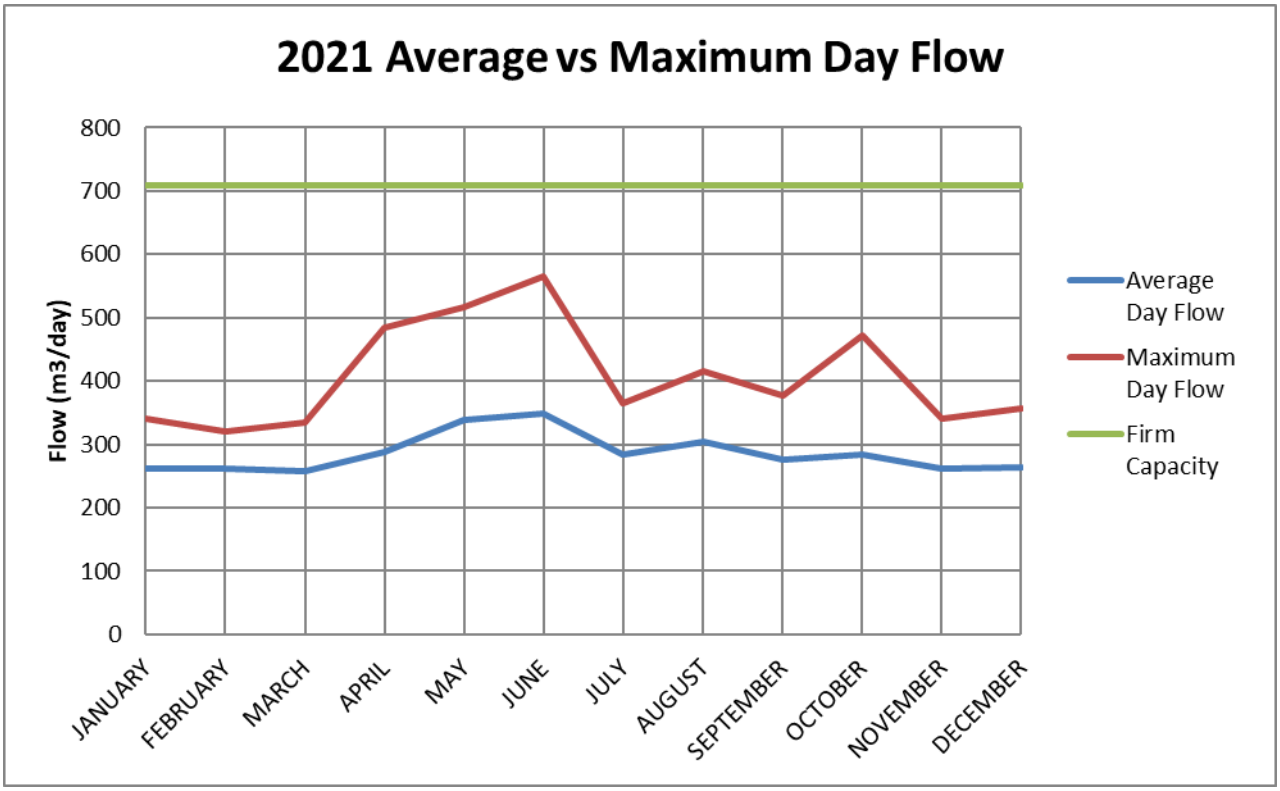
Parameter	*Sample Date*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Chromium	“	0.14	50	0.03
Mercury	“	ND	1	0.01
Selenium	“	ND	5	0.04
Uranium	“	0.884	20	0.002

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

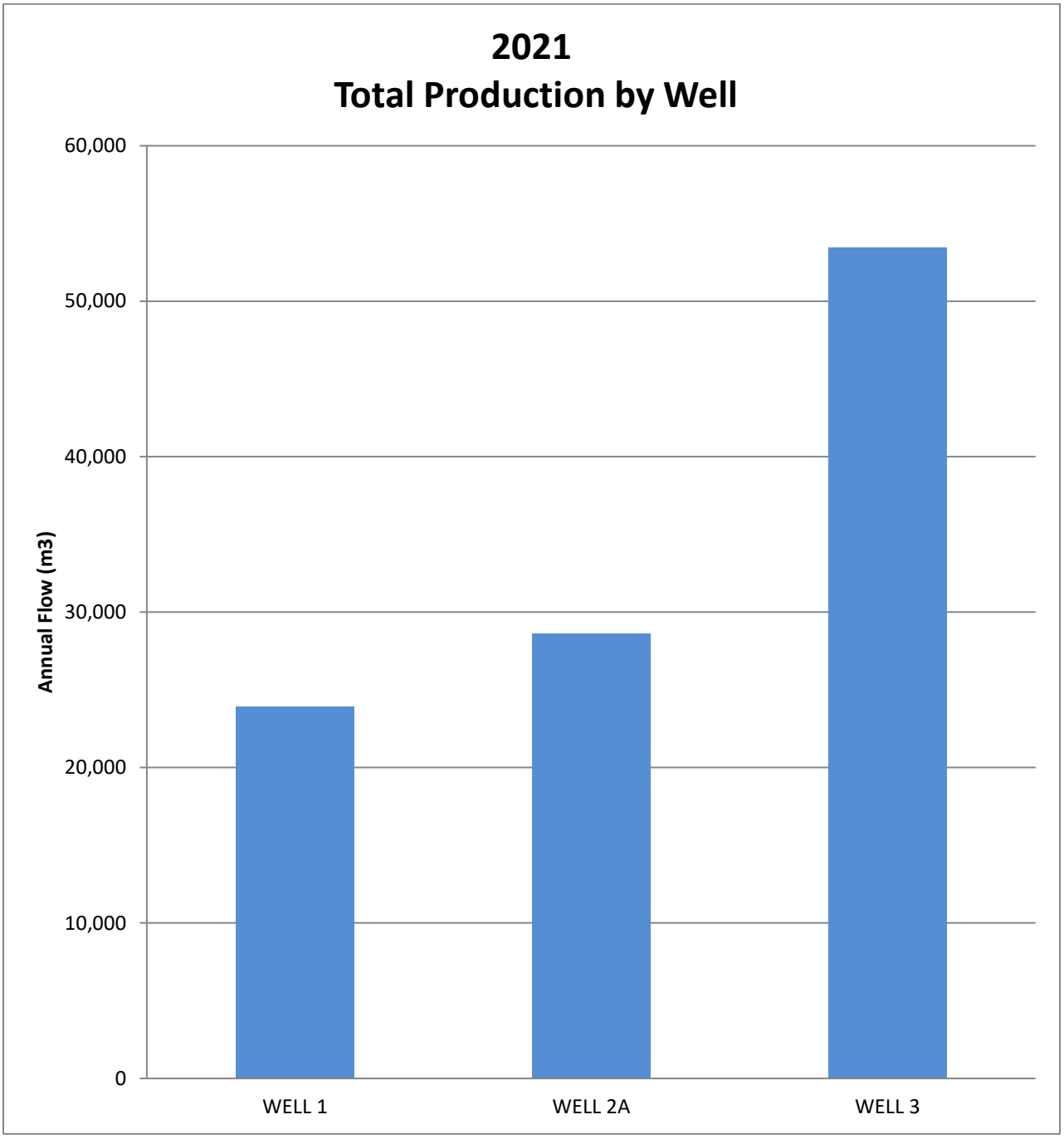
Parameter	*Sample Date*	Result Value (ug/L)	*MAC (ug/L)*	*MDL (ug/L)*
Alachlor	June 7, 2021	ND	5	0.02
Atrazine + N-dealkylatedmetobolites	“	ND	5	0.01
Azinphos-methyl	“	ND	20	0.05
Benzene	“	ND	1	0.32
Benzo(a)pyrene	“	ND	0.01	0.004
Bromoxynil	“	ND	5	0.33
Carbaryl	“	ND	90	0.05
Carbofuran	“	ND	90	0.01
Carbon Tetrachloride	“	ND	2	0.17
Chlorpyrifos	“	ND	90	0.02
Diazinon	“	ND	20	0.02
Dicamba	“	ND	120	0.20
1,2-Dichlorobenzene	“	ND	200	0.41
1,4-Dichlorobenzene	“	ND	5	0.21
1,2-Dichloroethane	“	ND	5	0.36
1,1-Dichloroethylene(vinylidene chloride)	“	ND	14	0.33
Dichloromethane	“	ND	50	0.34
2-4 Dichlorophenol	“	ND	900	0.15
2,4-Dichlorophenoxy acetic acid (2,4-D)	“	ND	100	0.19
Diclofop-methyl	“	ND	9	0.35
Dimethoate	“	ND	20	0.06
Diquat	“	ND	70	1
Diuron	“	ND	150	0.03
Glyphosate	“	ND	280	1
Malathion	“	ND	190	0.02
Metolachlor	“	ND	50	0.01
2-methyl-4chlorophenoxyacetic acid (MCPA)	“	ND	100	0.19
Metribuzin	“	ND	80	0.02
Monochlorobenzene	“	ND	80	0.03
Paraquat	“	ND	10	1
Pentachlorophenol	“	ND	60	0.15
Phorate	“	ND	2	0.01
Picloram	“	ND	190	1
Polychlorinated Biphenyls(PCB)	“	ND	3	0.04
Prometryne	“	ND	1	0.03
Simazine	“	ND	10	0.01
Terbufos	“	ND	1	0.01
Tetrachloroethylene	“	ND	10	0.35
2,3,4,6-Tetrachlorophenol	“	ND	100	0.20
Triallate	“	ND	230	0.01
Trichloroethylene	“	ND	5	0.44
2,4,6-Trichlorophenol	“	ND	5	0.25
Trifluralin	“	ND	45	0.02
Vinyl Chloride	“	ND	1	0.17

APPENDIX B: WATER QUANTITY SUMMARY





Drumbo-Princeton Firm Capacity 709 m^3/day
Drumbo-Princeton Water Supply Capacity 1,329 m^3/day



Drumbo-Princeton Firm Capacity 709 m^3/day
Drumbo-Princeton Water Supply Capacity 1,329 m^3/day

2021 ANNUAL DRINKING WATER SYSTEM SUMMARY REPORT
Embro 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 publicworks@oxfordcounty.ca

Drinking Water System:	Embro Water System
Drinking Water System Number:	220000665
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: publicworks@oxfordcounty.ca
Reporting Period:	January 1, 2021 – December 31, 2021

1.1. System Description

The Embro Water System is a Large Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and serves a population of approximately 841. 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 2021, approximately 3,107 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 m^3 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 Water System is one of 14 water systems that have revenues and expenses pooled for the economy of scale purposes. The systems are combined into the Township Water financial system and in 2021 had operating and maintenance expenditures of approximately $3,000,000.

Operations and maintenance expenditures included:

- $175,000 for the replacement of general operating equipment and well rehabilitations

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Townships systems totaled $1,500,000 for improvements to water treatment systems and replacement of distribution mains in the Township System.

Township Capital Improvement Projects included:

- $65,000 groundwater modeling
- $350,000 for facilities improvements

Capital Improvement projects for all systems included:

- $720,000 to develop Countywide SCADA Master Plan for all water systems
- $14,000 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 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 2021 sampling program are shown in the table below. There were no adverse results from the 200 treated water samples in this reporting period.

	Number of Samples	*Range of E. coli Results Min - Max MAC = 0*	*Range of Total Coliform Results Min - Max MAC = 0*
Raw	98	0	0 - 7
Treated	52	0	0
Distribution	148	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. 2021 results are shown in the table below.

	Number of Samples	*Range of HPC Min - Max*
Treated	52	0 - 17
Distribution	39	0 - 18

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 to 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 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 20.2 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 or treated water. The average hardness for the Embro Drinking Water System is 483 mg/L (28 grains/gallon) based on samples collected from 2006 to 2019.

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 2021. 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. The turbidity of untreated water from the well is checked weekly. Turbidity is measured in nephelometric turbidity units (NTU). Under O. Reg. 170/03 turbidity in groundwater 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 2021 is provided in the table below.

Parameter	*Number of Tests or Monitoring Frequency*	*Range of Results (Min – Max) and Average*
Chlorine residual in distribution (mg/L)	Continuous	(1.02 – 1.85) 1.29
Chlorine residual after treatment (mg/L)	Continuous	(0.95 – 2.11) 1.48
Turbidity after treatment (NTU)	Continuous	(0.04 – 2.29) 0.07

5. WATER QUANTITY

Continuous monitoring of flowrates from supply wells 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 2021 flows are provided in the Table below and presented graphically in Appendix B.

Flow Summary	*Quantity*
Permit to Take Water Limit	917 m^3/d
Municipal Drinking Water License Limit	916 m^3/d
2021 Average Daily Flow	191 m^3/d
2021 Maximum Daily Flow	280 m^3/d
2021 Average Monthly Flow	5,797 m^3
2021 Total Amount of Water Supplied	69,564 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 916 m^3/day. Firm Capacity is defined as the removal of the highest producing well in an emergency or operational / maintenance situation. This system comprises of two supply wells. MDWL limits pumping rate of either well to 916 m^3/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 2021 MECP annual inspection of the Embro drinking water system took place on November 5, 2021. There was no non-compliance findings at the time of inspection. Due to a change in IT systems used by the MECP, the Inspection Rating Report (IRR) could not be generated at the same time as the inspection report. The IRR was not available at the time this annual report was drafted.

6.2. Adverse Results

Any adverse results from bacteriological, chemical samples or observations of operational conditions that indicate adverse water quality is reported as required and corrective actions are taken. There were no adverse or reportable occurrences in 2021.

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 at the MECP web site https://cvc.ca/wp-content/uploads/2011/03/std01_079707.pdf document # 4449e01 titled "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines".

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

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

Parameter	*Result Range* Min – Max *(mg/L)*	*Average Result (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Nitrite	ND	ND	1.0	0.003
Nitrate	0.010 – 0.017	0.013	10.0	0.006

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

Parameter	*Annual Average*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Trihalomethane (THM)	2021	18.5	100	0.37
Haloacetic Acids (HAA)	2021	12.7	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.

Parameter	*Sample Date*	*Result Value (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Sodium	May 21, 2019	20.2	20.0*	0.01
Fluoride	Aug 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 the leaching of lead into the water.

Parameter	*Result Range (Min - Max)*	*Number of Samples*	*Acceptable Level*
Distribution Alkalinity	198 – 203	4	30 – 500mg/L
Distribution pH	7.50 – 7.54	4	6.5 – 8.5
Distribution Lead 2021	0.13 – 1.19	4	10 ug/L MAC

The following Table summarizes the most recent test results for Schedule 23. Testing is required every 3 years for secure groundwater wells.

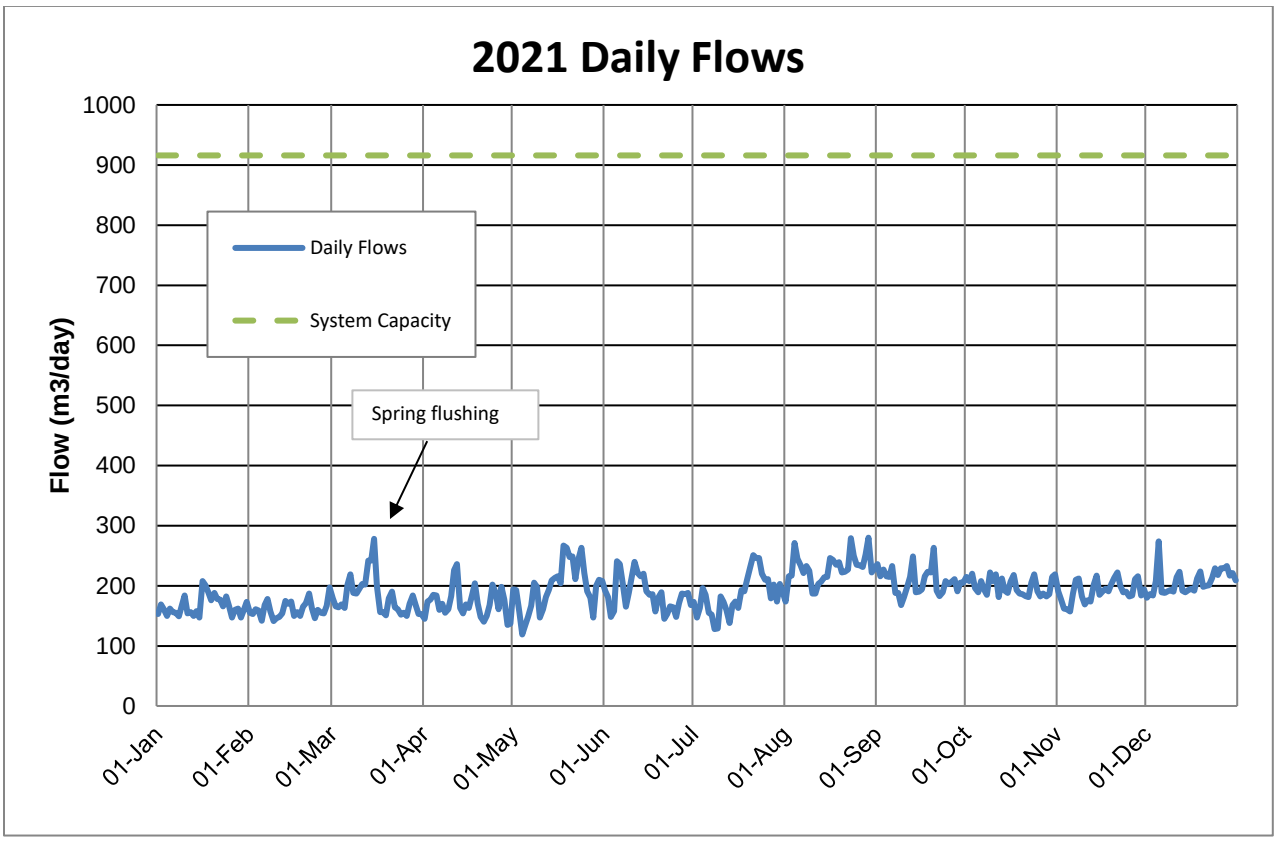
Parameter	*Sample Date*	*Result Value(ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Antimony	May 21/19	ND	6	0.09
Arsenic	"	0.3	10	0.2
Barium	"	56.3	1000	0.01
Boron	"	78	5000	2
Cadmium	"	ND	5	0.003
Chromium	"	ND	50	0.08
Mercury	"	ND	1	0.02

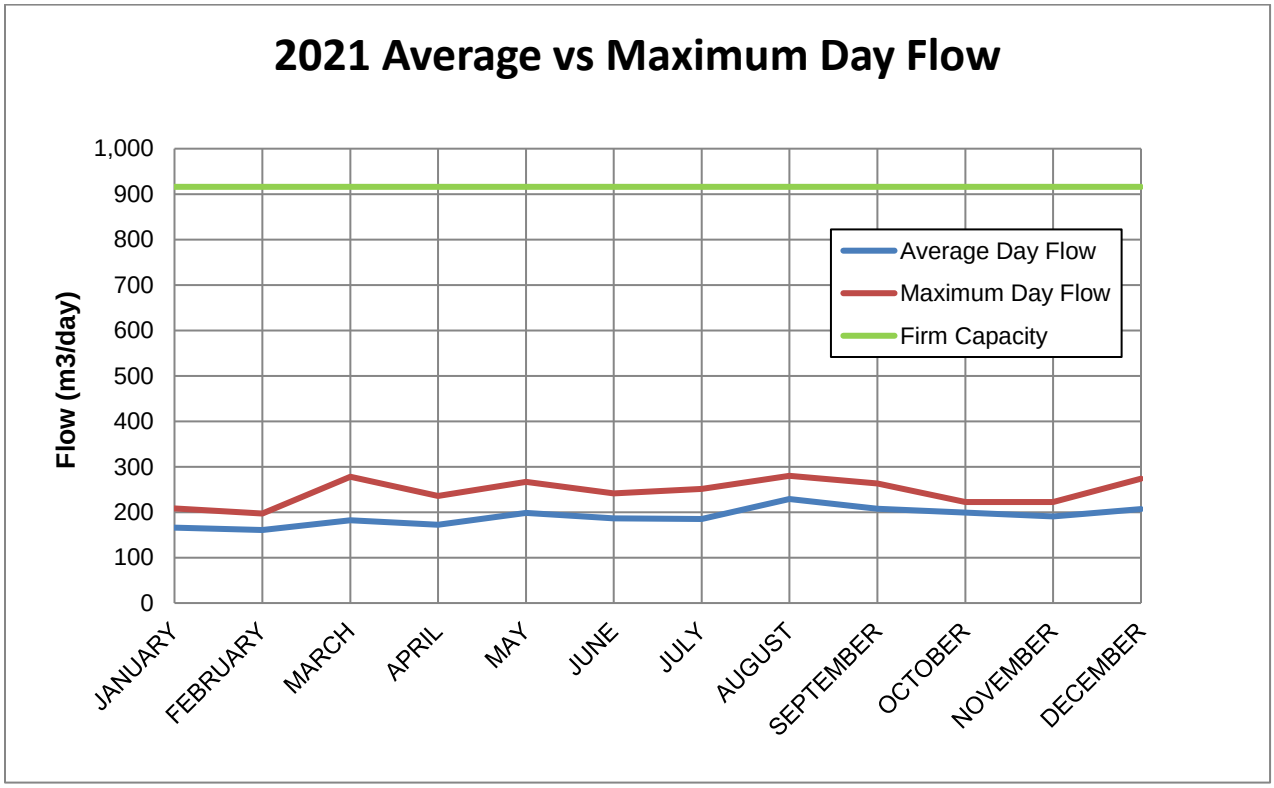
Selenium	“	ND	5	0.04
Uranium	“	0.032	20	0.002

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

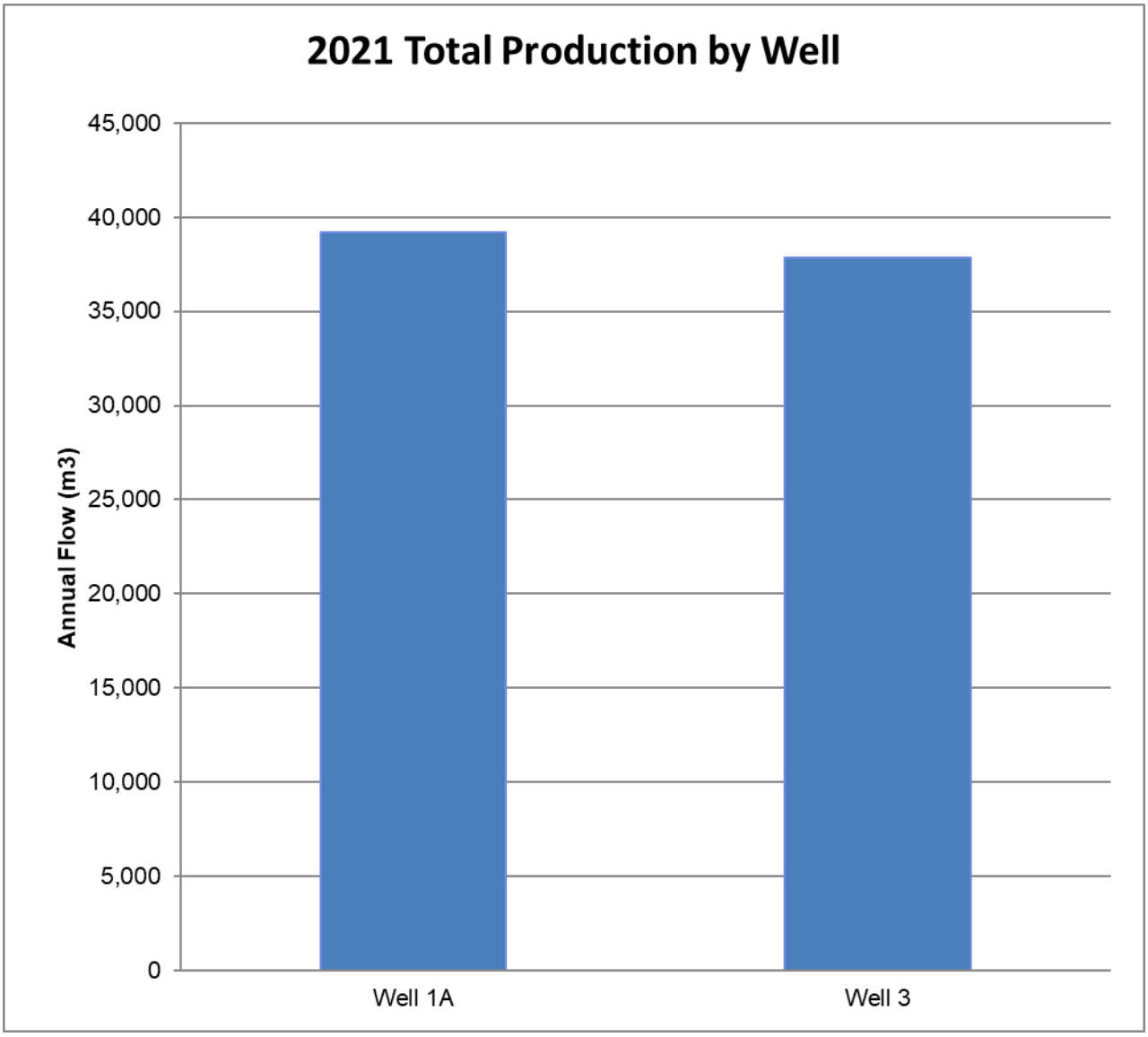
Parameter	Sample Date	Result Value (ug/L)	MAC (ug/L)	MDL (ug/L)
Alachlor	June 7, 2021	ND	5	0.02
Atrazine + N-dealkylatedmetobolites	“	ND	5	0.01
Azinphos-methyl	“	ND	20	0.05
Benzene	“	ND	1	0.32
Benzo(a)pyrene	“	ND	0.01	0.004
Bromoxynil	“	ND	5	0.33
Carbaryl	“	ND	90	0.05
Carbofuran	“	ND	90	0.01
Carbon Tetrachloride	“	ND	2	0.17
Chlorpyrifos	“	ND	90	0.02
Diazinon	“	ND	20	0.02
Dicamba	“	ND	120	0.20
1,2-Dichlorobenzene	“	ND	200	0.41
1,4-Dichlorobenzene	“	ND	5	0.36
1,2-Dichloroethane	“	ND	5	0.35
1,1-Dichloroethylene(vinylidene chloride)	“	ND	14	0.33
Dichloromethane	“	ND	50	0.35
2-4 Dichlorophenol	“	ND	900	0.15
2,4-Dichlorophenoxy acetic acid (2,4-D)	“	ND	100	0.19
Diclofop-methyl	“	ND	9	0.40
Dimethoate	“	ND	20	0.06
Diquat	“	ND	70	1
Diuron	“	ND	150	0.03
Glyphosate	“	ND	280	1
Malathion	“	ND	190	0.02
Metolachlor	“	ND	50	0.01
2-methyl-4chlorophenoxyacetic acid (MCPA)	“	ND	100	0.19
Metribuzin	“	ND	80	0.02
Monochlorobenzene	“	ND	80	0.30
Paraquat	“	ND	10	1
Pentachlorophenol	“	ND	60	0.15
Phorate	“	ND	2	0.01
Picloram	“	ND	190	1
Polychlorinated Biphenyls(PCB)	“	ND	3	0.04
Prometryne	“	ND	1	0.03
Simazine	“	ND	10	0.01
Terbufos	“	ND	1	0.01
Tetrachloroethylene	“	ND	10	0.35
2,3,4,6-Tetrachlorophenol	“	ND	100	0.20
Triallate	“	ND	230	0.01
Trichloroethylene	“	ND	5	0.44
2,4,6-Trichlorophenol	“	ND	5	0.25
Trifluralin	“	ND	45	0.02
Vinyl Chloride	“	ND	1	0.17

APPENDIX B: WATER QUANTITY SUMMARY





Embro Water System Firm Capacity is 916 m^3/day
Embro Water Supply Capacity 916 m^3/day



Embro Water System Firm Capacity is 916 m^3/day
Embro Water Supply Capacity 916 m^3/day

Growing stronger together

2021 ANNUAL DRINKING WATER SYSTEM SUMMARY REPORT
Hickson 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 publicworks@oxfordcounty.ca

Drinking Water System:	Hickson Water System
Drinking Water System Number:	2200006124
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: publicworks@oxfordcounty.ca
Reporting Period:	January 1, 2021 – December 31, 2021

1.1. System Description

The Hickson Water System is a Small Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and serves a population of approximately 102. The system consists of one groundwater well and a treatment facility. The water is treated with sodium hypochlorite (liquid chlorine) for disinfection.

In 2021, approximately 184 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 62 m^3 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 Water System is one of 14 water systems that have revenues and expenses pooled for the economy of scale purposes. The systems are combined into the Township Water financial system and in 2021 had operating and maintenance expenditures of approximately $3,000,000.

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Townships systems totaled $1,500,000 for improvements to water treatment systems and replacement of distribution mains in the Township Systems.

Capital Improvement projects for the Township systems included:

- 65,000 for groundwater modelling
- 350,000 for facilities improvements
- 175,000 for the replacement of general operating equipment including well rehabilitations

Capital Improvement projects for all systems included:

- $720,000 to develop Countywide SCADA Master Plan for all water systems
- $14,000 for Updated Water Systems Modelling

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 the 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 2021 sampling program are shown in the table below. There were no adverse test results from 88 treated water samples in this reporting period.

	Number of Samples	*Range of E. coli Results Min - Max MAC = 0*	*Range of Total Coliform Results Min - Max MAC = 0*
Raw	52	0 - 0	0 - 39
Treated	36	0 - 0	0 - 0
Distribution	52	0 - 0	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 2021 results are shown in the table below.

	Number of Samples	*Range of HPC Min - Max*
Distribution	52	0 - 56

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 system is provided below.

3.1. Hardness

Hardness 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 either raw or treated water. The average hardness for the Hickson System is 308 mg/L (18 grains/gallon) based on samples collected from 2006 to 2019.

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 2021. 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. The turbidity of untreated water from the well is checked weekly. Turbidity is measured in nephelometric turbidity units (NTU). Under O.Reg. 170/03 turbidity in groundwater 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 2021 is provided in the table below.

Parameter	*Number of Tests or Monitoring Frequency*	*Range of Results (Min – Max) and Average*
Chlorine residual in distribution (mg/L)	104	(0.51 – 1.42) 0.93
Chlorine residual after treatment (mg/L)	Continuous	(0.58 – 3.11) 1.15
Turbidity after treatment (NTU)	Continuous	(0.15 – 4.00) 0.24

5. WATER QUANTITY

Continuous monitoring of flow rates from supply wells 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 2021 flows are provided in the Table below and presented graphically in Appendix B.

Flow Summary	*Quantity*
Permit to Take Water Limit	300 m^3/d
Municipal Drinking Water License Limit	389 m^3/d
2021 Average Daily Flow	20 m^3/d
2021 Maximum Daily Flow	137 m^3/d
2021 Average Monthly Flow	595 m^3
2021 Total Amount of Water Supplied	7,143 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 100 m^3/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 m^3/day if necessary to maintain system integrity. This system comprises of one supply well. The reservoir capacity is 62 m^3/day.

6. NON-COMPLIANCE FINDINGS AND ADVERSE RESULTS

This section documents any known incidents of non-compliance or adverse results and the associated corrective 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 for the Hickson Drinking Water System took place in June 2021. There were no non-compliance findings and the 2021 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 is reported as required and corrective actions are taken. There were no adverse or reportable occurrences in 2021.

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".

Results are shown as concentrations with units of either milligrams per litre (mg/L) or micrograms per litre (ug/L). 1 mg/L is equal to 1000 ug/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 where an average result must be calculated. Where all collected samples are ND the average sample result will be assumed to be ND.

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

Parameter	*Result Range* Min – Max *(mg/L)*	*Average Result (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Nitrite	ND	ND	1.0	0.003
Nitrate	ND – 0.012	0.007	10.0	0.006

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

Parameter	*Annual Average*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Trihalomethane (THM)	2021	14.5	100	0.37
Haloacetic Acids (HAA)	2021	7.0	80	5.3

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

Parameter	*Sample Date*	*Result Value (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Sodium	Aug 16/21	10.9	20.0*	0.01
Fluoride	Aug 16/21	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.

Parameter	*Result Range (Min - Max)*	*Number of Samples*	*Acceptable Level*
Distribution Alkalinity	231 – 238	2	30 – 500mg/L
Distribution pH	7.28 – 7.57	2	6.5 – 8.5
Distribution Lead 2021	0.14 – 0.23	2	10 ug/L MAC

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

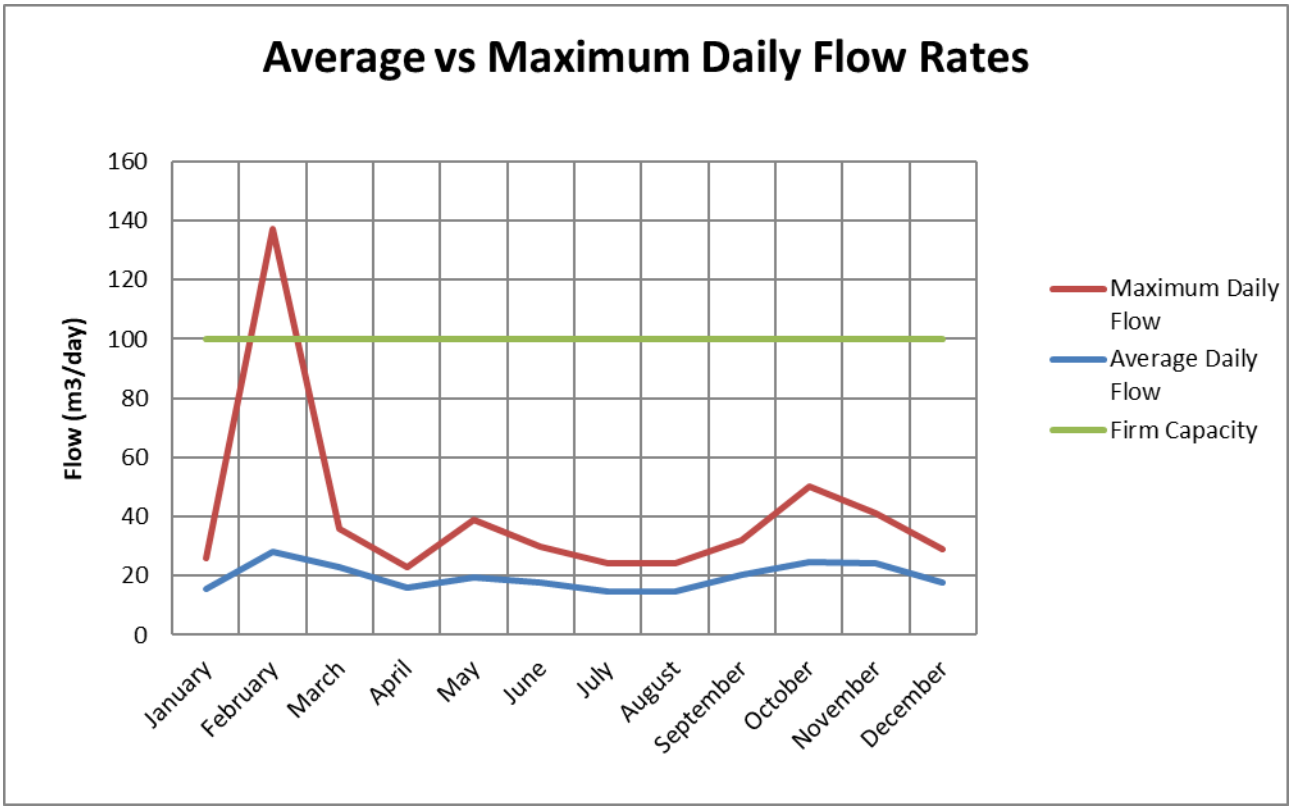
Parameter	*Sample Date*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Antimony	May 21, 2019	ND	6	0.09
Arsenic	"	ND	10	0.20
Barium	"	53.5	1000	0.02
Boron	"	27	5000	2.0
Cadmium	"	ND	5	0.003
Chromium	"	0.18	50	0.08
Mercury	"	ND	1	0.01
Selenium	"	ND	50	0.04

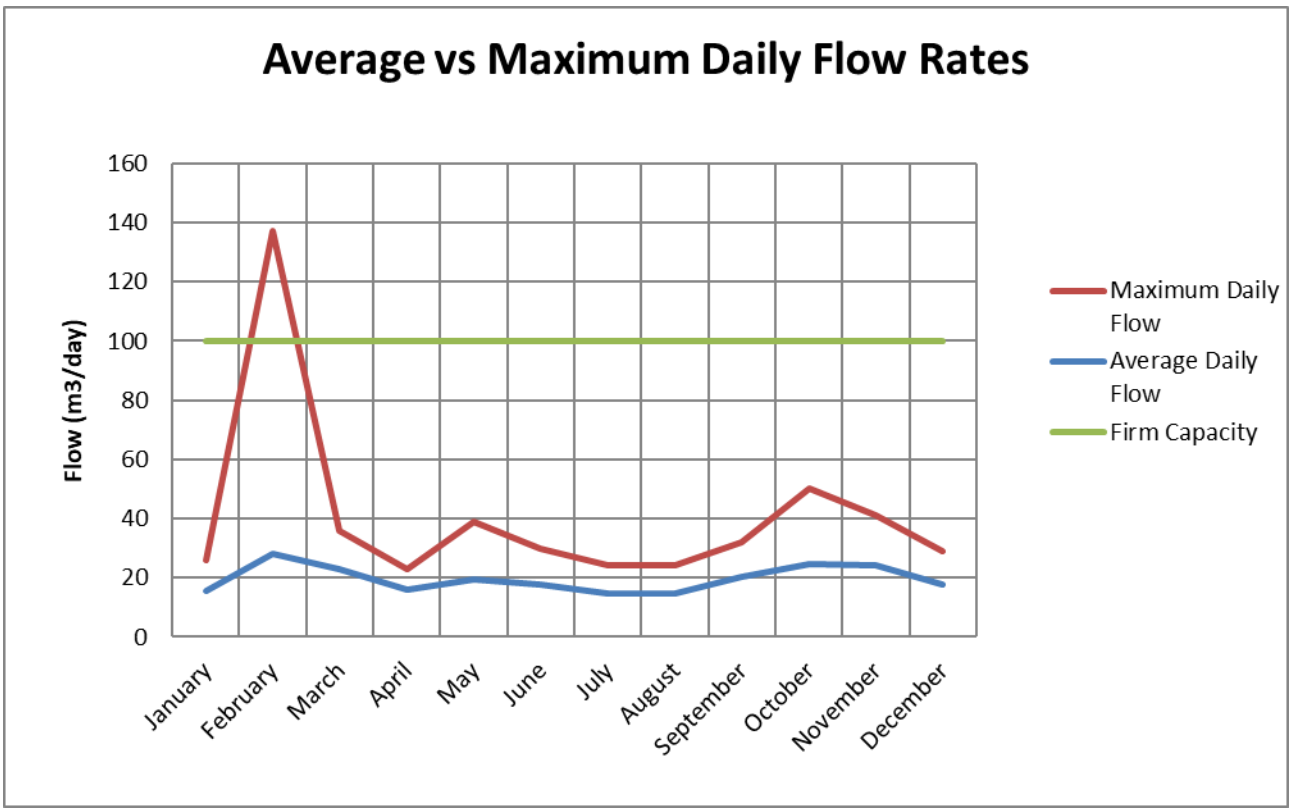
Parameter	*Sample Date*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Uranium	"	0.04	20	0.002

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

Parameter	*Sample Date*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Alachlor	June 7, 2021	ND	5	0.02
Atrazine + N-dealkylated metobolites	"	ND	5	0.01
Azinphos-methyl	"	ND	20	0.05
Benzene	"	ND	1	0.32
Benzo(a)pyrene	"	ND	0.01	0.004
Bromoxynil	"	ND	5	0.33
Carbaryl	"	ND	90	0.05
Carbofuran	"	ND	90	0.01
Carbon Tetrachloride	"	ND	2	0.16
Chlorpyrifos	"	ND	90	0.02
Diazinon	"	ND	20	0.02
Dicamba	"	ND	120	0.20
1,2-Dichlorobenzene	"	ND	200	0.41
1,4-Dichlorobenzene	"	ND	5	0.36
1,2-Dichloroethane	"	ND	5	0.35
1,1-Dichloroethylene (vinylidene chloride)	"	ND	14	0.33
Dichloromethane	"	ND	50	0.35
2-4 Dichlorophenol	"	ND	900	0.15
2,4-Dichlorophenoxy acetic acid (2,4-D)	"	ND	100	0.19
Diclofop-methyl	"	ND	9	0.40
Dimethoate	"	ND	20	0.03
Diquat	"	ND	70	1
Diuron	"	ND	150	0.03
Glyphosate	"	ND	280	1
Malathion	"	ND	190	0.02
MCPA	"	ND	100	0.12
Metolachlor	"	ND	50	0.01
Metribuzin	"	ND	80	0.02
Monochlorobenzene	"	ND	80	0.30
Paraquat	"	ND	10	1
Pentachlorophenol	"	ND	60	0.15
Phorate	"	ND	2	0.01
Picloram	"	ND	190	1
Polychlorinated Biphenyls (PCB)	"	ND	3	0.04
Prometryne	"	ND	1	0.03
Simazine	"	ND	10	0.01
Terbufos	"	ND	1	0.01
Tetrachloroethylene	"	ND	10	0.35
2,3,4,6-Tetrachlorophenol	"	ND	100	0.2
Triallate	"	ND	230	0.01
Trichloroethylene	"	ND	5	0.44
2,4,6-Trichlorophenol	"	ND	5	0.25
Trifluralin	"	ND	45	0.02
Vinyl Chloride	"	ND	1	0.17

APPENDIX B: WATER QUANTITY SUMMARY





Hickson Water System Firm Capacity 100 m^3/day
Hickson Water System Supply Capacity 300 m^3/day

2021 ANNUAL DRINKING WATER SYSTEM SUMMARY REPORT
Ingersoll 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 publicworks@oxfordcounty.ca.

Drinking Water System:	Ingersoll Water System
Drinking Water System Number:	220000692
Drinking Water System Owner & Contact Information:	Oxford County Public Works Department Water & Wastewater Services P.O. Box 1614 21 Reeve Street Woodstock, ON N4S 7Y3 Telephone: 519-539-9800 Toll Free: 866-537-7778 Email: publicworks@oxfordcounty.ca
Reporting Period:	January 1, 2021 – December 31, 2021

1.1. System Description

The Ingersoll Water System is a Large Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and serves a population of approximately 13,600. There are seven groundwater wells and Water Treatment Facilities (WTF) serving the Ingersoll systems as follows:

Merritt Street WTF – Well 2
Hamilton Road WTF – Well 3
Canterbury Street WTF – Well 5
West Street WTF – Well 7 (Not operational in 2021)
Dunn's Road WTF – Well 8
Thompson Road WTF – Well 10
Wallace Line WTF – Well 11 (Not operational in 2021)

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 2021, approximately 171,111 litres of sodium hypochlorite (liquid chlorine) and 952 kg of chlorine gas were used in the water treatment process. Also 284 litres 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 2021, the Ingersoll Water System had forecasted operating and maintenance expenditures of approximately $1,800,000.

In addition to regular operational and maintenance expenditures Capital improvement projects for Ingersoll totaled $1,600,000 for improvements to water treatment systems and replacement of distribution mains in the Ingersoll System.

Capital improvement projects included:

- $950,000 for the replacement of aging watermains
- $150,000 for groundwater model
- $130,000 for water quality and treatment enhancements
- $55,000 for facilities improvements
- $200,000 for the replacement of general operating equipment including well rehabilitations

Capital Improvement projects for all systems included:

- $720,000 to develop Countywide SCADA Master Plan for all water systems
- $14,000 for Updated Water Systems Modelling

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 each 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 the 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 2021 sampling program are shown in the table below. There were no adverse test result from 504 treated water samples in this reporting period.

	Number of Samples	*Range of E. coli Results Min - Max MAC = 0*	*Range of Total Coliform Results Min - Max MAC = 0*
Raw	213	0	0 - 22
Treated	211	0	0
Distribution	293	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's 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. The 2021 results are shown in the table below.

	Number of Samples	*Range of HPC Min - Max*
Treated	211	0 - 8
Distribution	83	0 – 18

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 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 water.

When sodium levels are above 20 mg/L the MECP and MOH are notified. Southwestern Public Health Unit 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 tested 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 Unit webpage 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

Hardness 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 a water softener at the level recommended by the manufacturer. Samples for hardness are collected at a minimum every 3 years from either raw or treated water. The average hardness for the Ingersoll System is 329 mg/L (equivalent to 19 grains) based on samples collected from 2006 to 2021.

3.4. Additional Testing Required by MECP

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

Type of legal instrument: MECP Municipal Drinking Water License – June 9, 2020					
Parameter	*Date Sampled*	*Result Raw Water*	*Result Treated Water*	*Aesthetic Objective (mg/L)*	MDL (mg/L)
Sulfides – Merritt St	Nov 22, 2021	0.10	ND	0.05	0.006
Sulfides – Hamilton Rd	Dec 6, 2021	0.08	ND	0.05	0.006
Sulfides – Canterbury St	Nov 22, 2021	0.09	ND	0.05	0.006
Sulfides – Dunn's Rd	Nov 22, 2021	0.46	ND	0.05	0.006
Sulfides – Dunn's Rd	Dec 12, 2021	3.19		0.05	0.006
Sulfides – Thompson Rd	Nov 22, 2021	0.05	ND	0.05	0.006

4. OPERATIONAL MONITORING

4.1. Chlorine Residual

Free chlorine levels of the treated water are monitored continuously at the discharge point of each Water Treatment Facility. In the distribution system, free chlorine is monitored continuously at the water tower. As the target, the 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. A summary of the chlorine residual readings is provided in the table below.

4.2. Turbidity

Turbidity of treated water is continuously monitored at each treatment facility. A change in turbidity can indicate an operational problem. The turbidity of untreated water from each well is checked weekly. Turbidity is measured in nephelometric turbidity units (NTU). Under O.Reg. 170/03 turbidity in groundwater 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 2021 is provided in the table below.

Parameter	*Monitoring Frequency*	*Range of Results (Min – Max) and Average*
Chlorine Residual in Distribution (mg/L)	Continuous	(0.47 – 2.63) 1.02
Chlorine – Merritt St. WTF (mg/L)	Continuous	(0.45 – 2.56) 1.18
Chlorine – Hamilton Rd. WTF (mg/L)	Continuous	(0.44 – 2.77) 1.41
Chlorine – Canterbury St. WTF (mg/L)	Continuous	(0.31 – 2.85) 1.40
Chlorine – Dunn's Rd. WTF (mg/L)	Continuous	(0.35 – 3.99) 1.39
Chlorine – Thompson Rd. WTF (mg/L)	Continuous	(0.34 – 2.41) 1.48
Turbidity – Merritt St. WTF (NTU)	Continuous	(0.07 – 5.02) 0.14
Turbidity – Hamilton Rd. WTF (NTU)	Continuous	(0.04 – 2.94) 0.10
Turbidity – Canterbury St. WTF (NTU)	Continuous	(0.03 – 4.57) 0.15
Turbidity – Dunn's Rd. WTF (NTU)	Continuous	(0.07 – 4.32) 0.13
Turbidity – Thompson Rd. WTF (NTU)	Continuous	(0.05 – 3.52) 0.06

5. WATER QUANTITY

Continuous monitoring of flow rates from supply wells 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 2021 flows are provided in the Table below and presented graphically in Appendix B.

Flow Summary	*Quantity*
Permit to Take Water Limit	26,413 m^3/d
Municipal Drinking Water License Limit	26,521 m^3/d
2021 Average Daily Flow	4,131 m^3/d
2021 Maximum Daily Flow	6,745 m^3/d
2021 Average Monthly Flow	125,632 m^3
2021 Total Amount of Water Supplied	1,507,578 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 has not been scheduled yet with the final report likely to be issued in late Q1 2022. Therefore a current Inspection Report rating and any non-compliance findings are unavailable from the final report.

6.2. Adverse Results

Any adverse results from bacteriological, chemical or observations of operational conditions that indicate adverse water quality are reported as required to the MECP and the MOH and corrective actions taken. There were no adverse or reportable occurrences in 2021.

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 at https://cvc.ca/wp-content/uploads/2011/03/std01_079707.pdf PSIB 4449e01 titled "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines".

Results are shown as concentrations with units of either milligrams per litre (mg/L) or micrograms per litre (ug/L). 1 mg/L is equal to 1000 ug/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 where an average result must be calculated. Where all collected samples are ND the average sample result will be assumed to be ND.

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

Parameter & Location	*Result Range* Min – Max *(mg/L)*	*Average Result (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Nitrite				
Merritt St.	ND	ND	1.0	0.003
Hamilton Rd.	ND – 0.006	0.004	1.0	0.003
Canterbury St.	ND	ND	1.0	0.003
Dunn's Rd.	ND	ND	1.0	0.003
Thompson Rd.	ND	ND	1.0	0.003
Nitrate				
Merritt St.	0.008 – 0.030	0.019	10.0	0.006
Hamilton Rd.	ND – 0.011	0.009	10.0	0.006
Canterbury St.	0.010 – 0.012	0.011	10.0	0.006
Dunn's Rd.	ND – 0.009	0.007	10.0	0.006
Thompson Rd.	0.006 – 0.048	0.017	10.0	0.006

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

Parameter	*Annual Average*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Trihalomethane (THM)	2021	22	100	0.37
Haloacetic Acids (HAA)	2021	10	80	5.3

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

Parameter & Location	*Sample Date*	*Result Value (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Sodium				
Merritt St.	July 10/19	51.4	20.0*	0.01
Hamilton Rd.	June 5/19	47.9	20.0*	0.01
Canterbury St.	June 3/19	55.2	20.0*	0.01
Dunn's Rd.	June 3/19	61.2	20.0*	0.01
Thompson Rd.	June 3/19	45.5	20.0*	0.01
Fluoride				
Merritt St.	July 10/19	2.12	1.5**	0.06
Hamilton Rd.	May 27/19	0.77	1.5**	0.06
Canterbury St.	June 3/19	1.50	1.5**	0.06
Dunn's Rd.	June 3/19	1.96	1.5**	0.06
Thompson Rd.	June 3/19	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.

Parameter	*Result Range (Min - Max)*	*Number of Samples*	*Acceptable Level*
Distribution Alkalinity	216 – 251	8	30 – 500mg/L
Distribution pH	7.49 – 7.61	8	6.5 – 8.5
Distribution Lead 2021	ND – 0.57	8	10 ug/L MAC

The following Tables summarize the most recent test results for the Inorganic parameters in Schedules 23. Testing is required every 3 years for secure groundwater wells.

Parameter	***Well 2*** *Result Value (ug/L) July 10, 2019*	***Well 3*** *Result Value (ug/L) May 27, 2019*	***Well 5*** *Result Value (ug/L) May 27, 2019*	*MAC (ug/L)*	*MDL (ug/L)*
Antimony	ND	ND	ND	6	0.09
Arsenic	ND	ND	0.3	10	0.2
Barium	46.4	117	55.0	1000	0.02
Boron	132	44	88	5000	2
Cadmium	0.003	ND	ND	5	0.003
Chromium	ND	0.14	0.14	50	0.08
Mercury	ND	ND	ND	1	0.01
Selenium	ND	ND	ND	50	0.04
Uranium	0.045	0.091	0.187	20	0.002

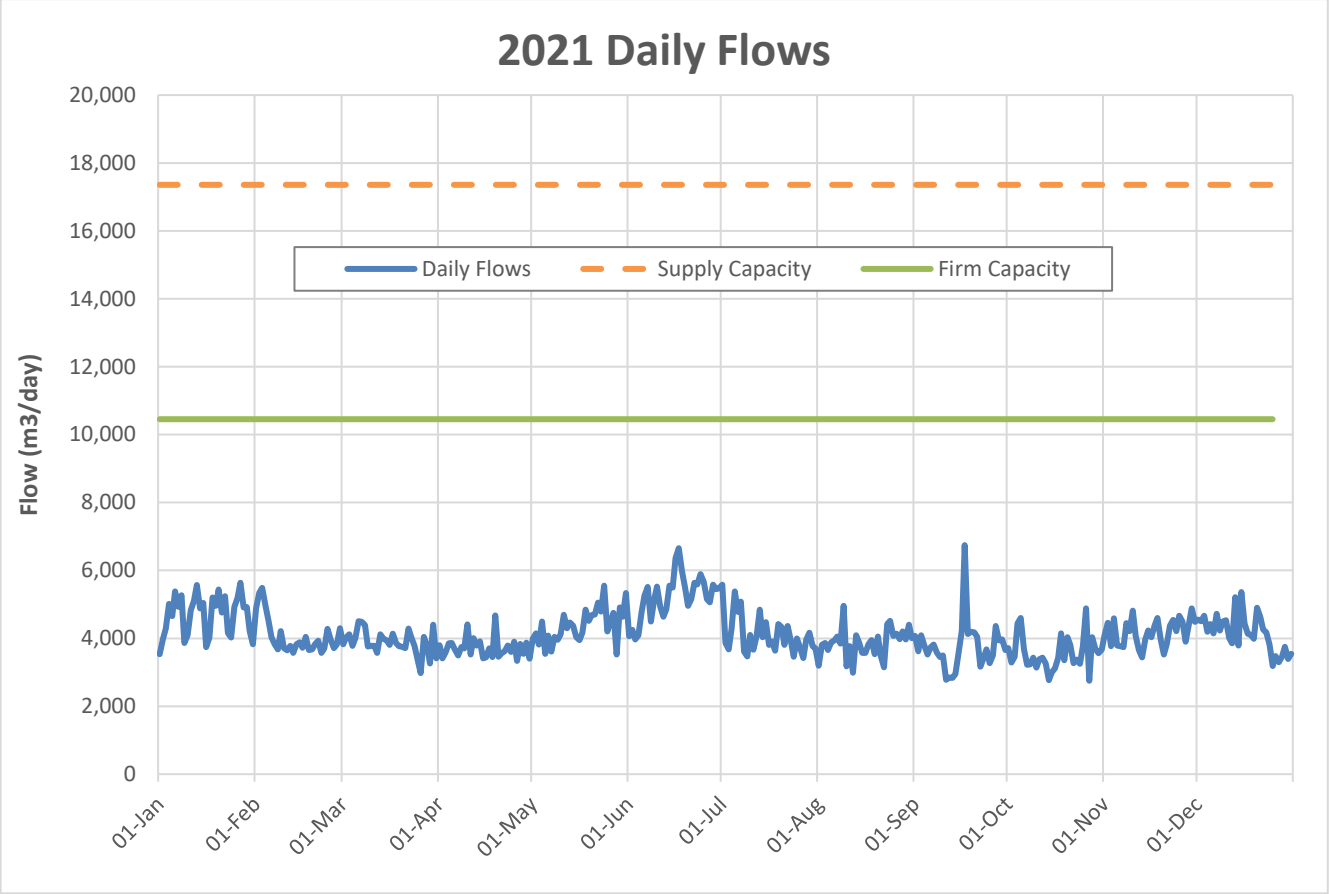
Parameter	***Well 8*** *Result Value (ug/L) May 27, 2019*	***Well 10*** *Result Value (ug/L) May 27, 2019*	*MAC (ug/L)*	*MDL (ug/L)*
Antimony	ND	ND	6	0.09
Arsenic	ND	ND	10	0.2
Barium	30.1	65.3	1000	0.02
Boron	157	103	5000	2
Cadmium	ND	ND	5	0.003
Chromium	0.24	0.11	50	0.08
Mercury	ND	ND	1	0.01
Selenium	ND	ND	50	0.04
Uranium	0.076	0.082	20	0.002

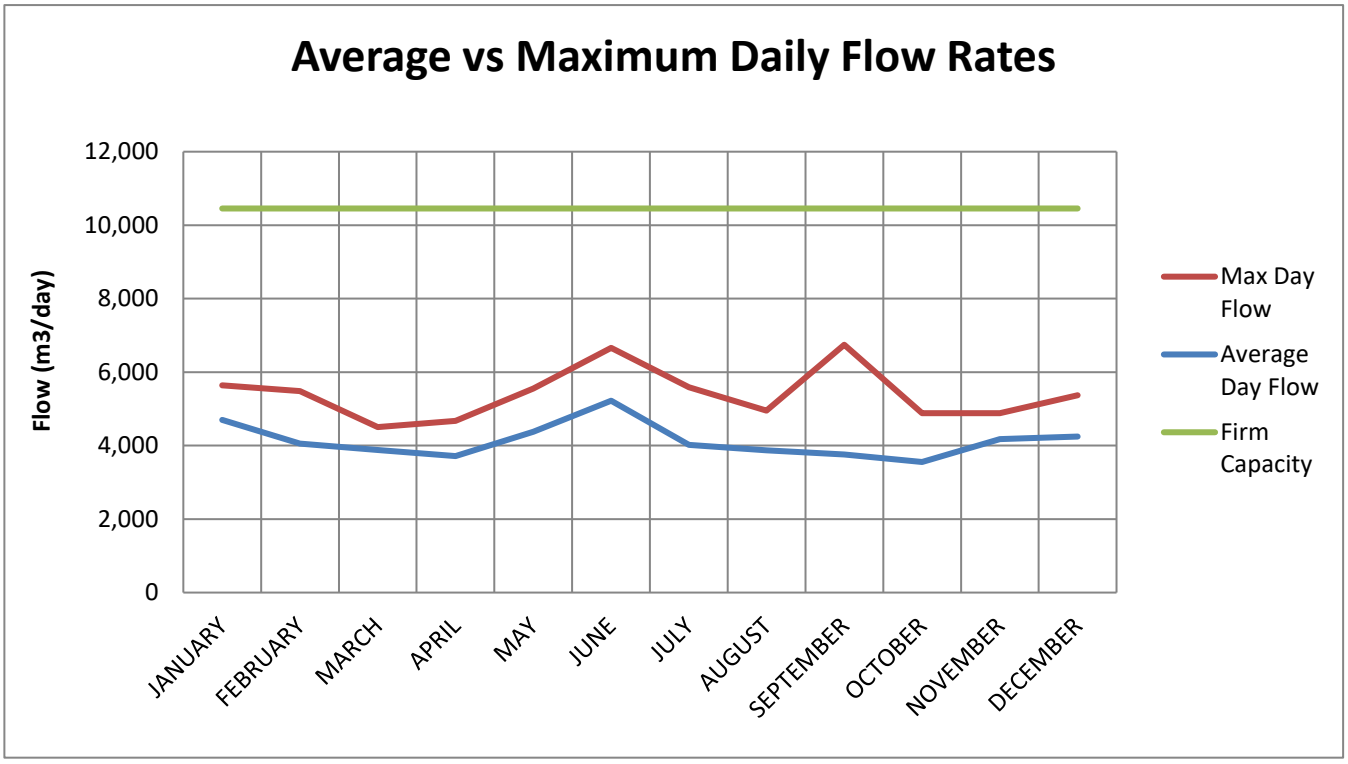
The following Tables summarize the most recent test results for the Organic parameters in Schedules 24. Testing is required every 3 years for secure groundwater wells.

Parameter	***Well 2*** *Result Value (ug/L) Aug 16, 2021*	***Well 3*** *Result Value (ug/L) June 7, 2021*	***Well 5*** *Result Value (ug/L) May 20, 2021*	*MAC (ug/L)*	*MDL (ug/L)*
Alachlor	ND	ND	ND	5	0.02
Atrazine + N-dealkylatedmetobolites	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	0.16
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
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	0.03
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

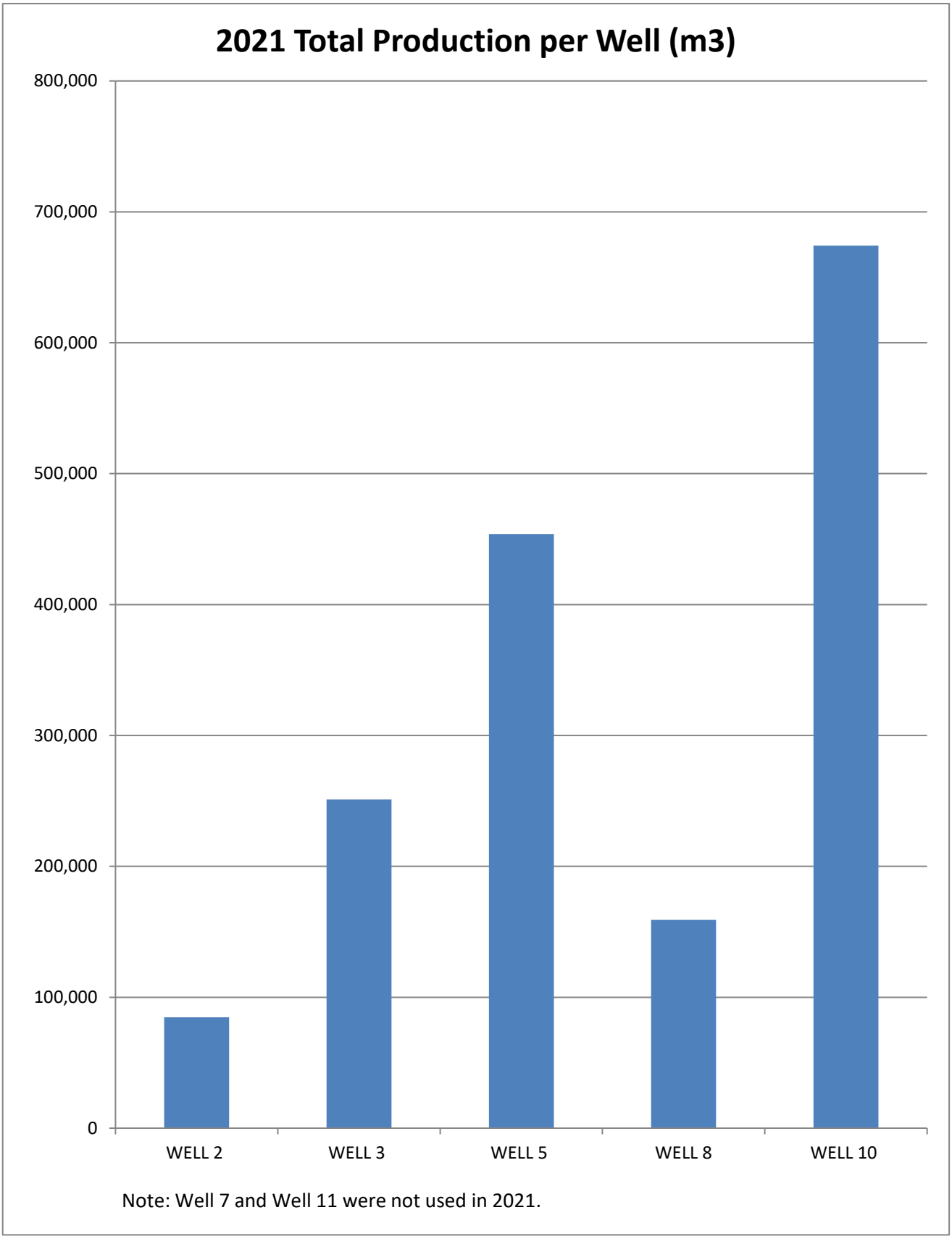
Parameter	***Well 8*** *Result Value (ug/L) June 7, 2021*	***Well 10*** *Result Value (ug/L) June 7, 2021*	*MAC (ug/L)*	*MDL (ug/L)*
Alachlor	ND	ND	5	0.02
Atrazine + N-dealkylatedmetobolites	ND	ND	5	0.01
Azinphos-methyl	ND	ND	20	0.05
Benzene	ND	ND	1	0.32
Benzo(a)pyrene	ND	ND	0.01	0.004
Bromoxynil	ND	ND	5	0.33
Carbaryl	ND	ND	90	0.05
Carbofuran	ND	ND	90	0.01
Carbon Tetrachloride	ND	ND	2	0.16
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
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	0.03
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: 2021 WATER QUANTITY SUMMARY





Ingersoll Water System Supply Capacity 17,357 m^3/day
Ingersoll Water System Firm Capacity 10,454 m^3/day



Ingersoll Water System Supply Capacity 17,357 m^3/day
Ingersoll Water System Firm Capacity 10,454 m^3/day

2021 ANNUAL DRINKING WATER SYSTEM SUMMARY REPORT
Innerkip Water System

1. GENERAL INFORMATION

Oxford 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 Oxford 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 of Oxford at the address and phone number listed below or by email at publicworks@oxfordcounty.ca.

Drinking Water System:	Innerkip Water System
Drinking Water System Number:	260046995
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: publicworks@oxfordcounty.ca
Reporting Period:	January 1, 2021 – December 31, 2021

1.1. System Description

The Innerkip Water System is a Large Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and serves a population of approximately 1,290. 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 2021, approximately 6,970 L 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 m^3 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 Water System is one of 14 water systems that have revenues and expenses pooled for the economy of scale purposes. The systems are combined into the Township Water financial system and in 2021 had operating and maintenance expenditures of approximately $3,000,000.

Operations and maintenance expenditures included:

- $175,000 for the replacement of general operating equipment and well rehabilitations

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Townships systems totaled $1,500,000 for improvements to water treatment systems and replacement of distribution mains in the Township System.

Township Capital Improvement Projects included:

- $65,000 groundwater modeling
- $350,000 for facilities improvements

Capital Improvement projects for all systems included:

- $720,000 to develop Countywide SCADA Master Plan for all water systems
- $14,000 for updated water systems modeling

2. MICROBIOLOGICAL TESTING

2.1. *E. coli and Total Coliform*

Bacteriological tests for *E. coli* and total coliforms are taken 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 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 2021 sampling program are shown in the table below. There were no adverse test results from 200 treated water samples in this reporting period.

	Number of Samples	*Range of E. coli Results Min - Max MAC = 0*	*Range of Total Coliform Results Min - Max MAC = 0*
Raw	103	0	0 - 1
Treated	52	0	0
Distribution	148	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. The 2021 results are shown in the table below.

	Number of Samples	*Range of HPC Min - Max*
Treated	52	0 - 39
Distribution	39	0 - 22

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 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 or treated water. The average hardness for the Innerkip Drinking Water System is 935 mg/L (55 grains/gallon) based on samples collected from 2006 to 2019.

3.2. Additional Testing Required by MECP

Testing of the lagoon backwash discharge is required for the Innerkip Water System. A summary of the monitoring results for 2021 is below.

Legal instrument: Municipal Drinking Water License issued December 1, 2018					
Parameter	*Result Range (Min–Max) mg/L*	*Average mg/L*	*Number of Samples*	*Limit*	*MDL (mg/L)*
Suspended Solids from lagoon backwash discharge	(3.00 - 32.0)	14.0	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 is taken. There were no reportable incidents in 2021. 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. The turbidity of untreated water from the well is checked weekly. Turbidity is measured in nephelometric turbidity units (NTU). Under O.Reg. 170/03 turbidity in groundwater 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 2021 is provided in the table below.

Parameter	*Number of Tests or Monitoring Frequency*	*Range of Results (Min – Max) and Average*
Chlorine residual in distribution (mg/L)	Continuous	(0.67– 1.55) 1.14
Chlorine residual after treatment (mg/L)	Continuous	(0.44 – 3.74) 1.37
Turbidity after treatment (NTU)	Continuous	(0.06 – 1.84) 0.09

5. WATER QUANTITY

Continuous monitoring of flowrates from supply wells 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 2021 flows are provided in the Table below and presented graphically in Appendix B.

Flow Summary	*Quantity*
Permit to Take Water Limit	1,728 m^3/d
Municipal Drinking Water License Limit	1,296 m^3/d
2021 Average Daily Flow	310 m^3/d
2021 Maximum Daily Flow	621 m^3/d
2021 Average Monthly Flow	9,433 m^3
2021 Total Amount of Water Supplied	113,201 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 m^3/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 m^3/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 2021 MECP annual inspection of the Innerkip drinking water system took place on June 23, 2021. There were no non-compliance findings and the 2021 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 2021.

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 https://cvc.ca/wp-content/uploads/2011/03/std01_079707.pdf PIBS 4449e01 titled "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines".

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

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

Parameter	*Result Range* Min – Max *(mg/L)*	*Average Result (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Nitrite	ND	ND	1.0	0.003
Nitrate	0.046 - 0.062	0.054	10.0	0.006

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

Parameter	*Annual Average*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Trihalomethane (THM)	2021	17.3	100	0.37
Haloacetic Acids (HAA)	2021	15.3	80	5.3

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

Parameter	*Sample Date*	*Result Value (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Sodium	August 16, 2021	17.7	20.0*	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.

Parameter	*Result Range (Min -- Max)*	*Number of Samples*	*Acceptable Level*
Distribution Alkalinity	220 – 259	4	30 – 500mg/L
Distribution pH	7.15 – 7.24	4	6.5 – 8.5
Distribution Lead 2021	ND – 0.02	4	10 ug/L MAC

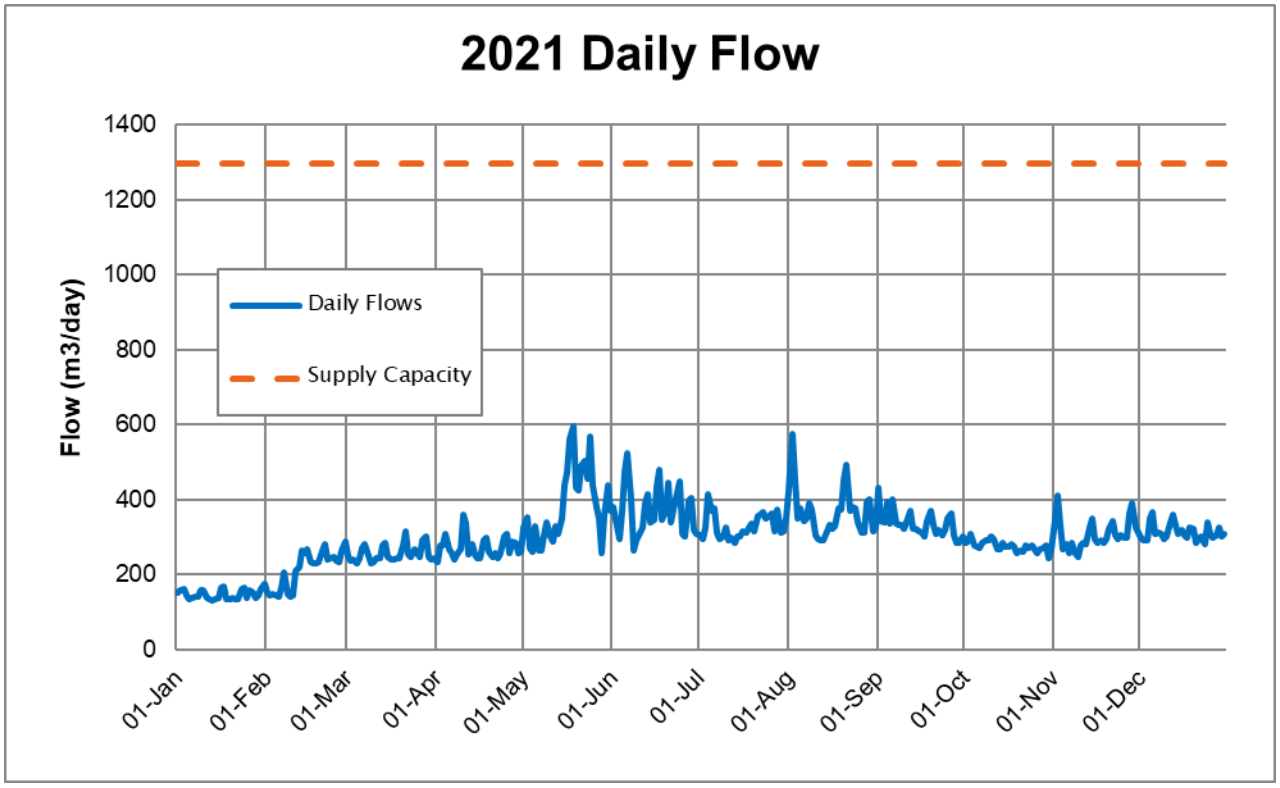
The following Table summarizes the most recent test results for Schedule 23. Testing is required every 3 years for secure groundwater wells.

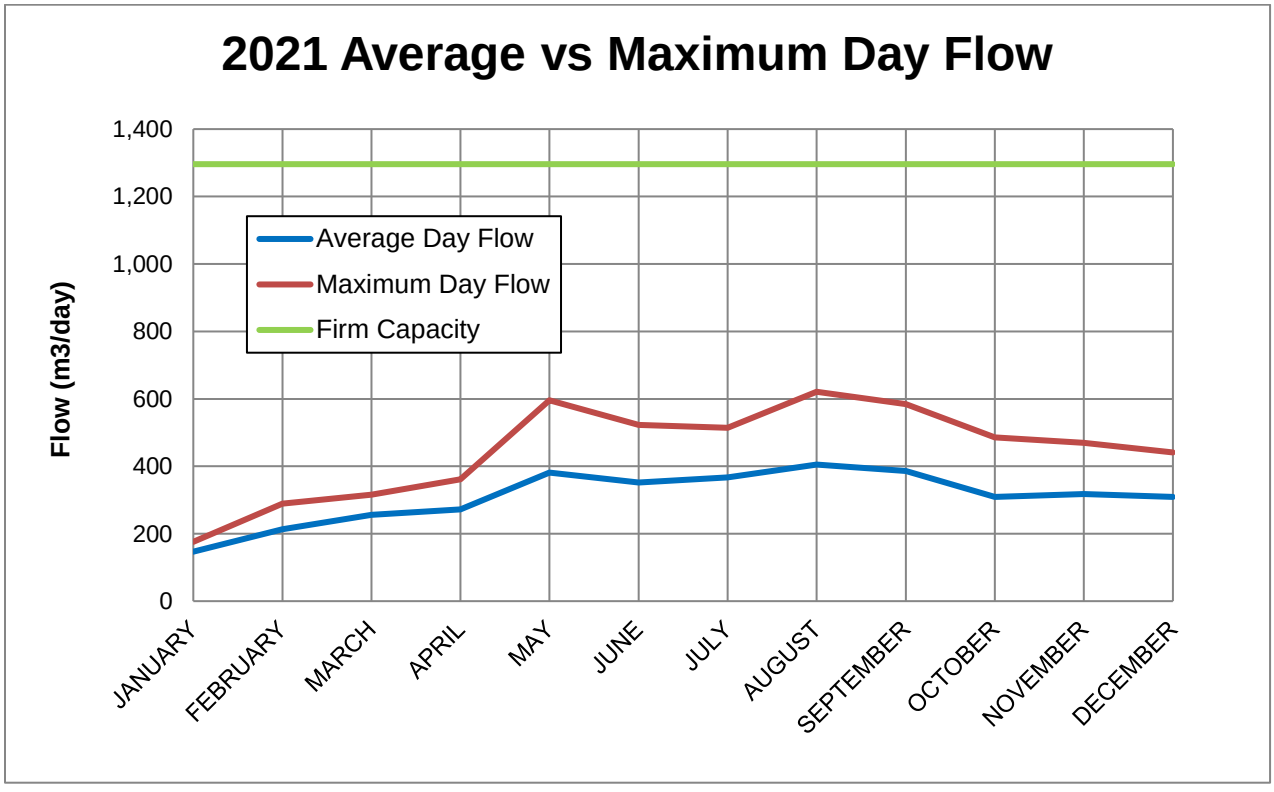
Parameter	*Sample Date*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Antimony	Feb 18/20	0.09	6	0.02
Arsenic	"	ND	10	0.2
Barium	"	72.5	1000	0.01
Boron	"	102	5000	2
Cadmium	"	0.007	5	0.003
Chromium	"	0.12	50	0.03
Mercury	"	ND	1	0.01
Selenium	"	ND	5	1
Uranium	"	0.697	20	0.001

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

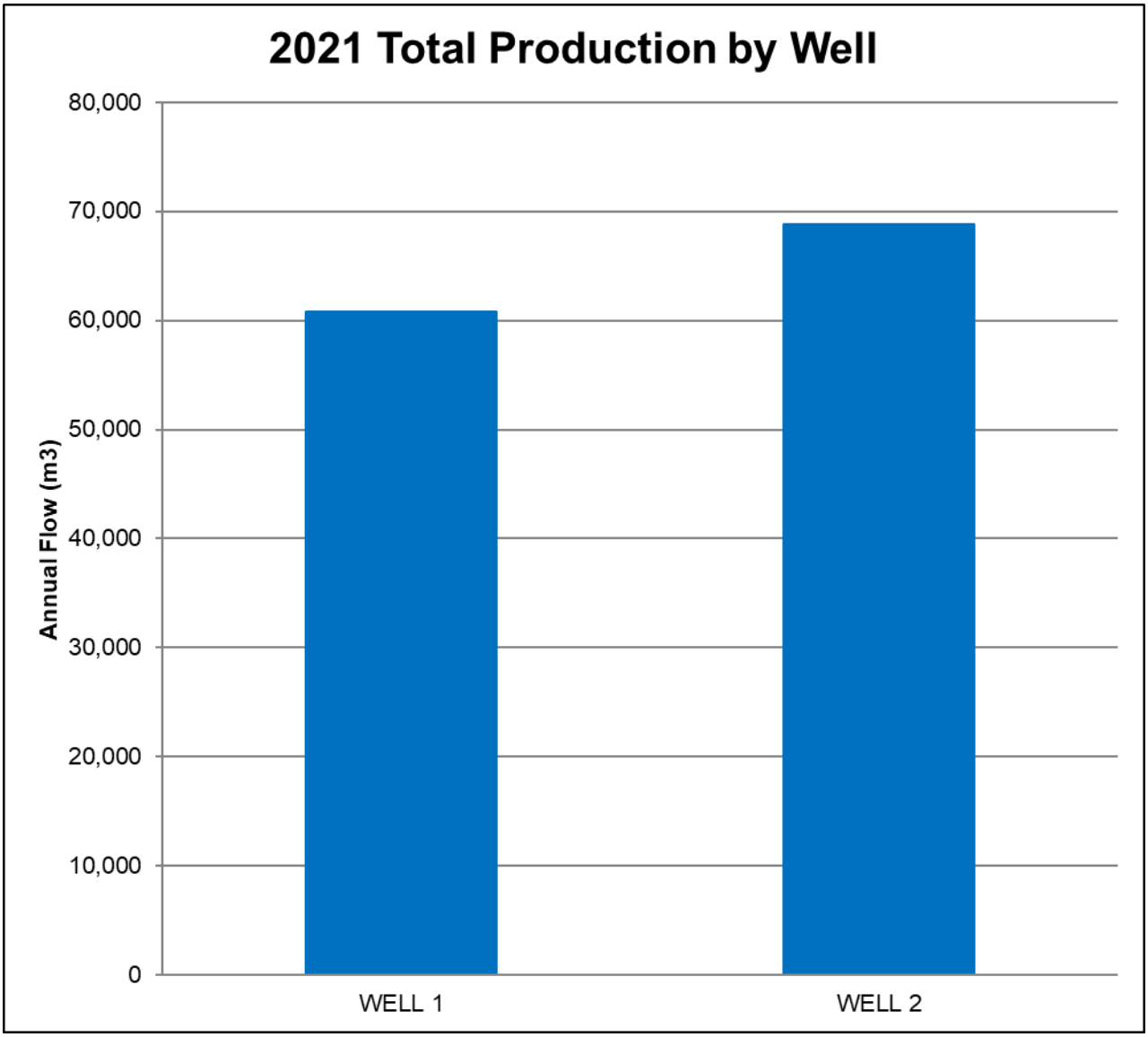
Parameter	Sample Date	Result Value (ug/L)	MAC (ug/L)	MDL (ug/L)
Alachlor	Feb 18/20	ND	5	0.11
Atrazine + N-dealkylatedmetobolites	“	ND	5	0.12
Azinphos-methyl	“	ND	20	0.21
Benzene	“	ND	1	0.37
Benzo(a)pyrene	“	ND	0.01	0.004
Bromoxynil	“	ND	5	0.33
Carbaryl	“	ND	90	0.16
Carbofuran	“	ND	90	0.37
Carbon Tetrachloride	“	ND	2	0.41
Chlorpyrifos	“	ND	90	0.18
Diazinon	“	ND	20	0.081
Dicamba	“	ND	120	0.20
1,2-Dichlorobenzene	“	ND	200	0.50
1,4-Dichlorobenzene	“	ND	5	0.21
1,2-Dichloroethane	“	ND	5	0.43
1,1-Dichloroethylene(vinylidene chloride)	“	ND	14	0.41
Dichloromethane	“	ND	50	0.34
2-4 Dichlorophenol	“	ND	900	0.15
2,4-Dichlorophenoxy acetic acid (2,4-D)	“	ND	100	0.19
Diclofop-methyl	“	ND	9	0.40
Dimethoate	“	ND	20	0.12
Diquat	“	ND	70	1
Diuron	“	ND	150	0.87
Glyphosate	“	ND	280	6
Malathion	“	ND	190	0.091
Metolachlor	“	ND	50	0.092
2-methyl-4chlorophenoxyacetic acid (MCPA)	“	ND	100	0.12
Metribuzin	“	ND	80	0.12
Monochlorobenzene	“	ND	80	0.58
Paraquat	“	ND	10	1
Pentachlorophenol	“	ND	60	0.15
Phorate	“	ND	2	0.11
Picloram	“	ND	190	0.25
Polychlorinated Biphenyls(PCB)	“	ND	3	0.04
Prometryne	“	ND	1	0.23
Simazine	“	ND	10	0.15
Terbufos	“	ND	1	0.12
Tetrachloroethylene	“	ND	10	0.45
2,3,4,6-Tetrachlorophenol	“	ND	100	0.14
Triallate	“	ND	230	0.10
Trichloroethylene	“	ND	5	0.38
2,4,6-Trichlorophenol	“	ND	5	0.25
Trifluralin	“	ND	45	0.12
Vinyl Chloride	“	ND	1	0.17

APPENDIX B: WATER QUANTITY SUMMARY





Innerkip Firm Capacity 1,296 m^3/day
Innerkip Water Supply Capacity 1,296 m^3/day



Innerkip Firm Capacity 1,296 m^3/day
Innerkip Water Supply Capacity 1,296 m^3/day

2021 ANNUAL DRINKING WATER SYSTEM SUMMARY REPORT
Lakeside 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 publicworks@oxfordcounty.ca

Drinking Water System:	Lakeside Water System
Drinking Water System Number:	220007533
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: publicworks@oxfordcounty.ca
Reporting Period:	January 1, 2021 – December 31, 2021

1.1. System Description

The Lakeside Water System is a Large Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and serves a population of approximately 384. The system consists of one groundwater well with treatment that consists of disinfection with sodium hypochlorite and sodium silicate to sequester iron. Approximately 661 L of sodium hypochlorite and 410 L (580 kg) of sodium silicate 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 treatment facility houses high lift pumps, monitoring equipment and a 150 m^3 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 Water System is one of 14 water systems that have revenues and expenses pooled for the economy of scale purposes. The systems are combined into the Township Water financial system and in 2021 had operating and maintenance expenditures of approximately $3,000,000.

Operations and maintenance expenditures included:

- $175,000 for the replacement of general operating equipment and well rehabilitations

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Townships systems totaled $1,500,000 for improvements to water treatment systems and replacement of distribution mains in the Township System.

Township Capital Improvement Projects included:

- $65,000 groundwater modeling
- $350,000 for facilities improvements

Capital Improvement projects for all systems included:

- $720,000 to develop Countywide SCADA Master Plan for all water systems
- $14,000 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 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 2021 sampling program are shown in the table below. There were no adverse test results from 159 treated water samples in this reporting period.

	Number of Samples	*Range of E. coli Results Min - Max MAC = 0*	*Range of Total Coliform Results Min - Max MAC = 0*
Raw	52	0	0
Treated	54	0	0
Distribution	104	0	0

2.2. Heterotrophic Plate Count (HPC)

HPC analyses are required from the treated and distribution water for small systems. 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. The 2021 results are shown in the table below.

	Number of Samples	*Range of HPC Min - Max*
Treated	52	0 - 3
Distribution	26	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 to 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 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 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, 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 average hardness for the Lakeside Drinking Water System is 203 mg/L (12 grains/gallon) based on samples collected from 2006 to 2019.
- The average iron level in 2021 was 0.43 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 is taken. There were no reportable incidents in 2021. 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. The turbidity of untreated water from the well is checked weekly. Turbidity is measured in nephelometric turbidity units (NTU). Under O.Reg. 170/03 turbidity in groundwater 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 2021 is provided in the table below.

Parameter	*Number of Tests or Monitoring Frequency*	*Range of Results (Min – Max) and Average*
Chlorine residual in distribution (mg/L)	366	(0.59 – 1.63) 1.27
Chlorine residual after treatment (mg/L)	Continuous	(0.12 – 2.45) 1.34
Turbidity after treatment (NTU)	Continuous	(0.05 – 0.49) 0.07

5. WATER QUANTITY

Continuous monitoring of flowrates from supply wells 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 2021 flows are provided in the Table below and presented graphically in Appendix B.

Flow Summary	*Quantity*
Permit to Take Water Limit	270 m^3/d
Municipal Drinking Water License Limit	432 m^3/d
2021 Average Daily Flow	47 m^3/d
2021 Maximum Daily Flow	125 m^3
2021 Average Monthly Flow	1,442 m^3
2021 Total Amount of Water Supplied	17,306 m^3

Firm Capacity of this system is rated at 100 m^3/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 m^3/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 June 2021. There were no non-compliance findings and the 2021 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 is reported as required and corrective actions taken. There were no adverse or reportable occurrences in 2021.

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 https://cvc.ca/wp-content/uploads/2011/03/std01_079707.pdf PIBS4449e01 titled "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines".

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

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

Parameter	*Result Range* Min – Max *(mg/L)*	*Average Result (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Nitrite	ND	ND	1.0	0.003
Nitrate	0.008 – 0.009	0.0085	10.0	0.006

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

Parameter	*Annual Average*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Trihalomethane (THM)	2021	16.3	100	0.37
Haloacetic Acids (HAA)	2021	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.

Parameter	*Sample Date*	*Result Value (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Sodium	August 06, 2019	12.1	20.0*	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.

Parameter	*Result Range (Min - Max)*	*Number of Samples*	*Acceptable Level*
Distribution Alkalinity	199 - 201	2	30 – 500mg/L
Distribution pH	7.75 - 7.76	2	6.5 – 8.5
Distribution Lead 2020	0.04	1	10 ug/L MAC

The following Table summarizes the most recent test results for Schedule 23. Testing is required every 3 years for secure groundwater wells.

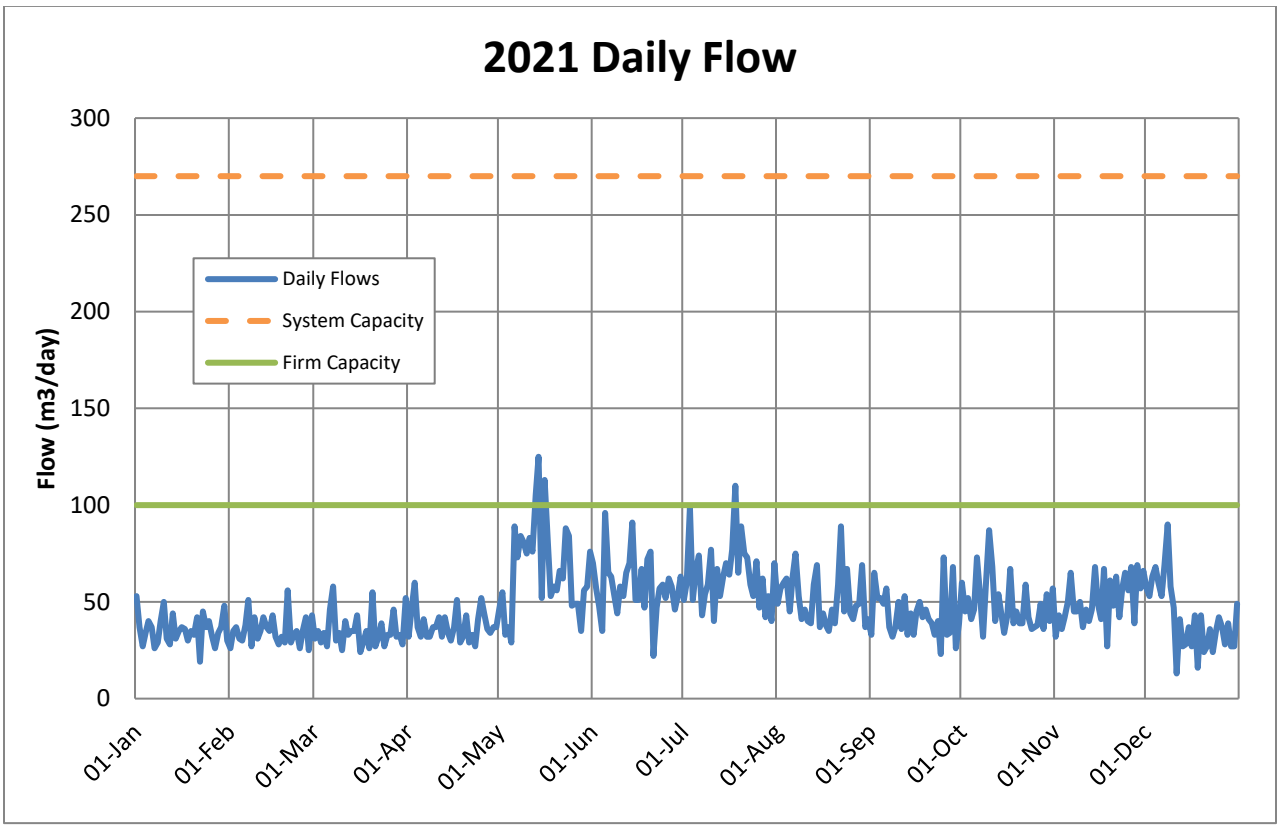
Parameter	*Sample Date*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Antimony	May 21, 2019	ND	6	0.09
Arsenic	"	0.5	10	0.2
Barium	"	351	1000	0.01
Boron	"	20	5000	2
Cadmium	"	ND	5	0.003
Chromium	"	0.14	50	0.03
Mercury	"	ND	1	0.02

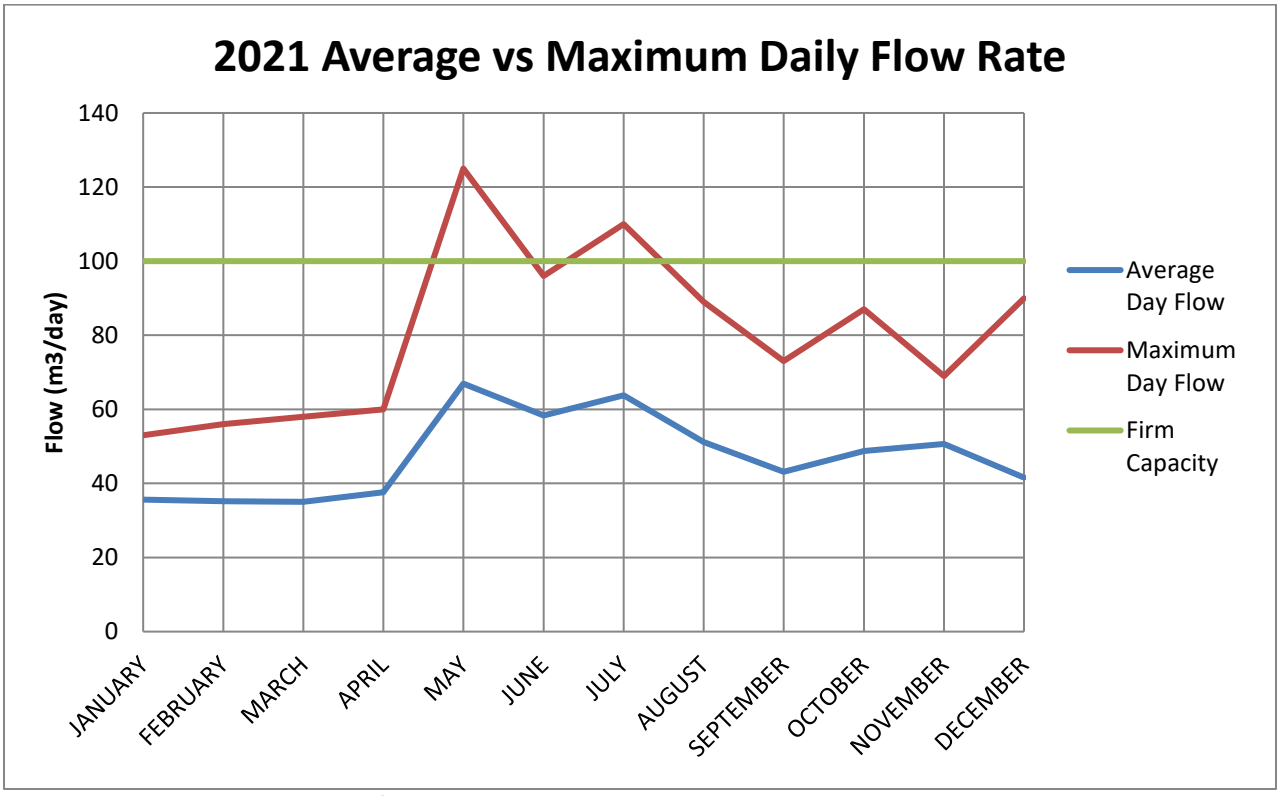
Selenium	“	ND	5	0.04
Uranium	“	0.20	20	0.002

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

Parameter	*Sample Date*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Alachlor	June 7, 2021	ND	5	0.02
Atrazine + N-dealkylatedmetobolites	“	ND	5	0.01
Azinphos-methyl	“	ND	20	0.05
Benzene	“	ND	1	0.32
Benzo(a)pyrene	“	ND	0.01	0.004
Bromoxynil	“	ND	5	0.33
Carbaryl	“	ND	90	0.05
Carbofuran	“	ND	90	0.01
Carbon Tetrachloride	“	ND	2	0.17
Chlorpyrifos	“	ND	90	0.02
Diazinon	“	ND	20	0.02
Dicamba	“	ND	120	0.20
1,2-Dichlorobenzene	“	ND	200	0.41
1,4-Dichlorobenzene	“	ND	5	0.36
1,2-Dichloroethane	“	ND	5	0.35
1,1-Dichloroethylene(vinylidene chloride)	“	ND	14	0.33
Dichloromethane	“	ND	50	0.35
2-4 Dichlorophenol	“	ND	900	0.15
2,4-Dichlorophenoxy acetic acid (2,4-D)	“	ND	100	0.19
Diclofop-methyl	“	ND	9	0.40
Dimethoate	“	ND	20	0.06
Diquat	“	ND	70	1
Diuron	“	ND	150	0.03
Glyphosate	“	ND	280	1
Malathion	“	ND	190	0.02
Metolachlor	“	ND	50	0.01
2-methyl-4chlorophenoxyacetic acid (MCPA)	“	ND	100	0.12
Metribuzin	“	ND	80	0.02
Monochlorobenzene	“	ND	80	0.3
Paraquat	“	ND	10	1
Pentachlorophenol	“	ND	60	0.15
Phorate	“	ND	2	0.01
Picloram	“	ND	190	1
Polychlorinated Biphenyls(PCB)	“	ND	3	0.04
Prometryne	“	ND	1	0.03
Simazine	“	ND	10	0.01
Terbufos	“	ND	1	0.01
Tetrachloroethylene	“	ND	10	0.35
2,3,4,6-Tetrachlorophenol	“	ND	100	0.20
Triallate	“	ND	230	0.01
Trichloroethylene	“	ND	5	0.44
2,4,6-Trichlorophenol	“	ND	5	0.25
Trifluralin	“	ND	45	0.02
Vinyl Chloride	“	ND	1	0.17

APPENDIX B: WATER QUANTITY SUMMARY





Lakeside Firm Capacity is 100 m^3/day
Lakeside Water System Capacity 270 m^3 /day

2021 ANNUAL DRINKING WATER SYSTEM SUMMARY REPORT
Mount Elgin 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 publicworks@oxfordcounty.ca

Drinking Water System:	Mount Elgin Water System
Drinking Water System Number:	220000629
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: publicworks@oxfordcounty.ca
Reporting Period:	January 1, 2021 – December 31, 2021

1.1. System Description

The Mount Elgin Water System is a Large Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and serves a population of approximately 603. The system consists of two groundwater wells and two treatment facilities. The water from Mount Elgin Well 3A was treated with approximately 1,956 litres of sodium hypochlorite (liquid chlorine) for disinfection and the water from Well 5 was treated with approximately 310 litres of sodium hypochlorite and 6,142 kg of carbon dioxide for pH adjustment. These chemicals are certified to meet standards set by the Standards Council of Canada or American National Standards Institute.

The two treatment facilities house pumps, monitoring equipment, and there is a 380 m^3 underground reservoir at the Well 3A facility. A standby generator is available to run the Well 3A facility in the event of a power failure and a generator is planned to be installed at the Well 5 facility. 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

The Mount Elgin Water System is one of 14 water systems that have revenues and expenses pooled for the economy of scale purposes. The systems are combined into the Township Water financial system and in 2021 had operating and maintenance expenditures of approximately $3,000,000.

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Townships systems totaled $1,500,000 for improvements to water treatment systems and replacement of distribution mains in the Township System.

Capital Improvement projects for the Township systems included:

- 65,000 for groundwater modelling
- 350,000 for facilities improvements
- 175,000 for the replacement of general operating equipment including well rehabilitations

Capital Improvement projects for all systems included:

- $720,000 to develop Countywide SCADA Master Plan for all water systems
- $14,000 for Updated Water Systems Modelling

Capital Construction project:

- $1,900,000 for the Graydon WTF 2021 construction costs

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 must be reported to the Ministry of the 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 2021 sampling program are shown in the table below. There were no adverse test results from 176 treated water samples in this reporting period.

	Number of Samples	*Range of E. coli Results Min - Max MAC = 0*	*Range of Total Coliform Results Min - Max MAC = 0*
Raw	74	0 - 0	0 - 2
Treated	75	0 - 0	0 - 0
Distribution	104	0 - 0	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. The 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 2021 results are shown in the table below.

	Number of Samples	*Range of HPC Min - Max*
Treated	75	0 - 9
Distribution	26	0 - 22

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 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 either raw or treated water. The average hardness for the Mount Elgin System is 231 mg/L (14 grains/gallon) based on samples collected from 2006 to 2019.

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 Unit 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 water system is 29.2 mg/L (ranging from 21.3 to 37.0 mg/L).

3.3. Fluoride

Fluoride levels are tested 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 Unit webpage 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 however the Mount Elgin system has naturally occurring fluoride levels averaging 1.5 mg/L (ranging from 1.4 to 1.7 mg/L). The test results for each treatment facility are provided in Appendix A.

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. A summary of the chlorine residual readings is provided in the table below. There was one incident reported to the MECP and MOH in 2021 the details of which are provided in Section 6.2.

4.2. Turbidity

Turbidity of treated water is continuously monitored at the treatment facility, as a change in turbidity can indicate an operational problem. The turbidity of untreated water from the well is checked weekly. Turbidity is measured in nephelometric turbidity units (NTU). Under O. Reg. 170/03 turbidity in groundwater 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 2021 is provided in the table below.

Parameter	*Number of Tests or Monitoring Frequency*	*Range of Results (Min – Max) and Average*
Chlorine residual in distribution (mg/L)	360	(0.03 – 2.40) 1.20
Mount Elgin Well 3A WTF		
Chlorine residual after treatment (mg/L)	Continuous	(0.53 – 2.63) 1.31
Turbidity after treatment (NTU)	Continuous	(0.04 – 4.53) 0.14
Graydon Well 5 WTF		
Chlorine residual after treatment (mg/L)	Continuous	(0.23 – 4.64) 1.29
Turbidity after treatment (NTU)	Continuous	(0.19 – 5.00) 0.55

5. WATER QUANTITY

Continuous monitoring of flow rates from supply wells 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 2021 flows are provided in the Table below and presented graphically in Appendix B.

Flow Summary	*Quantity*
Permit to Take Water Limit	1,649 m^3/d
Municipal Drinking Water License Limit	1,192 m^3/d
2021 Average Daily Flow	129 m^3/d
2021 Maximum Daily Flow	314 m^3/d
2021 Average Monthly Flow	3,916 m^3
2021 Total Amount of Water Supplied	46,991 m^3

Construction of the Mount Elgin Graydon Well 5 treatment facility started in 2020 and was operational in September 2021. With this facility now operational there will be sufficient supply capacity to meet the community's long term growth needs.

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 m^3/day to maintain system integrity. This system comprises of two supply wells with a 380 m^3 underground reservoir at the Well 3A facility.

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 2021 MECP annual inspection of the Mount Elgin drinking water system took place on July 15, 2021. There were no non-compliance findings and the 2021 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 taken. Below is a summary of the adverse/reportable occurrence in 2021 along with the corresponding resolution.

Incident / Date	*Corrective Action*	*Resolution / Date*
Treated Water Sample with Chemistry Exceedance		
Fluoride of 1.62 mg/L taken Aug 24, 2021 at the Graydon Well 5 WTF	Reported, sample collected for confirmation	Sample result was confirmed (1.71 mg/L) Sep 7, 2021
Chlorine Residual in Distribution System < 0.05 mg/L		
Chlorine residual = 0.03 mg/L on November 26, 2021	Report, flush and retest	Acceptable chlorine residual restored November 26, 2021

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 https://cvc.ca/wp-content/uploads/2011/03/std01_079707.pdf PIBS 4449e01 titled "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines".

Results are shown as concentrations with units of either milligrams per litre (mg/L) or micrograms per litre (ug/L). ario Drinking Water Standards, Objectives and Guidelines". 1 mg/L is equal to 1000 ug/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.

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

Parameter	*Result Range* Min – Max *(mg/L)*	*Average Result (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Nitrite				
Mount Elgin WTF	ND	ND	1.0	0.003
Graydon WTF	ND	ND	1.0	0.003
Nitrate				
Mount Elgin WTF	0.013 – 0.020	0.017	10.0	0.006
Graydon WTF	0.010 – 0.012	0.011	10.0	0.006

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

Parameter	*Annual Average*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Trihalomethane (THM)	2021	12	100	0.37
Haloacetic Acids (HAA)	2021	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.

Parameter	*Sample Date*	*Result Value (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Sodium				
Mount Elgin WTF	May 28, 2019	21.3	20.0*	0.01
Graydon WTF	Aug 18, 2021	37.0	20.0*	0.01
Fluoride				
Mount Elgin WTF	May 28, 2019	1.39	1.5**	0.06
Graydon WTF	Aug 18, 2021	1,62	1.5**	0.06
Graydon WTF	Aug 26, 2021	1,71	1.5**	0.06

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

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

Parameter	*Result Range (Min – Max)*	*Number of Samples*	*Acceptable Level*
Distribution Alkalinity	216 – 224	2	30 – 500mg/L
Distribution pH	7.71 – 7.85	2	6.5 – 8.5
Distribution Lead 2021	0.22 – 0.49	2	10 ug/L MAC

The following Table summarizes the most recent test results for Schedule 23. Testing is required every 3 years for secure groundwater wells.

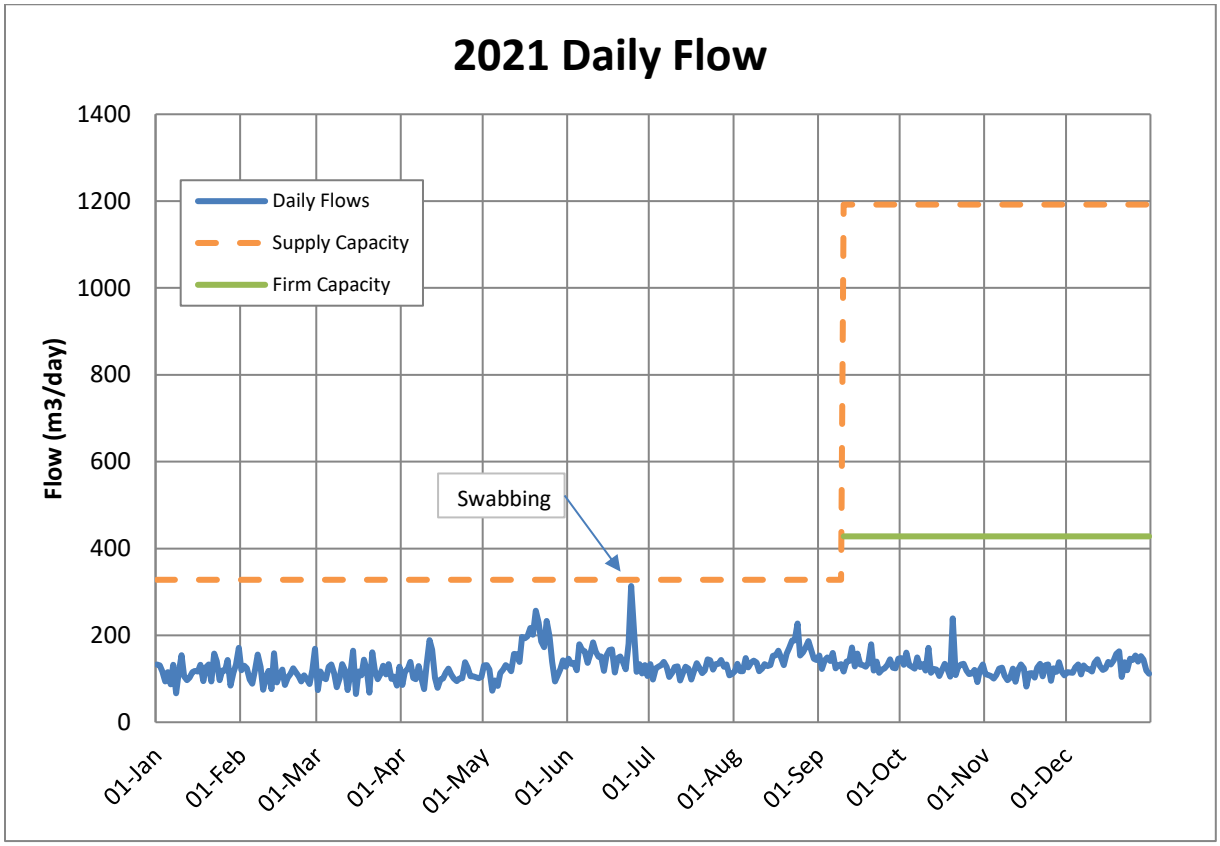
Parameter	***Mt Elgin Well 3A WTF*** *Result Value (ug/L)* Feb 24, 2020	***Graydon Well 5 WTF*** *Result Value (ug/L)* Aug 18, 2021	*MAC (ug/L)*	*MDL (ug/L)*
Antimony	ND	ND	6	0.9
Arsenic	ND	ND	10	0.2
Barium	142	139	1000	0.02
Boron	80	117	5000	2
Cadmium	0.003	0.007	5	0.003
Chromium	0.65	0.27	50	0.08
Mercury	ND	ND	1	0.01
Selenium	ND	ND	50	0.04
Uranium	0.011	0.013	20	0.002

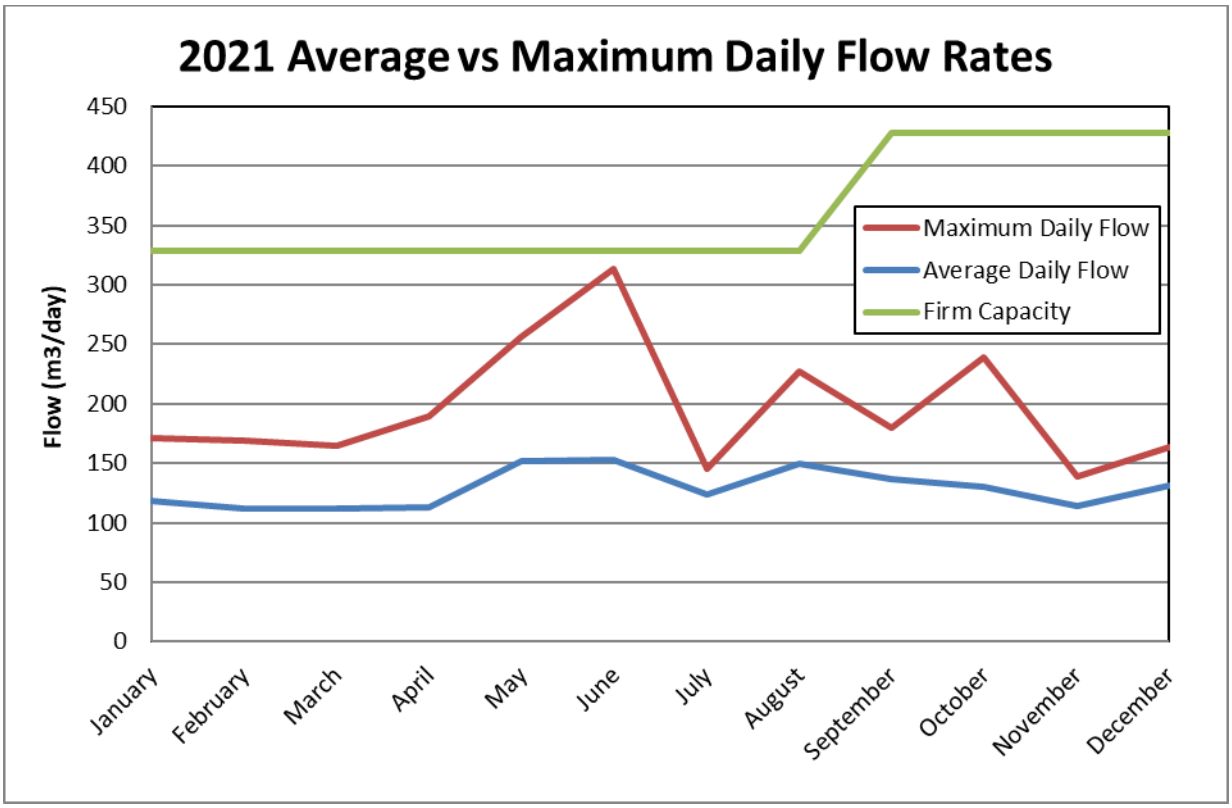
The following Table summarizes the most recent test results for the Organic parameters in Schedule 24. Testing is required every 3 years for secure groundwater wells.

Parameter	***Well 3A WTF*** *Result Value (ug/L)* Feb 24, 2020	***Well 5 WTF*** *Result Value (ug/L)* Aug 18, 2021	*MAC (ug/L)*	*MDL (ug/L)*
Alachlor	ND	ND	5	0.02
Atrazine + N-dealkylatedmetobolites	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	0.16
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
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	0.03
Diquat	ND	ND	70	1
Diuron	ND	ND	150	0.03
Glyphosate	ND	ND	280	1
Malathion	ND	ND	190	0.02
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

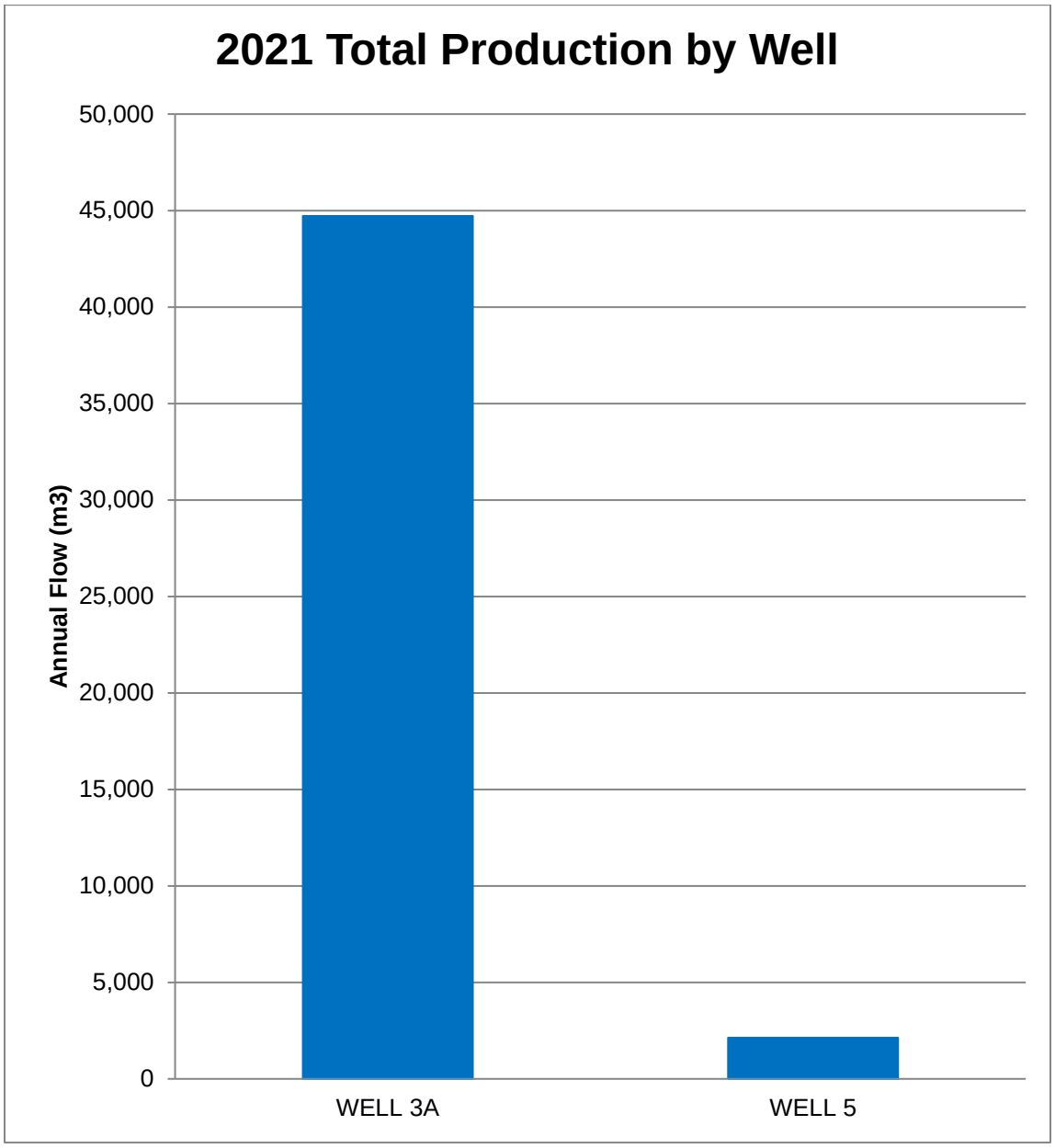




Mount Elgin Water System Supply Capacity 1,192m^3/day

Mount Elgin Water System Firm Capacity 428 m^3/day

APPENDIX B: WATER QUANTITY SUMMARY



Mount Elgin Water System Supply Capacity 1,192m^3/day

Mount Elgin Water System Firm Capacity 428 m^3/day

2021 ANNUAL DRINKING WATER SYSTEM SUMMARY REPORT
Oxford South 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.

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Drinking Water System:	Oxford South Water System
Drinking Water System Number:	220000601
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: publicworks@oxfordcounty.ca
Reporting Period:	January 1, 2021- December 31, 2021

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 5,340. Transmission watermains interconnect the communities of Otterville, Springford, and Norwich.

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

Treatment Facility	*Location*	*Wells*	*Treatment*
Pitcher Street	Norwich	N2 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 O4	Disinfection with sodium hypochlorite
Springford	Springford	S4 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 m^3 water tower at Norwich and a 1,440 m^3 water tower in Otterville provide storage and maintain pressure in the system.

In 2021, approximately 15,785 L of sodium hypochlorite and 1,740 L of sodium silicate was 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 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 Water System is one of 14 water systems that have revenues and expenses pooled for the economy of scale purposes. The systems are combined into the Township Water financial system and in 2021 had operating and maintenance expenditures of approximately $3,000,000.

Operations and maintenance expenditures included:

- $175,000 for the replacement of general operating equipment and well rehabilitations

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Townships systems totaled $1,500,000 for improvements to water treatment systems and replacement of distribution mains in the Township System.

Township Capital Improvement Projects included:

- $65,000 groundwater modeling
- $350,000 for facilities improvements

Capital Improvement projects for all systems included:

- $720,000 to develop Countywide SCADA Master Plan for all water systems
- $14,000 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 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 2021 sampling program are shown on the table below. There were no adverse test results from 484 treated water samples in this reporting period.

	Number of Samples	*Range of E. coli Results Min - Max MAC = 0*	*Range of Total Coliform Results Min - Max MAC = 0*
Raw	364	0-2	0-13
Treated	261	0	0
Distribution	223	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. The 2021 results are shown in the table below.

	Number of Samples	*Range of HPC Min - Max*
Treated	156	0-15
Distribution	52	0-50

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 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 water.

When sodium levels are above 20 mg/L the MECP and Medical Officer of Health (MOH) are notified. Southwest 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 system range from 23.2 to 48.4 mg/L, depending on which wells are in use.

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 of fluoride may cause staining or pitting of teeth in children less than 6 years old. Further information on fluoride can be found on the Southwest 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, however, the Springford wells have naturally occurring fluoride levels. The fluoride levels in the Springford wells are 1.68 mg/L. All the other wells in the system have fluoride levels below the reportable levels.

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.

The hardness in the Oxford South system depends on the wells being used. The Norwich wells supply a larger proportion of the water to the entire system and a weighted average was used to give an accurate representation for the average hardness of the Otterville-Springford system. Samples for hardness are collected at a minimum every 3 years from raw or treated water.

- The average hardness in Norwich is 275 mg/L (16 grains/gallon) based on samples collected from 2006-2019.
- The average hardness in Otterville-Springford is 309 mg/L (18 grains/gallon) based on samples collected 2006 to 2019.

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

- The Otterville and Springford wells have less than 0.30 mg/L iron.
- Iron is removed by filtration at the Norwich Pitcher St. facility, wells N2 and N5.

- The iron level at the Norwich Main St. facility well N4 is 0.51 mg/L (ppm) and sodium silicate is added to keep the iron in suspension.

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.

- The Norwich Main St. facility (W4) average manganese level in 2021 was 0.03 mg/L.
- The Springford water treatment facility average manganese level in 2021 was 0.03 mg/L.

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 2021. 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. The turbidity of untreated water from each well is checked weekly. Turbidity is measured in nephelometric turbidity units (NTU). Under O.Reg. 170/03 turbidity in groundwater 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 2021 is provided in the table below.

	Number of Tests or Monitoring Frequency	*Range of Results (Min – Max) and Average*
Chlorine residual in distribution (mg/L)	Continuous	(0.36 – 1.55) 1.17
Norwich Main St. E. WTF		
Chlorine Residual (mg/L)	Continuous	(0.39 – 3.51) 1.19
Turbidity (NTU)	Continuous	(0.04 – 2.64) 0.07
Norwich Pitcher St. WTF		
Chlorine Residual (mg/L)	Continuous	(0.56 – 1.64) 1.34
Turbidity (NTU)	Continuous	(0.02 – 2.51) 0.26
Otterville WTF		
Chlorine (mg/L)	Continuous	(0.63 – 2.44) 1.35
Turbidity (NTU)	Continuous	(0.01 – 4.00) 0.12
Springford WTF		
Chlorine (mg/L)	Continuous	(0.71 – 4.03) 1.13
Turbidity (NTU)	Continuous	(0.04 – 4.03) 0.23

5. WATER QUANTITY

Continuous monitoring of flow rates from supply wells 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 2021 flows are provided in the Table below and presented graphically in Appendix B.

Flow Summary	*Quantity*
Permit to Take Water Limit	6,054 m^3/d
Municipal Drinking Water License Limit	6,054 m^3/d
2021 Average Daily Flow	1,205 m^3/d
2021 Maximum Daily Flow	2,277 m^3/d
2021 Average Monthly Flow	36,629 m^3
2021 Total Amount of Water Supplied	439,663 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 m^3/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 m^3/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 2021. There were no non-compliance findings and the 2021 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 is reported as required and corrective actions taken. There were no adverse or reportable occurrences in 2021.

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 at https://cvc.ca/wp-content/uploads/2011/03/std01_079707.pdf PSIB 4449e01 titled "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines".

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

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

Parameter & Location	*Result Range* Min – Max *(mg/L)*	*Average Result (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Nitrite			1.0	0.003
Norwich Main St. WTF	ND	ND		
Norwich Pitcher St. WTF	ND	ND		
Otterville WTF	ND	ND		
Springford WTF	ND	ND		
Nitrate			10.0	0.006
Norwich Main St. WTF	ND-0.035	0.013		
Norwich Pitcher St. WTF	ND-0.031	0.013		
Otterville WTF	6.28-7.92	7.25		
Springford WTF	0.006-0.043	0.014		

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

Parameter	*Annual Average*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Trihalomethane (THM)	2021	9.3	100	0.37
Haloacetic Acids (HAA)	2021	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.

Parameter & Location	*Sample Date*	*Result Value (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
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	April 17/2017	51.4		
Fluoride			1.5**	0.06
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 WTF	April 17/2017	1.67		

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

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

Parameter	*Result Range (Min - Max)*	*Number of Samples*	*Acceptable Level*
Distribution Alkalinity	211-244	6	30 – 500mg/L
Distribution pH	7.48-7.55	6	6.5 – 8.5
Distribution Lead 2021	0.03-1.31	6	10 ug/L MAC

The following Table summarizes the most recent test results for Schedules 23.Testing is required every 3 years for secure groundwater wells.

Parameter	*Result Value (ug/L) Norwich Pitcher St. December 7, 2020*	*Result Value (ug/L) Norwich Main St. December 7, 2020*	*MAC (ug/L)*	*MDL (ug/L)*
Antimony	ND	ND	6	0.02
Arsenic	1.1*	1.5	10	0.2
Barium	174	226	1000	0.01
Boron	79	51	5000	2
Cadmium	ND	ND	5	0.003
Chromium	0.62	0.80	50	0.03
Mercury	ND	ND	1	0.01
Selenium	ND	ND	5	1
Uranium	0.088	0.386	20	0.001

Parameter	*Result Value (ug/L) Otterville WTF May 27, 2019*	*Result Value (ug/L) Springford WTF July 7, 2020*	*MAC (ug/L)*	*MDL (ug/L)*
Antimony	ND	ND	6	0.02
Arsenic	0.2	5.7*	10	0.2
Barium	35.0	116	1000	0.01
Boron	17	204	5000	2
Cadmium	0.012	0.003	5	0.003
Chromium	0.29	0.09	50	0.08
Mercury	ND	ND	1	0.01
Selenium	0.36	ND	5	0.04
Uranium	0.552	0.067	20	0.002

**average of all annual samples (collected in 2021)*

The following Tables summarize the most recent test results for Schedule 24. Testing is required every 3 years for secure groundwater wells.

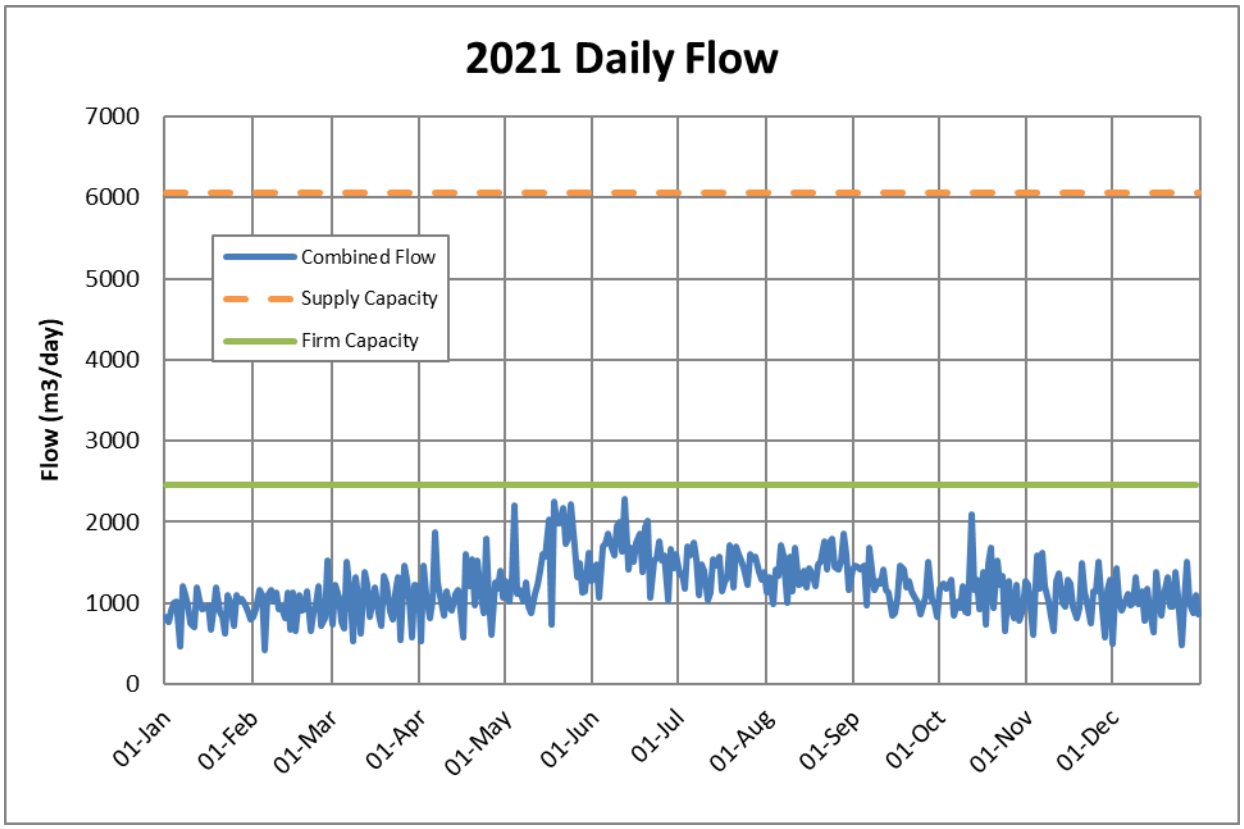
Parameter	*Result Value (ug/L) Norwich Pitcher St December 7, 2020*	*Result Value (ug/L) Norwich Main St. December 7, 2020*	*MAC (ug/L)*	*MDL (ug/L)*
Alachlor	ND	ND	5	0.02
Atrazine + N-dealkylated metobolites	ND	ND	5	0.01
Benzene	ND	ND	1	0.32
Benzo(a)pyrene	ND	ND	0.01	0.004
Bromoxynil	ND	ND	5	0.33
Carbaryl	ND	ND	90	0.01
Carbofuran	ND	ND	90	0.01
Carbon Tetrachloride	ND	ND	2	0.16
Chlorpyrifos	ND	ND	90	0.02
Cyanazine	ND	ND	10	0.03
Diazinon	ND	ND	20	0.02

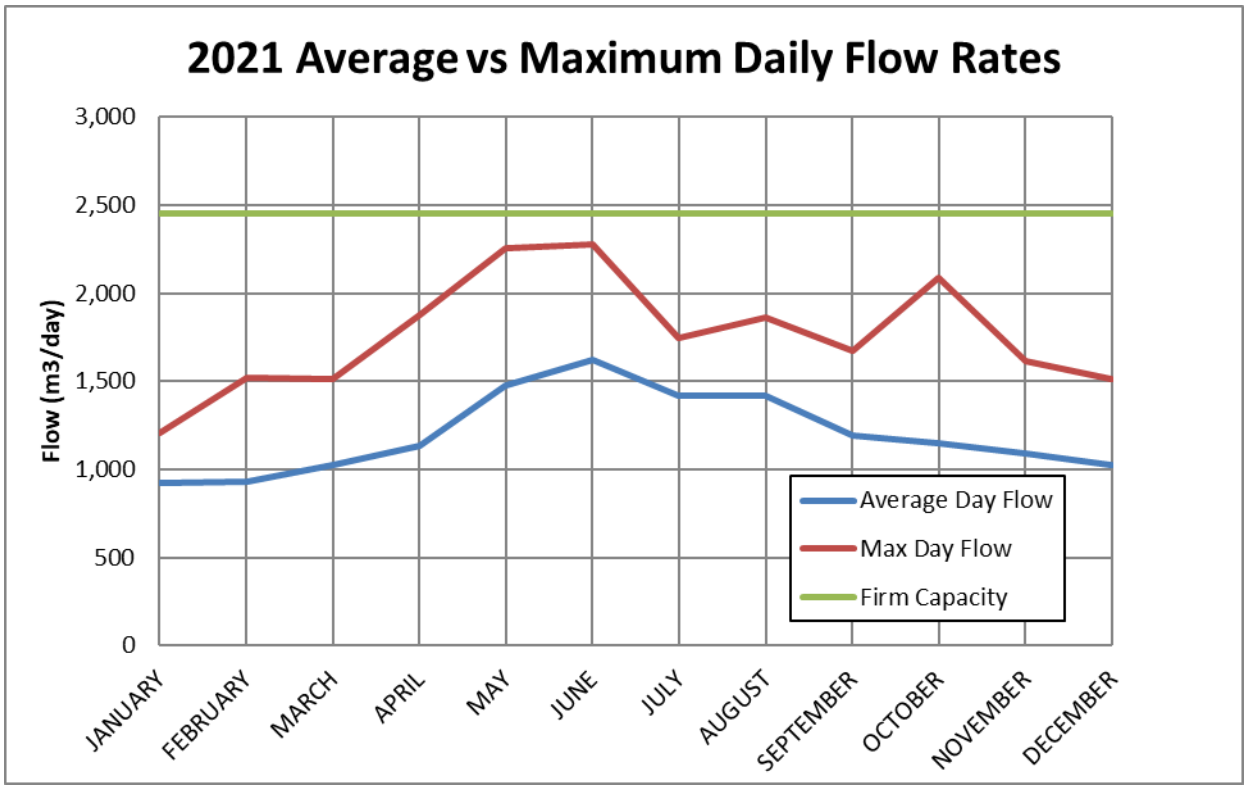
Parameter	*Result Value (ug/L) Norwich Pitcher St December 7, 2020*	*Result Value (ug/L) Norwich Main St. December 7, 2020*	*MAC (ug/L)*	*MDL (ug/L)*
Dicamba	ND	ND	120	0.20
1,2-Dichlorobenzene	ND	ND	200	0.36
1,4-Dichlorobenzene	ND	ND	5	0.36
1,2-Dichloroethane	ND	ND	5	0.35
1,1-Dichloroethylene (vinylidene chloride)	ND	ND	14	0.33
Dichloromethane	ND	ND	50	0.35
2-4 Dichlorophenol	ND	ND	900	0.15
2,4-Dichlorophenoxy acetic acid (2,4-D)	ND		100	0.19
Diclofop-methyl	ND	ND	9	0.40
Dimethoate	ND	ND	20	0.03
Dinoseb				
Diquat	ND	ND	70	1
Diuron	ND	ND	150	0.003
Glyphosate	ND	ND	280	6
Malathion	ND	ND	190	0.02
2-methyl-4chlorophenoxyacetic acid (MCPA)	ND	ND	100	0.12
Methoxychlor	ND	ND	900	0.01
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	0.25
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	0.44
2,3,4,6-Tetrachlorophenol	ND	ND	100	0.14
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

Parameter	*Result Value (ug/L) Otterville WTF June 7, 2021*	MDL (ug/L)	*Result Value (ug/L) Springford WTF July 6, 2020*	MDL (ug/L)	*MAC (ug/L)*
Alachlor	ND	0.02	ND	0.02	5
Atrazine + N-dealkylated metobolites	ND	0.01	ND	0.01	5
Azinphos-methyl	ND	0.02	ND	0.02	20
Benzene	ND	0.32	ND	0.32	1
Benzo(a)pyrene	ND	0.004	ND	0.004	0.01
Bromoxynil	ND	0.33	ND	0.33	5
Carbaryl	ND	0.05	ND	0.01	90
Carbofuran	ND	0.01	ND	0.01	90
Carbon Tetrachloride	ND	0.17	ND	0.16	2
Chlorpyrifos	ND	0.02	ND	0.02	90

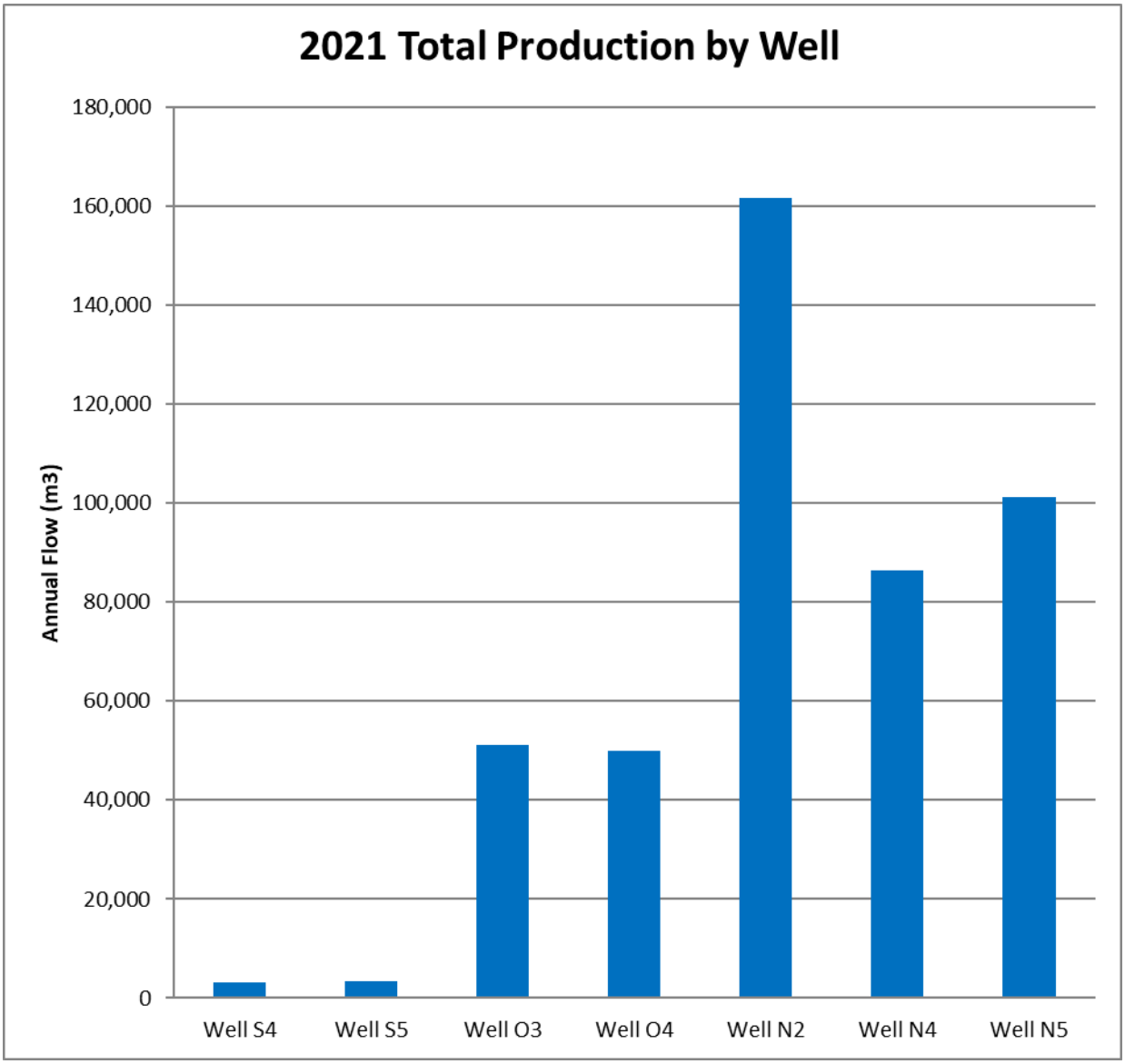
Parameter	*Result Value (ug/L) Otterville WTF June 7, 2021*	MDL (ug/L)	*Result Value (ug/L) Springford WTF July 6, 2020*	MDL (ug/L)	*MAC (ug/L)*
Diazinon	ND	0.02	ND	0.02	20
Dicamba	ND	0.20	ND	0.20	120
1,2-Dichlorobenzene	ND	0.41	ND	0.36	200
1,4-Dichlorobenzene	ND	0.36	ND	0.36	5
1,2-Dichloroethane	ND	0.35	ND	0.35	5
1,1-Dichloroethylene (vinylidene chloride)	ND	0.33	ND	0.33	14
Dichloromethane	ND	0.35	ND	0.35	50
2-4 Dichlorophenol	ND	0.15	ND	0.15	900
2,4-Dichlorophenoxy acetic acid (2,4-D)	ND	0.19	ND	0.19	100
Diclofop-methyl	ND	0.40	ND	0.40	9
Dimethoate	ND	0.03	ND	0.03	20
Diquat	ND	1	ND	1	70
Diuron	ND	0.03	ND	0.003	150
Glyphosate	ND	1	ND	6	280
Malathion	ND	0.02	ND	0.02	190
2-methyl-4chlorophenoxyacetic acid (MCPA)	NA	0.12	ND	0.12	100
Metolachlor	ND	0.01	ND	0.01	50
Metribuzin	ND	0.02	ND	0.02	80
Monochlorobenzene	ND	0.30	ND	0.30	80
Paraquat	ND	1	ND	1	10
Pentachlorophenol	ND	0.15	ND	0.15	60
Phorate	ND	0.01	ND	0.01	2
Picloram	ND	0.25	ND	0.25	190
Polychlorinated Biphenyls(PCB)	ND	0.04	ND	0.04	3
Prometryne	ND	0.03	ND	0.03	1
Simazine	ND	0.01	ND	0.01	10
Terbufos	ND	0.01	ND	0.01	1
Tetrachloroethylene	ND	0.35	ND	0.35	10
2,3,4,6-Tetrachlorophenol	ND	0.20	ND	0.14	100
Triallate	ND	0.01	ND	0.01	230
Trichloroethylene	ND	0.44	ND	0.44	5
2,4,6-Trichlorophenol	ND	0.25	ND	0.25	5
Trifluralin	ND	0.02	ND	0.02	45
Vinyl Chloride	ND	0.17	ND	0.17	1

APPENDIX B: WATER QUANTITY SUMMARY





Oxford South Water System Firm Capacity 2,454 m^3/day
Oxford South Water System Capacity 6,054 m3 /day



Oxford South Water System Firm Capacity 2,454 m^3/day
Oxford South Water System Capacity 6,054 m3 /day

2021 ANNUAL DRINKING WATER SYSTEM SUMMARY REPORT
Plattsville 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 publicworks@oxfordcounty.ca

Drinking Water System:	Plattsville Water System
Drinking Water System Number:	210001291
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: publicworks@oxfordcounty.ca
Reporting Period:	January 1, 2021 – December 31, 2021

1.1. System Description

The Plattsville Water System is a Large Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and serves a population of approximately 1,607. 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 2021, approximately 4,158 L of sodium hypochlorite and 2,285 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.

The treatment facility houses pumps and monitoring equipment. A 1,830 m^3 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 Water System is one of 14 water systems that have revenues and expenses pooled for the economy of scale purposes. The systems are combined into the Township Water financial system and in 2021 had operating and maintenance expenditures of approximately $3,000,000.

Operations and maintenance expenditures included:

- $175,000 for the replacement of general operating equipment and well rehabilitations

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Townships systems totaled $1,500,000 for improvements to water treatment systems and replacement of distribution mains.

Township Capital Improvement Projects included:

- $12,000 for Plattsville water quality report
- $65,000 groundwater modeling
- $350,000 for facilities improvements

Capital Improvement projects for all systems included:

- $720,000 to develop Countywide SCADA Master Plan for all water systems
- $14,000 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 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 2021 sampling program are shown on the table below. There were no adverse test results from 204 treated water samples in this reporting period.

	Number of Samples	*Range of E. coli Results Min - Max MAC = 0*	*Range of Total Coliform Results Min - Max MAC = 0*
Raw	104	0	0 -1
Treated	52	0	0
Distribution	152	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. The 2021 results are shown in the table below.

	Number of Samples	*Range of HPC Min - Max*
Treated	52	0 - 3
Distribution	40	0 - 2

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 system is provided below.

3.1. 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 average hardness for the Plattsville Drinking Water System is 1241 (73 grains/gallon) based on samples collected from 2006 to 2019.

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 2021 was 0.62 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 2021 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 2021. 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. The turbidity of untreated water from the well is checked weekly. Turbidity is measured in nephelometric turbidity units (NTU). Under O.Reg. 170/03 turbidity in groundwater 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 2021 is provided in the table below.

Parameter	*Number of Tests or Monitoring Frequency*	*Range of Results (Min – Max) and Average*
Chlorine residual in distribution (mg/L)	Continuous	(0.81 – 1.67) 1.14
Chlorine residual after treatment (mg/L)	Continuous	(0.08 – 4.00) 1.32
Turbidity after treatment (NTU)	Continuous	(0.04 – 4.00) 0.36

5. WATER QUANTITY

Continuous monitoring of flowrates from supply wells 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 2021 flows are provided in the Table below and presented graphically in Appendix B.

Flow Summary	*Quantity*
Permit to Take Water Limit	4,579 m^3/d
Municipal Drinking Water License Limit	2,290 m^3/d
2021 Average Daily Flow	403 m^3/d
2021 Maximum Daily Flow	1,184 m^3/d
2021 Average Monthly Flow	12,259 m^3
2021 Total Amount of Water Supplied	147,103 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. 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 983 m^3/d which averages flow over a three day period to moderate the variance in pumping.

This system comprises of two supply wells. Firm Capacity is defined as the removal of the highest producing well in an emergency or operational / maintenance situation with the ability to transport a maximum of 100 m^3/day if necessary to maintain system integrity. Firm Capacity of this system is rated at 1,296 m^3/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

At the time this report was draft the annual inspection by the MECP had not been undertaken in 2021.

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 2021.

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 at https://cvc.ca/wp-content/uploads/2011/03/std01_079707.pdf PSIB 4449e01titled "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines".

Results are shown as concentrations with units of either milligrams per litre (mg/L) or micrograms per litre (ug/L). 1 mg/L is equal to 1000 ug/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 nitrate samples are required every 3 months in normal operation.

Parameter	*Result Range* Min – Max *(mg/L)*	*Average Result (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Nitrite	ND	ND	1.0	0.003
Nitrate	0.085 – 0.258	0.156	10.0	0.006

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

Parameter	*Annual Average*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Trihalomethane (THM)	2021	15	100	0.37
Haloacetic Acids (HAA)	2021	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.

Parameter	*Sample Date*	*Result Value (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Sodium	August 16, 2021	19.1	20.0*	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.

Parameter	*Result Range (Min - Max)*	*Number of Samples*	*Acceptable Level*
Distribution Alkalinity	212 - 218	4	30 – 500mg/L
Distribution pH	7.08 – 7.21	4	6.5 – 8.5
Distribution Lead 2021	0.10 – 1.60	4	10 ug/L MAC

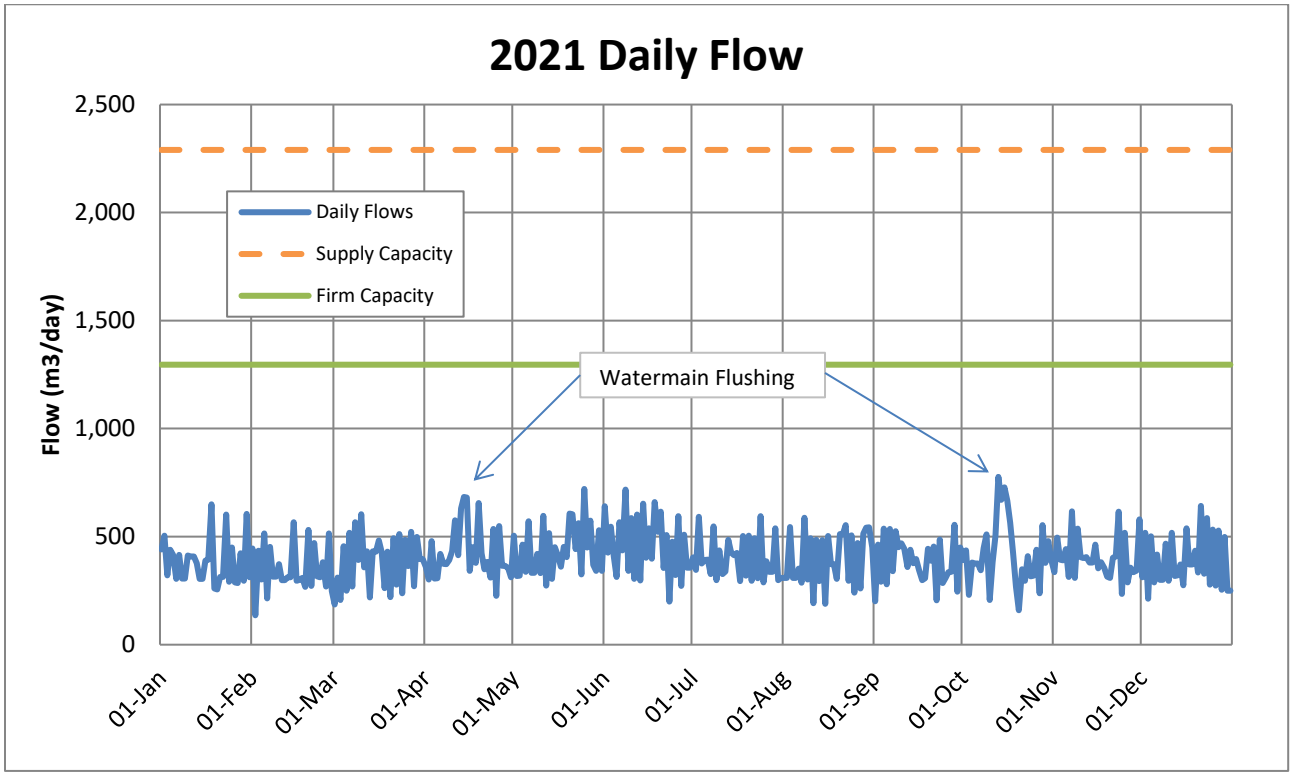
The following Table summarizes the most recent test results for Schedule 23. Testing is required every 3 years for secure groundwater wells.

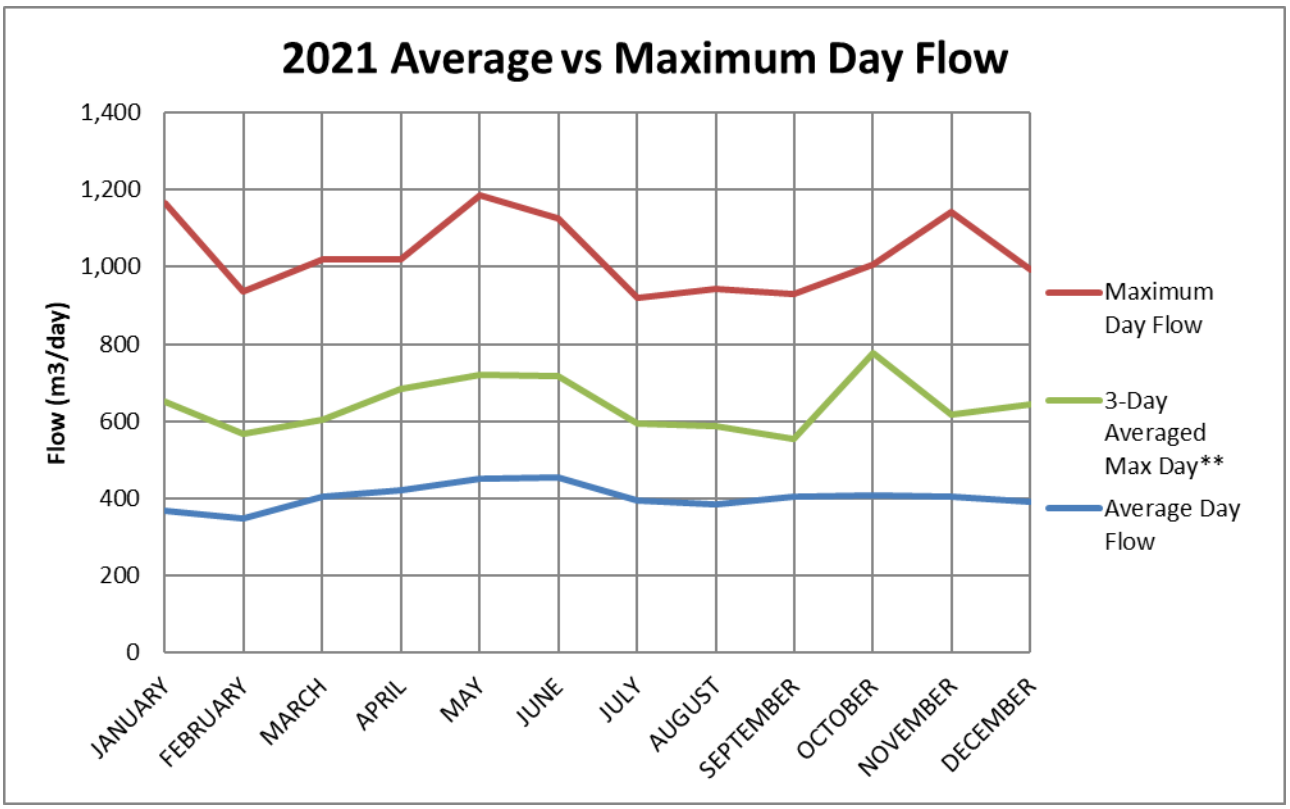
Parameter	*Sample Date*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Antimony	May 21/19	0.11	6	0.09
Arsenic	"	0.4	10	0.2
Barium	"	11.2	1000	0.01
Boron	"	106	5000	2
Cadmium	"	0.033	5	0.003
Chromium	"	0.15	50	0.03
Mercury	"	ND	1	0.01
Selenium	"	0.08	5	0.04
Uranium	"	0.519	20	0.002

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

Parameter	*Sample Date*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Alachlor	June 7, 2021	ND	5	0.02
Atrazine + N-dealkylatedmetobolites	“	ND	5	0.01
Azinphos-methyl	“	ND	20	0.05
Benzene	“	ND	1	0.32
Benzo(a)pyrene	“	ND	0.01	0.004
Bromoxynil	“	ND	5	0.33
Carbaryl	“	ND	90	0.05
Carbofuran	“	ND	90	0.01
Carbon Tetrachloride	“	ND	2	0.17
Chlorpyrifos	“	ND	90	0.02
Diazinon	“	ND	20	0.02
Dicamba	“	ND	120	0.20
1,2-Dichlorobenzene	“	ND	200	0.41
1,4-Dichlorobenzene	“	ND	5	0.36
1,2-Dichloroethane	“	ND	5	0.35
1,1-Dichloroethylene(vinylidene chloride)	“	ND	14	0.33
Dichloromethane	“	ND	50	0.35
2-4 Dichlorophenol	“	ND	900	0.15
2,4-Dichlorophenoxy acetic acid (2,4-D)	“	ND	100	0.19
Diclofop-methyl	“	ND	9	0.40
Dimethoate	“	ND	20	0.06
Diquat	“	ND	70	1
Diuron	“	ND	150	0.03
Glyphosate	“	ND	280	1
Malathion	“	ND	190	0.02
Metolachlor	“	ND	50	0.01
2-methyl-4chlorophenoxyacetic acid (MCPA)	“	ND	100	0.12
Metribuzin	“	ND	80	0.02
Monochlorobenzene	“	ND	80	0.3
Paraquat	“	ND	10	1
Pentachlorophenol	“	ND	60	0.15
Phorate	“	ND	2	0.01
Picloram	“	ND	190	1
Polychlorinated Biphenyls(PCB)	“	ND	3	0.04
Prometryne	“	ND	1	0.03
Simazine	“	ND	10	0.01
Terbufos	“	ND	1	0.01
Tetrachloroethylene	“	ND	10	0.35
2,3,4,6-Tetrachlorophenol	“	ND	100	0.20
Triallate	“	ND	230	0.01
Trichloroethylene	“	ND	5	0.44
2,4,6-Trichlorophenol	“	ND	5	0.25
Trifluralin	“	ND	45	0.02
Vinyl Chloride	“	ND	1	0.17

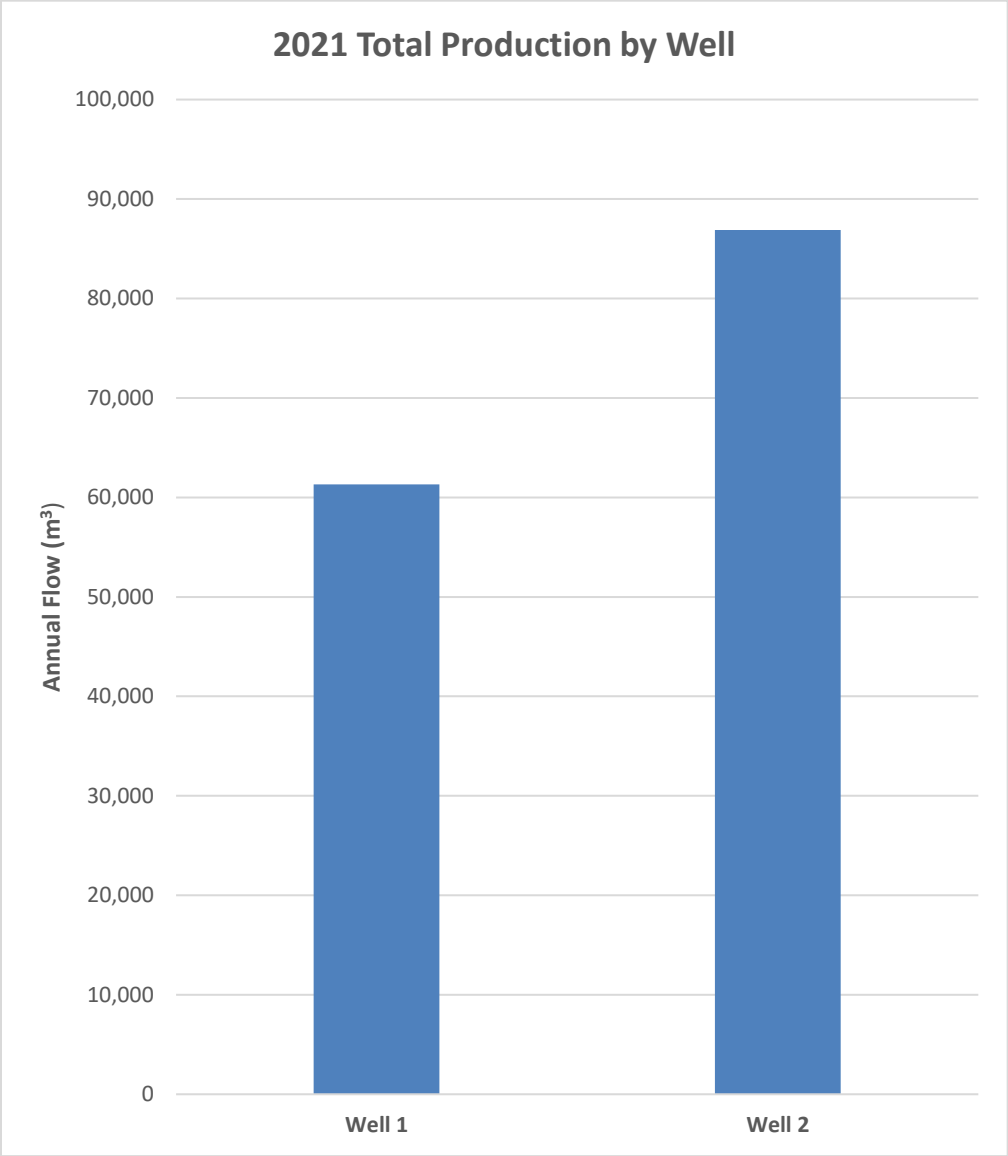
APPENDIX B: WATER QUANTITY SUMMARY





** Operational practices artificially elevate the maximum day flows and they are recalculated to a 3 day maximum average day flow. See Section 5 of Annual Report

Plattsville Water System Firm Capacity 1,296 m^3/ day
Plattsville Water System Capacity 2,290 m^3/ day



Plattsville Water System Firm Capacity 1,296 m^3/ day
Plattsville Water System Capacity 2,290 m^3/ day

2021 ANNUAL DRINKING WATER SYSTEM SUMMARY REPORT
Tavistock 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 publicworks@oxfordcounty.ca.

Drinking Water System:	Tavistock Water System
Drinking Water System Number:	2200000647
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: publicworks@oxfordcounty.ca
Reporting Period:	January 1, 2021 – December 31, 2021

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 3,008. 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. In 2021, approximately 26,855 L of sodium hypochlorite and 14,760 L (20,880 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 m^3 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 Water System is one of 14 water systems that have revenues and expenses pooled for the economy of scale purposes. The systems are combined into the Township Water financial system and in 2021 had operating and maintenance expenditures of approximately $3,000,000.

Operations and maintenance expenditures included:

- $175,000 for the replacement of general operating equipment and well rehabilitations

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Townships systems totaled $1,500,000 for improvements to water treatment systems and replacement of distribution mains in the Township System.

Township Capital Improvement Projects included:

- $260,000 for Tavistock well exploration
- $65,000 groundwater modeling
- $350,000 for facilities improvements

Capital Improvement projects for all systems included:

- $720,000 to develop Countywide SCADA Master Plan for all water systems
- $14,000 for updated water system modelling

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 2021 sampling program are shown on the table below. There were no adverse test results from 209 treated water samples in this reporting period.

	Number of Samples	*Range of E. coli Results Min - Max MAC = 0*	*Range of Total Coliform Results Min - Max MAC = 0*
Raw	146	0-OG	0 - OG
Treated	54	0	0
Distribution	155	0	0

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

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. The 2021 results are shown in the table below.

	Number of Samples	*Range of HPC Min - Max*
Treated	52	0 - 4
Distribution	39	0 - 12

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 system is provided below.

3.1. 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 average hardness for the Tavistock Drinking Water System is 315 mg/L (18 grains/gallon) based on samples collected from 2006 to 2019.

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 2021 was 0.66 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 2021 was 0.015 mg/L

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 2021. 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. The turbidity of untreated water from the well is checked weekly. Turbidity is measured in nephelometric turbidity units (NTU). Under O.Reg. 170/03 turbidity in groundwater 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 2021 is provided in the table below.

Parameter	*Number of Tests or Monitoring Frequency*	*Range of Results (Min – Max) and Average*
Chlorine residual in distribution (mg/L)	Continuous	(0.69 – 1.67) 1.18
Chlorine residual after treatment (mg/L)	Continuous	(0.83 – 1.77) 1.35
Turbidity after treatment (NTU)	Continuous	(0.01 – 2.64) 0.04

5. WATER QUANTITY

Continuous monitoring of flowrates from supply wells 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 2021 flows are provided in the Table below and presented graphically in Appendix B.

Flow Summary	*Quantity*
Permit to Take Water Limit	5,616 m^3/d
Municipal Drinking Water License Limit	5,616 m^3/d
2021 Average Daily Flow	1,581 m^3/d
2021 Maximum Daily Flow	2,660 m^3/d
2021 Average Monthly Flow	48,083 m^3
2021 Total Amount of Water Supplied	576,995 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 m^3/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 m^3/day if necessary to maintain system integrity. This system comprises of three supply 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 2021 MECP annual inspection had not taken place at the time this annual report was drafted. No investigation into non-compliances or inspection report rating was available at this time.

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 taken. There were no adverse or reportable occurrences in 2021.

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 can be found in the MECP document at https://cvc.ca/wp-content/uploads/2011/03/std01_079707.pdf PSIB 4449e01 titled "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines".

Results are shown as concentrations with units of either milligrams per litre (mg/L) or micrograms per litre (ug/L). 1 mg/L is equal to 1000 ug/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 nitrate samples are required every 3 months in normal operation.

Parameter	*Result Range* Min – Max *(mg/L)*	*Average Result (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Nitrite	ND	ND	1.0	0.003
Nitrate	ND – 0.017	0.015	10.0	0.006

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

Parameter	*Annual Average*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Trihalomethane (THM)	2021	18.75	100	0.37
Haloacetic Acids (HAA)	2021	8.0	80	5.3

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

Parameter	*Sample Date*	*Result Value (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Sodium	August 16, 2021	18.3	20.0*	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.

Parameter	*Result Range (Min - Max)*	*Number of Samples*	*Acceptable Level*
Distribution Alkalinity	231 - 243	4	30 – 500mg/L
Distribution pH	7.63 - 7.71	4	6.5 – 8.5
Distribution Lead 2021	0.01 – 1.00	4	10 ug/L MAC

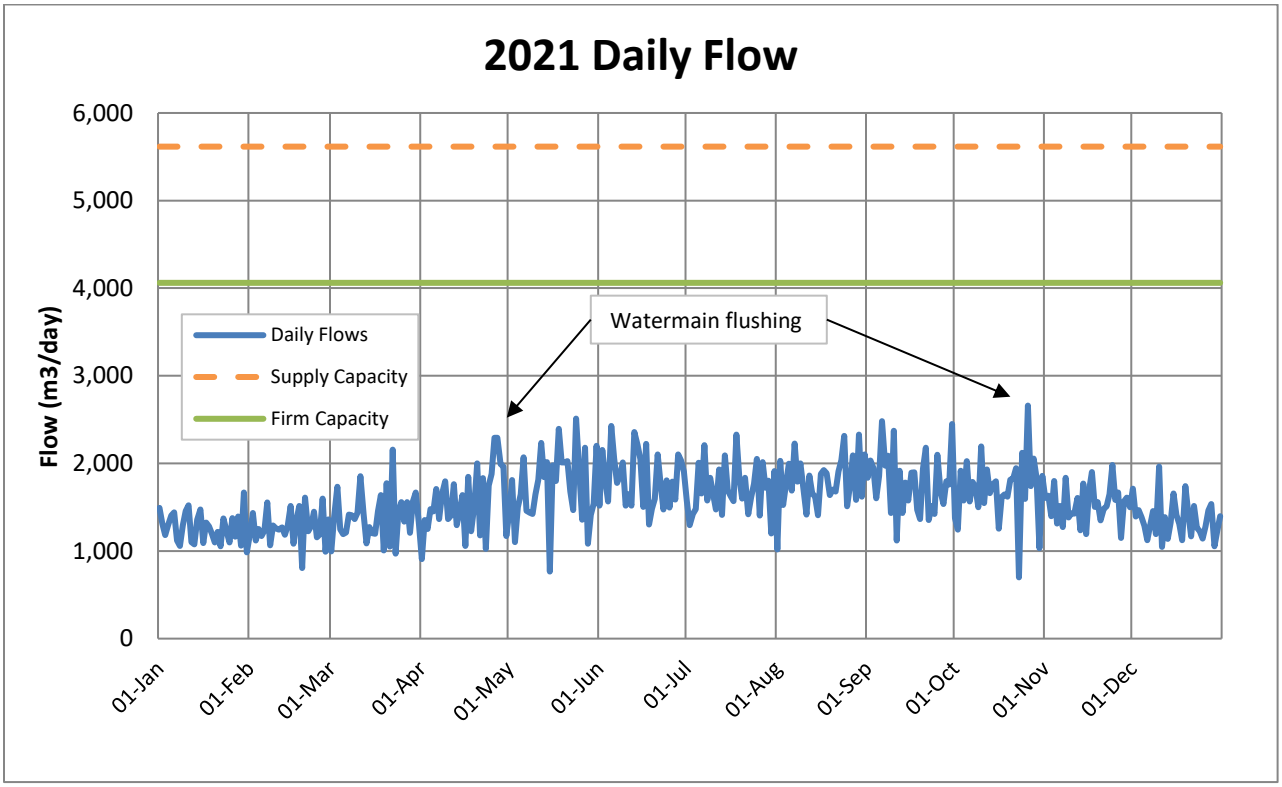
The following Table summarizes the most recent test results for Schedule 23. Testing is required every 3 years for secure groundwater wells.

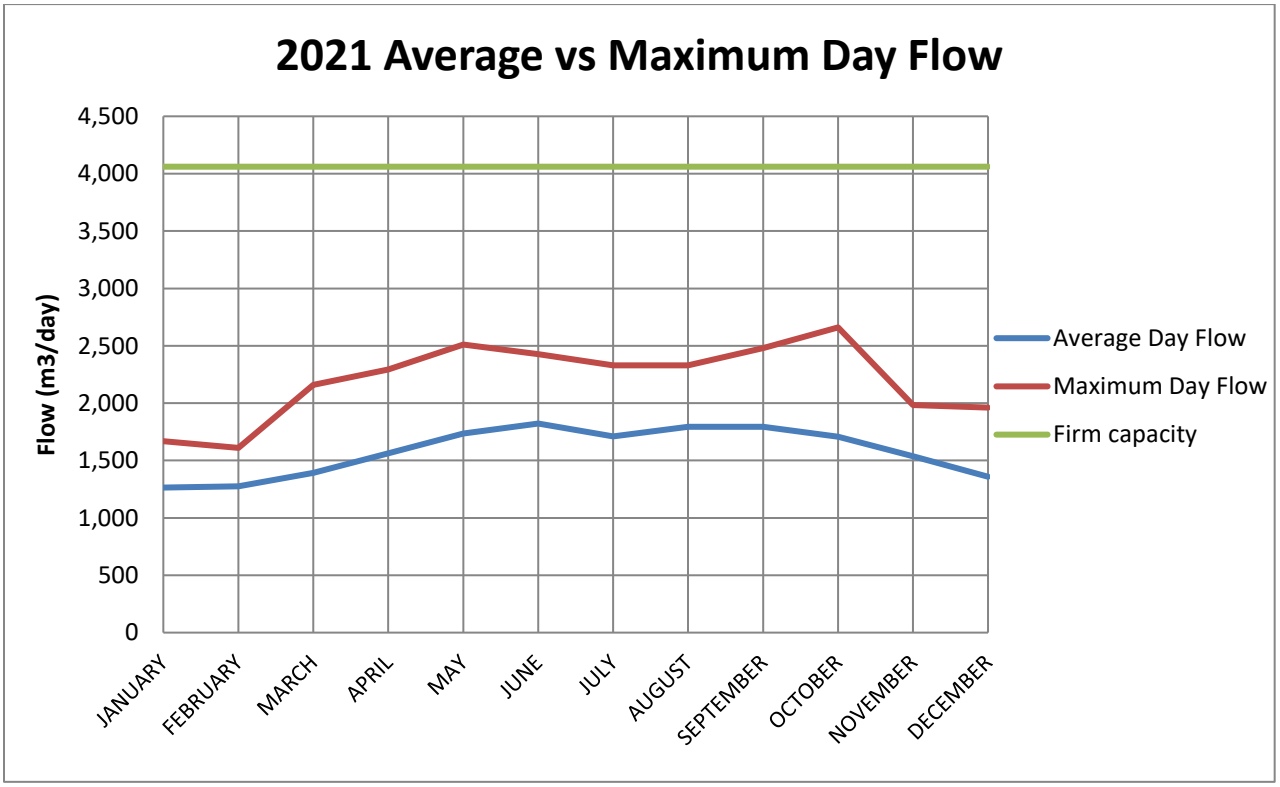
Parameter	*Sample Date*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Antimony	May 21/19	ND	6	0.09
Arsenic	"	1.4	10	0.2
Barium	"	266	1000	0.01
Boron	"	37	5000	2
Cadmium	"	ND	5	0.003
Chromium	"	0.13	50	0.03
Mercury	"	ND	1	0.01
Selenium	"	ND	5	0.04
Uranium	"	0.116	20	0.002

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

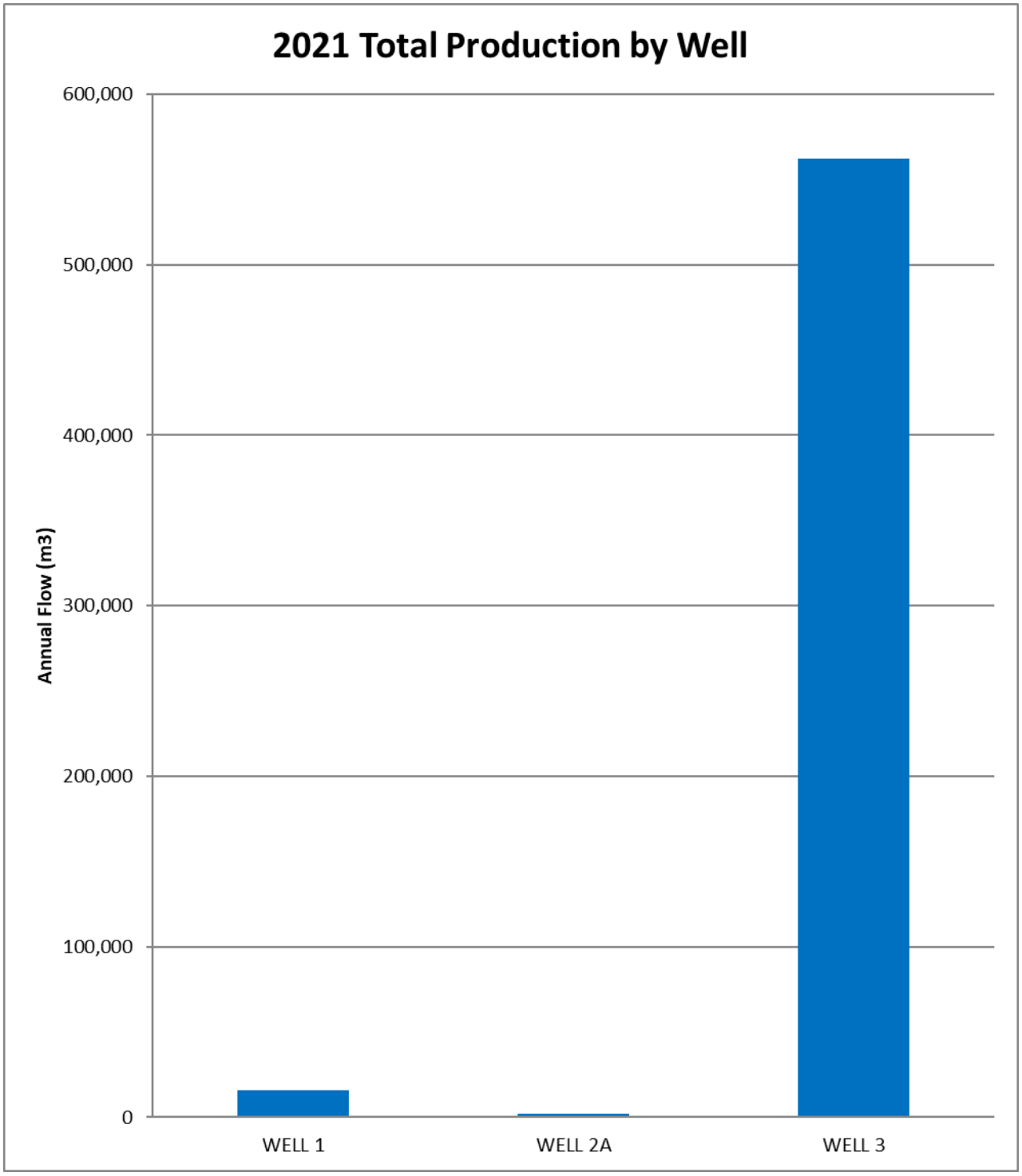
Parameter	*Sample Date*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Alachlor	June 7, 2021	ND	5	0.02
Atrazine + N-dealkylatedmetobolites	“	ND	5	0.01
Azinphos-methyl	“	ND	20	0.05
Benzene	“	ND	1	0.32
Benzo(a)pyrene	“	ND	0.01	0.004
Bromoxynil	“	ND	5	0.33
Carbaryl	“	ND	90	0.05
Carbofuran	“	ND	90	0.01
Carbon Tetrachloride	“	ND	2	0.17
Chlorpyrifos	“	ND	90	0.02
Diazinon	“	ND	20	0.02
Dicamba	“	ND	120	0.20
1,2-Dichlorobenzene	“	ND	200	0.41
1,4-Dichlorobenzene	“	ND	5	0.36
1,2-Dichloroethane	“	ND	5	0.35
1,1-Dichloroethylene(vinylidene chloride)	“	ND	14	0.33
Dichloromethane	“	ND	50	0.35
2-4 Dichlorophenol	“	ND	900	0.15
2,4-Dichlorophenoxy acetic acid (2,4-D)	“	ND	100	0.19
Diclofop-methyl	“	ND	9	0.40
Dimethoate	“	ND	20	0.06
Diquat	“	ND	70	1
Diuron	“	ND	150	0.03
Glyphosate	“	ND	280	1
Malathion	“	ND	190	0.02
Metolachlor	“	ND	50	0.01
2-methyl-4chlorophenoxyacetic acid (MCPA)	“	ND	100	0.12
Metribuzin	“	ND	80	0.02
Monochlorobenzene	“	ND	80	0.3
Paraquat	“	ND	10	1
Pentachlorophenol	“	ND	60	0.15
Phorate	“	ND	2	0.01
Picloram	“	ND	190	1
Polychlorinated Biphenyls(PCB)	“	ND	3	0.04
Prometryne	“	ND	1	0.03
Simazine	“	ND	10	0.01
Terbufos	“	ND	1	0.01
Tetrachloroethylene	“	ND	10	0.35
2,3,4,6-Tetrachlorophenol	“	ND	100	0.20
Triallate	“	ND	230	0.01
Trichloroethylene	“	ND	5	0.44
2,4,6-Trichlorophenol	“	ND	5	0.25
Trifluralin	“	ND	45	0.02
Vinyl Chloride	“	ND	1	0.17

APPENDIX B: WATER QUANTITY SUMMARY





Tavistock Firm Capacity 4,061 m^3/day
Tavistock Water Supply Capacity 5,616 m^3/day



Tavistock Firm Capacity 4,061 m^3/day
Tavistock Water Supply Capacity 5,616 m^3/day

2021 ANNUAL DRINKING WATER SYSTEM SUMMARY REPORT
Thamesford 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 publicworks@oxfordcounty.ca

Drinking Water System:	Thamesford Water System
Drinking Water System Number:	2200000610
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: publicworks@oxfordcounty.ca
Reporting Period:	January 1, 2021 – December 31, 2021

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 2,430. The system consists of four well sources, three of which are classified as GUDI (Groundwater Under the Direct Influence of surface water). The third is a secure groundwater well. Well 4 at the River wells site was connected in March 2021.The water is treated by filtration for iron and manganese removal followed by disinfection by Ultra Violet (UV) light and sodium hypochlorite. In 2021, approximately 9,448 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 m^3 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 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 2021 had forecasted operating and maintenance expenditures of approximately $3,000,000.

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Townships systems totaled $1,500,000 for improvements to water treatment systems and replacement of distribution mains in the Township System.

Capital Improvement projects for the Township systems included:

- 65,000 for groundwater modelling
- 350,000 for facilities improvements
- 175,000 for the replacement of general operating equipment including well rehabilitations

Capital Improvement projects for all systems included:

- $720,000 to develop Countywide SCADA Master Plan for all water systems
- $14,000 for Updated Water Systems Modelling

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 2021 sampling program are shown on the table below. There were no adverse test results from the 205 treated water samples in this reporting period.

	Number of Samples	*Range of E. coli Results Min - Max MAC = 0*	*Range of Total Coliform Results Min - Max MAC = 0*
Raw	206	0	0 - 29
Treated	52	0	0
Distribution	153	0	0

2.2. Heterotrophic Plate Count (HPC)

HPC analyses are required from the treatment 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. The 2021 results are shown in the table below.

	Number of Samples	*Range of HPC Min - Max*
Treated	52	0 - 9
Distribution	42	0 - 33

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 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 water.

When sodium levels are above 20 mg/L the MECP and MOH are notified. Southwestern Public Health maintain 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 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 either raw or treated water. The average hardness for the Thamesford System is 308 mg/L (18 grains/gallon) based on samples collected from 2007 to 2019.

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 2021. 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. The turbidity of untreated water from the well is checked weekly. Turbidity is measured in nephelometric turbidity units (NTU). Under O.Reg. 170/03 turbidity in groundwater 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 2021 is provided in the table below.

Parameter	*Number of Tests or Monitoring Frequency*	*Range of Results (Min – Max) and Average*
Chlorine residual in distribution (mg/L)	Continuous	(0.53 – 3.01) 1.04
Chlorine residual after treatment (mg/L)	Continuous	(0.44 – 2.86) 1.32
Turbidity after treatment (NTU)	Continuous	(0.03 – 3.98) 0.06

4.3. Ultra Violet (UV) Disinfection

Supply wells that have been classified as being GUDI require “enhanced disinfection” through 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 2021.

5. WATER QUANTITY

Continuous monitoring of flowrates from supply wells 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 2021 flows are provided in the Table below and presented graphically in Appendix B.

Flow Summary	*Quantity*
Permit to Take Water Limit	5,583 m^3/d
Municipal Drinking Water License Limit	5,391 m^3/d
2021 Average Daily Flow	688 m^3/d
2021 Maximum Daily Flow	1,370 m^3/d
2021 Average Monthly Flow	20,923 m^3
2021 Total Amount of Water Supplied	251,070 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 m^3/day and the GUDI portion of this is 1,468 m^3/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

The annual MECP inspection took place in October 2021. There were no non-compliance findings and the 2021 Inspection Report rating was 100%.

6.2. Adverse Results

There were no adverse or reportable occurrences in 2021. 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.

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 can be found in the MECP document at https://cvc.ca/wp-content/uploads/2011/03/std01_079707.pdf PSIB 4449e01 titled "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines".

Results are shown as concentrations with units of either milligrams per litre (mg/L) or micrograms per litre (ug/L). 1 mg/L is equal to 1000 ug/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.

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

Parameter	*Result Range* Min – Max *(mg/L)*	*Average Result (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Nitrite	ND – 0.003	ND	1.0	0.003
Nitrate	2.36 – 3.31	2.76	10.0	0.006

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

Parameter	*Annual Average*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Trihalomethane (THM)	2021	33	100	0.37
Haloacetic Acids (HAA)	2021	13.6	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.

Parameter	*Sample Date*	*Result Value (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Sodium	May 21 /19	26.0	20.0*	0.01
Fluoride	May 21 /19	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.

Parameter	*Result Range (Min - Max)*	*Number of Samples*	*Acceptable Level*
Distribution Alkalinity	235 - 283	4	30 – 500mg/L
Distribution pH	7.5 - 7.65	4	6.5 – 8.5
Distribution Lead 2021	ND - 1.58	4	10 ug/L MAC

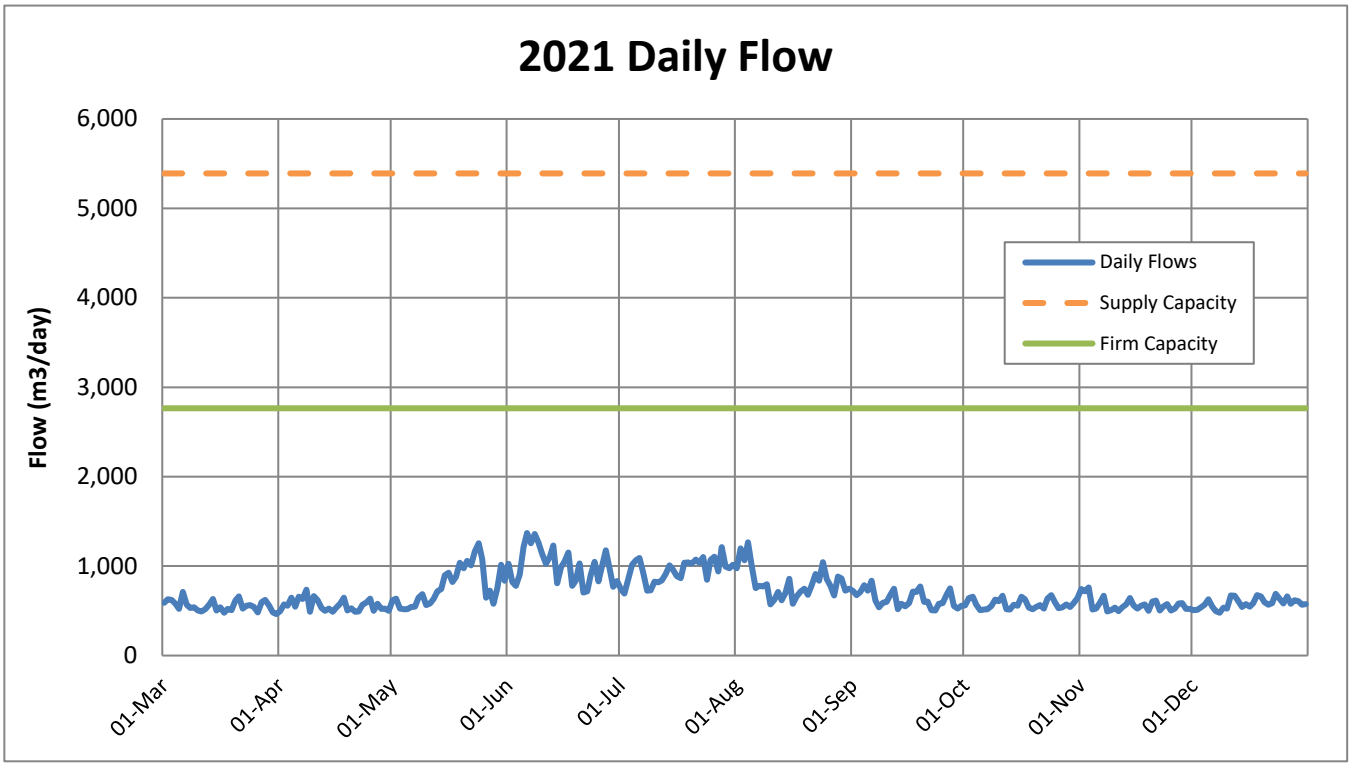
The following Table summarizes the most recent test results for Schedule 23. Testing is required annually for GUDI wells.

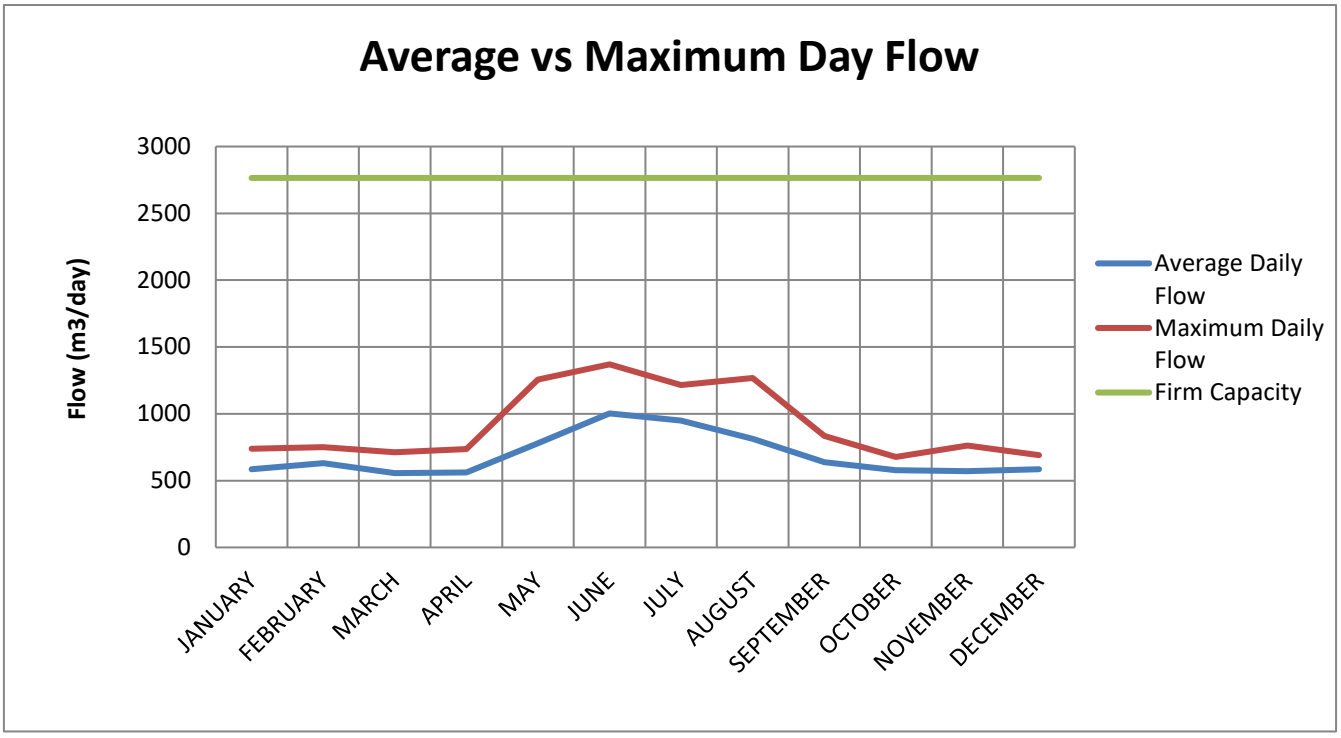
Parameter	*Sample Date*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Antimony	Jun 7/21	ND	6	0.9
Arsenic	"	0.2	10	0.2
Barium	"	65.0	1000	0.02
Boron	"	66	5000	2
Cadmium	"	ND	5	0.003
Chromium	"	0.17	50	0.08
Mercury	"	ND	1	0.01
Selenium	"	0.18	5	0.04
Uranium	"	0.378	20	0.002

The following Table summarizes the most recent test results for Schedule 24. Testing is required annually for GUDI wells.

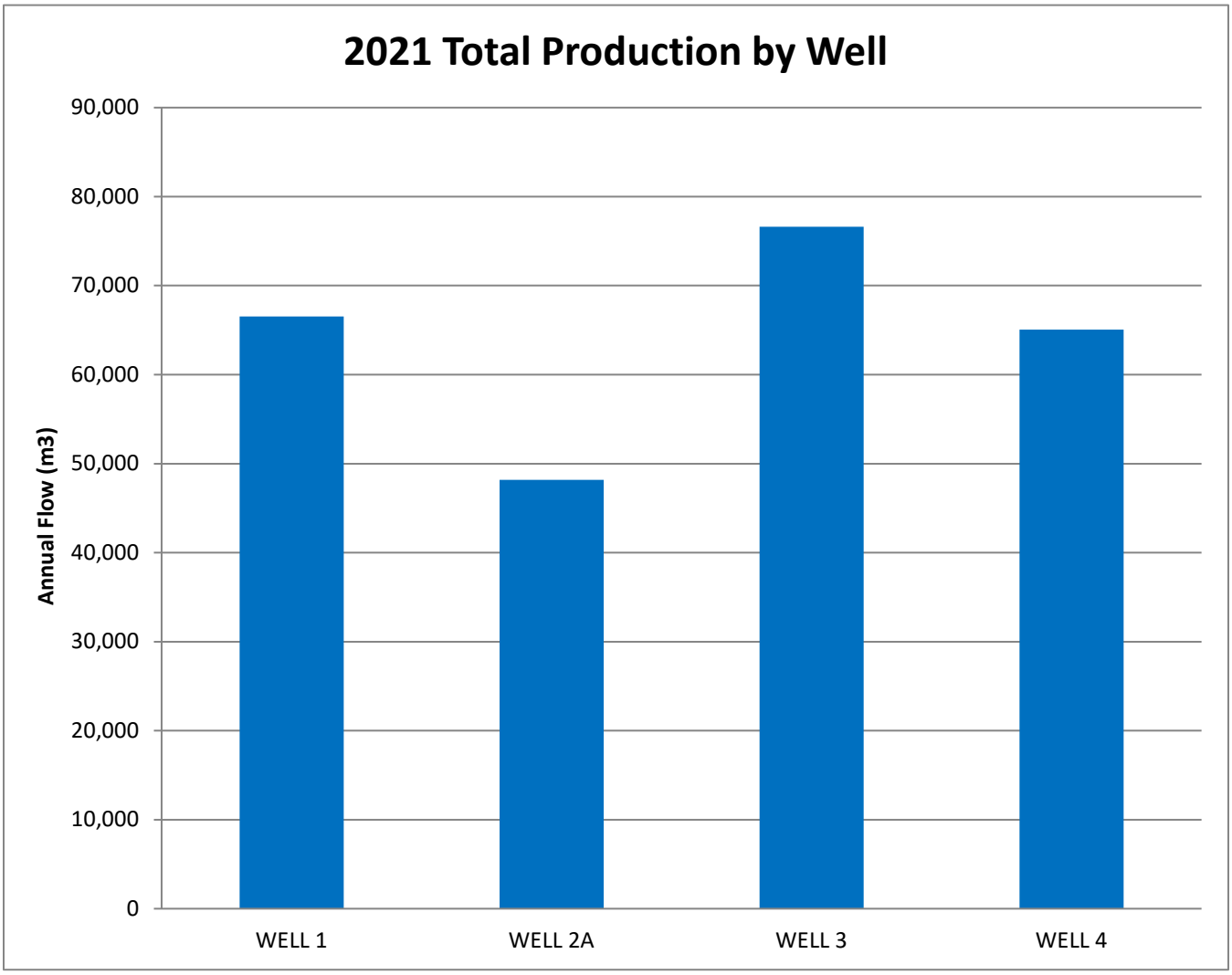
Parameter	*Sample Date*	*Result (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Alachlor	Jun 7/21	ND	5	0.02
Atrazine + N-dealkylatedmetobolites	“	ND	5	0.01
Azinphos-methyl	“	ND	20	0.01
Benzene	“	ND	1	0.32
Benzo(a)pyrene	“	ND	0.01	0.004
Bromoxynil	“	ND	5	0.33
Carbaryl	“	ND	90	0.05
Carbofuran	“	ND	90	0.01
Carbon Tetrachloride	“	ND	2	0.16
Chlorpyrifos	“	ND	90	0.02
Chlorpyrifos	“	ND	90	0.02
Diazinon	“	ND	20	0.02
Dicamba	“	ND	120	0.20
1,2-Dichlorobenzene	“	ND	200	0.41
1,4-Dichlorobenzene	“	ND	5	0.36
1,2-Dichloroethane	“	ND	5	0.35
1,1-Dichloroethylene (vinylidene chloride)	“	ND	14	0.33
Dichloromethane	“	ND	50	0.35
2-4 Dichlorophenol	“	ND	900	0.15
2,4-Dichlorophenoxy acetic acid (2,4-D)	“	ND	100	0.19
Diclofop-methyl	“	ND	9	0.40
Dimethoate	“	ND	20	0.03
Diquat	“	ND	70	1
Diuron	“	ND	150	0.03
Glyphosate	“	ND	280	1
Malathion	“	ND	190	0.02
2-methyl-4chlorophenoxyacetic acid (MCPA)	“	ND	100	0.12
Metolachlor	“	ND	50	0.01
Metribuzin	“	ND	80	0.02
Monochlorobenzene	“	ND	80	0.30
Paraquat	“	ND	10	1
Pentachlorophenol	“	ND	60	0.15
Phorate	“	ND	2	0.01
Picloram	“	ND	190	1
Polychlorinated Biphenyls(PCB)	“	ND	3	0.04
Prometryne	“	ND	1	0.03
Simazine	“	ND	10	0.01
Terbufos	“	ND	1	0.01
Tetrachloroethylene	“	ND	10	0.35
2,3,4,6-Tetrachlorophenol	“	ND	100	0.14
Triallate	“	ND	230	0.01
Trichloroethylene	“	ND	5	0.43
2,4,6-Trichlorophenol	“	ND	5	0.25
Trifluralin	“	ND	45	0.02
Vinyl Chloride	“	ND	1	0.17

APPENDIX B: 2021 WATER QUANTITY SUMMARY





Thamesford Water System Supply Capacity 5,391 m^3/day
Thamesford Water System Firm Capacity 2,765 m^3/day



Thamesford Water System Supply Capacity 5,391 m^3/day
Thamesford Water System Firm Capacity 2,765 m^3/day

2021 ANNUAL DRINKING WATER SYSTEM SUMMARY REPORT
Tillsonburg 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 publicworks@oxfordcounty.ca

Drinking Water System:	Tilsonburg Water System
Drinking Water System Number:	220000683
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: publicworks@oxfordcounty.ca
Reporting Period:	January 1, 2021- December 31, 2021

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 16,950. The system consists of ten well sources, seven of which are classified as GUDI (Groundwater Under Direct Influence of surface water) and three are secure groundwater wells. The treatment for each site is summarized below.

Treatment Facility	*Wells*	*Treatment*
Mall Road WTF	1A & 2	Filtration for iron removal and disinfection with ultraviolet (UV) and chlorine gas.
Fairview WTF	4, 5 & 7A	Disinfection with UV and chlorine gas. Sodium hypochlorite is added for disinfection at Well 7A and for secondary disinfection.
Plank Line WTF	6A	Disinfection with chlorine gas
Bell Mill Road WTF	9, 10 & 11	Filtration for iron removal and disinfection with UV and chlorine gas.
Rokeby Road 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 facilities in the event of a power failure. Water storage is provided by a 9,100 m^3 reservoir located north of the Town of Tillsonburg. There is a pressure boosting station on Fairview Street.

In 2021, approximately 4,080 kg of chlorine gas and 7,585 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 2021, the Tillsonburg Water System had operations and maintenance expenditures of $2,500,000. Operations and maintenance expenditures included:

- $60,000 for the replacement of general operating equipment and well rehabilitations

In addition to regular operational and maintenance expenditures, Capital Improvement projects for Tillsonburg totaled $1,700,000 for improvements to water treatment systems and distribution mains in the water system. Capital improvement projects included:

- $1,300,000 for the replacement of aging watermains
- $125,000 for bulk water station
- $20,000 for standby power
- $30,000 for facilities improvements

Capital Improvement projects for all drinking water systems included:

- $720,000 develop Countywide SCADA Master Plan for all water systems
- $14,000 Updated Water Modelling

2. MICROBIOLOGICAL TESTING

2.1. *E. coli* and Total Coliform

Bacteriological tests for *E. coli* and total coliforms are taken 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 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 2021 sampling program are shown on the table below. There were 0 adverse test results from 611 treated water samples in this reporting period.

	Number of Samples	*Range of E. coli Results Min - Max MAC = 0*	*Range of Total Coliform Results Min - Max MAC = 0*
Raw	451	0	0 - 7
Treated	252	0	0
Distribution	359	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. 2021 results are shown in the table below.

	Number of Samples	*Range of HPC Min - Max*
Treated	250	0 - 23
Distribution	99	0 - 190

3. CHEMICAL TESTING

The Safe Drinking Water Act requires periodic testing of the water for approximately 50 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 Water System is provided below.

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 maintain 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 running in 2021. All other locations are under 20 mg/L.

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 or treated water. The average hardness for the Tillsonburg Drinking Water System is 251 mg/L (15 grains/gallon) based on samples collected from 2006 to 2019.

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 at least 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. A summary of the chlorine residual readings is provided in the table below.

A precautionary boil water advisory was enacted following a watermain break that could have impacted the free chlorine residual. A summary of this incident can be found in section 6.2.

4.2. Turbidity

Turbidity of treated water is continuously monitored at the treatment facility, as a change in turbidity can indicate an operational problem. The turbidity of untreated water from the well is checked weekly. Turbidity is measured in nephelometric turbidity units (NTU). Under O.Reg. 170/03 turbidity in groundwater 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 2021 is provided in the table below.

Parameter & Location	*Monitoring Frequency*	*Range of Results (Min – Max) and Average*
Chlorine residual in distribution (mg/L)	Continuous	(0.19 – 2.65) 1.23
Bell Mill Road WTF		
Chlorine mg/L	Continuous	(0.37 – 1.43) 2.44
Turbidity NTU	Continuous	(0.03 – 0.04) 0.72
Fairview WTF/North Street West		
Chlorine mg/L	Continuous	(0.19 – 2.65) 1.18
Turbidity NTU	Continuous	(0.03 – 1.04) 0.06
Mall Road WTF		
Chlorine mg/L	Continuous	(0.96 – 1.93) 1.43
Turbidity NTU	Continuous	(0.02 – 2.69) 0.05
Plank Line WTF		
Chlorine mg/L	Continuous	Not running
Turbidity NTU	Continuous	Not running
Rokeby Road WTF		
Chlorine mg/L	Continuous	(0.34 – 1.69) 1.19
Turbidity NTU	Continuous	(0.03 – 4) 0.08

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/cm^2 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 2021.

5. WATER QUANTITY

Continuous monitoring of flowrates from supply wells 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 2021 flows are provided in the Table below and presented graphically in Appendix B.

Flow Summary	*Quantity*
Permit to Take Water Limit	17,913 m^3/d
Municipal Drinking Water License Limit	17,440 m^3/d
2021 Average Daily Flow	5,315 m^3/d
2021 Maximum Daily Flow	8,694 m^3/d
2021 Average Monthly Flow	161,679 m^3/d
2021 Total Amount of Water Supplied	1,940,152 m^3/d

In order to meet the long-term growth need of the Town, the County intends to construct a transmission main from Tillsonburg to the Oxford South system in Springford. The construction is currently anticipated to occur within the 20-year planning horizon.

Firm Capacity of this system is rated at 10,627 m^3/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 m^3/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 m^3/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 of this report being drafted the annual MECP inspection had not taken place for 2021. No inspection report rating was 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 taken. Below is a summary of the one adverse/reportable occurrences for 2021 along with the corresponding resolution.

Operational Incident: Low Pressure Event and Precautionary Boil Water Advisory		
Potential contamination following a watermain break on May 5, 2021. The watermain was damaged when a third party contractor was excavating in the area.	A precautionary boil water advisory for 12 residents was enacted while bacteriological samples were collected to confirm that there was no contamination to the drinking water system. The break was repaired, flushed, and water samples were collected.	All samples were acceptable on May 6, 2021.

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 at https://cvc.ca/wp-content/uploads/2011/03/std01_079707.pdf PSIB 4449e01, titled "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines".

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

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

Parameter & Location	*Result Range* Min – Max *(mg/L)*	*Average Result (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Nitrite			1.0	0.003
Bell Mill Road WTF	ND	ND		
Fairview WTF	ND	ND		
Mall Road WTF	ND	ND		
Plank Line WTF+	NA	NA		
Rokeby Road WTF	ND	ND		
Nitrate			10.0	0.006
Bell Mill Road WTF	2.98 – 4.28	3.63		
Fairview WTF	6.52 – 8.72	7.15		
Mall Road WTF	1.50 – 1.96	1.76		
Plank Line WTF+	NA	NA		
Rokeby Road WTF	5.28 – 5.57	5.45		

+not running in 2020

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

Parameter	*Annual Average*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Trihalomethane (THM)	2021	24.8	100	0.37
Haloacetic Acids (HAA)	2021	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.

Parameter & Location	*Sample Date*	*Result Value (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Sodium			20.0*	0.01
Bell Mill Road WTF	August 16, 2021	6.52		
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	2.55		
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 2021

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

Parameter	*Result Range (Min - Max)*	*Number of Samples*	*Acceptable Level*
Distribution Alkalinity	172 – 249	8	30 – 500mg/L
Distribution pH	7.32 – 7.56	8	6.5 – 8.5
Distribution Lead 2021	0.07– 2.29	8	10 ug/L MAC

The following Table summarizes the most recent test results for Schedules 23. Testing is required annually for GUDI wells at Bell Mill Road, Fairview and Mall Road.

Parameter	*Results (ug/L) Bell Mill Road WTF November 22, 2021*	*Results (ug/L) Fairview WTF November 22, 2021*	*Results (ug/L) Mall Road WTF November 22, 2021*	*MAC (ug/L)*	*MDL (ug/L)*
Antimony	ND	ND	ND	6	0.09
Arsenic	ND	1.7	ND	10	0.02
Barium	31.6	126	60.5	1000	0.01
Boron	18	68	22	5000	2.0
Cadmium	ND	0.008	0.003	5	0.003
Chromium	0.30	0.40	0.12	50	0.08
Mercury	ND	ND	ND	1	0.01
Selenium	0.18	0.39	0.07	5	0.04
Uranium	0.571	0.345	1.79	20	0.002

The following Table summarizes the most recent test results for Schedules 23.Testing is required every 3 years in secure, Non-GUDI wells at Plank Line and Rokeby Road.

Parameter	*Results (ug/L) Plank Line WTF June 6/16+*	*Results (ug/L) Rokeby Road WTF May 27/19*	*MAC (ug/L)*	*MDL (ug/L)*
Antimony	ND	ND	6	0.02
Arsenic	10.0	1.2	10	0.2
Barium	52.4	29.6	1000	0.01
Boron	153	14	5000	2.0
Cadmium	ND	ND	5	0.003
Chromium	3.94	0.52	50	0.03
Mercury	ND	ND	1	0.01
Selenium	0.09	0.26	5	0.04
Uranium	0.185	1.63	20	0.002

+not running in 2021

Summary of Organic parameters in Schedule 24 sampled during this reporting period or the most recent sample results. Testing is required annually for GUDI wells at Bells Mill Road, Fairview and Mall Road.

Parameter	*Results (ug/L) Bell Mill Rd. WTF November 22, 2021*	*Results (ug/L) Fairview WTF November 22, 2021*	*Results (ug/L) Mall Road WTF November 22, 2021*	*MAC (ug/L)*	*MDL (ug/L)*
Alachlor	ND	ND	ND	5	0.02
Atrazine + N-dealkylatedmetobolites	0.01	0.01	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	120	0.02
Dicamba	ND	ND	ND	200	0.20
1,2-Dichlorobenzene	ND	ND	ND	5	0.41
1,4-Dichlorobenzene	ND	ND	ND	30	0.36
1,2-Dichloroethane	ND	ND	ND	14	0.35

Parameter	*Results (ug/L) Bell Mill Rd. WTF November 22, 2021*	*Results (ug/L) Fairview WTF November 22, 2021*	*Results (ug/L) Mall Road WTF November 22, 2021*	*MAC (ug/L)*	*MDL (ug/L)*
1,1-Dichloroethylene (vinylidene chloride)	ND	ND	ND	50	0.33
Dichloromethane	ND	ND	ND	900	0.35
2-4 Dichlorophenol	ND	ND	ND	100	0.15
2,4-Dichlorophenoxy acetic acid (2,4-D)	ND	ND	ND	9	0.19
Diclofop-methyl	ND	ND	ND	20	0.40
Dimethoate	ND	ND	ND	10	0.06
Diquat	ND	ND	ND	150	1
Diuron	ND	ND	ND	280	0.03
Glyphosate	ND	ND	ND	3	1
Malathion	ND	ND	ND	900	0.02
2-methyl-4chlorophenoxyacetic acid (MCPA)	ND	ND	ND	100	0.12
Metolachlor	ND	ND	ND	80	0.01
Metribuzin	ND	ND	ND	80	0.02
Monochlorobenzene	ND	ND	ND	10	0.30
Paraquat	ND	ND	ND	50	1
Pentachlorophenol	ND	ND	ND	2	0.15
Phorate	ND	ND	ND	190	0.01
Picloram	ND	ND	ND	3	1
Polychlorinated Biphenyls(PCB)	ND	ND	ND	1	0.04
Prometryne	ND	ND	ND	10	0.03
Simazine	ND	ND	ND	280	0.01
Terbufos	ND	ND	ND	30	0.01
Tetrachloroethylene	ND	ND	ND	100	0.35
2,3,4,6-Tetrachlorophenol	ND	ND	ND	230	0.20
Triallate	ND	ND	ND	5	0.01
Trichloroethylene	ND	ND	ND	5	0.44
2,4,6-Trichlorophenol	ND	ND	ND	280	0.25
Trifluralin	ND	ND	ND	2	0.02
Vinyl Chloride	ND	ND	ND	1	0.17

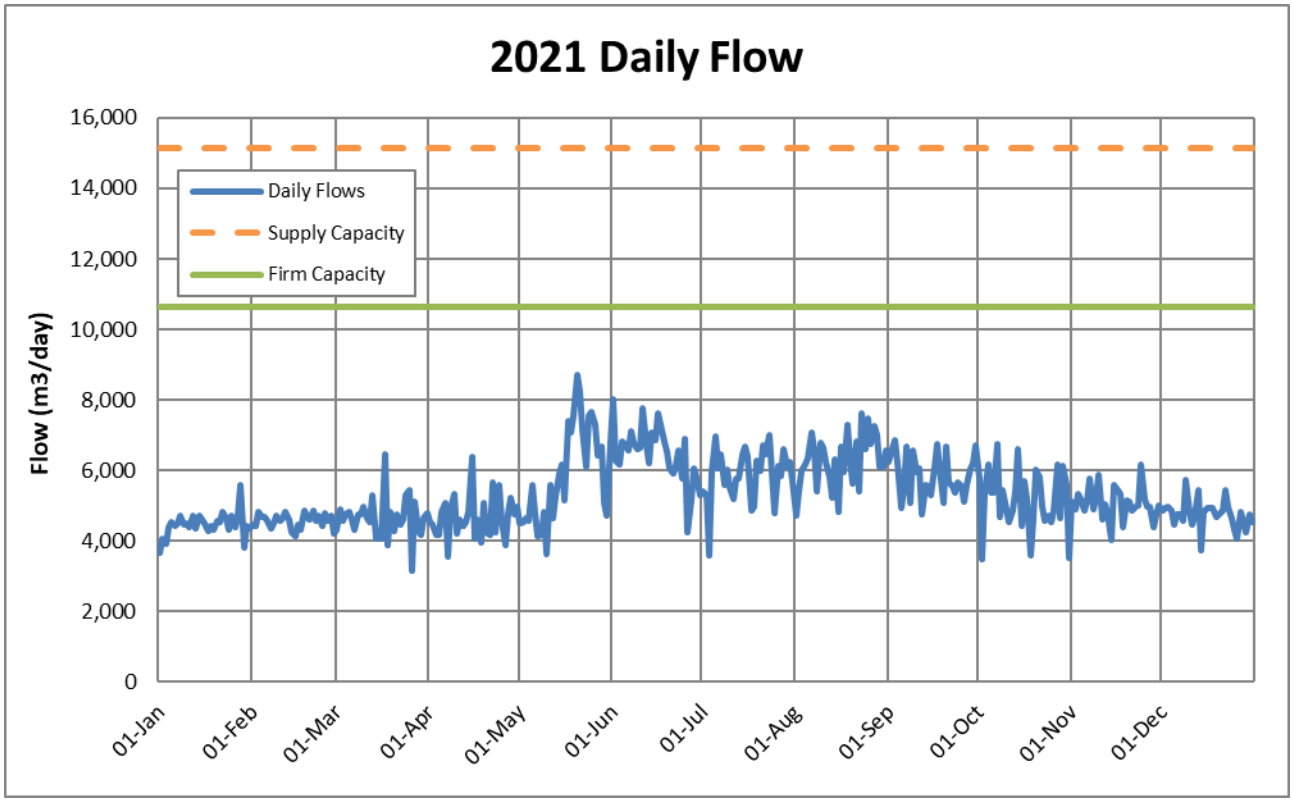
Summary of Organic parameters in Schedule 24 sampled during this reporting period or the most recent sample results. Testing is required every 3 years in secure, Non-GUDI wells at Plank Line and Rokeby Road.

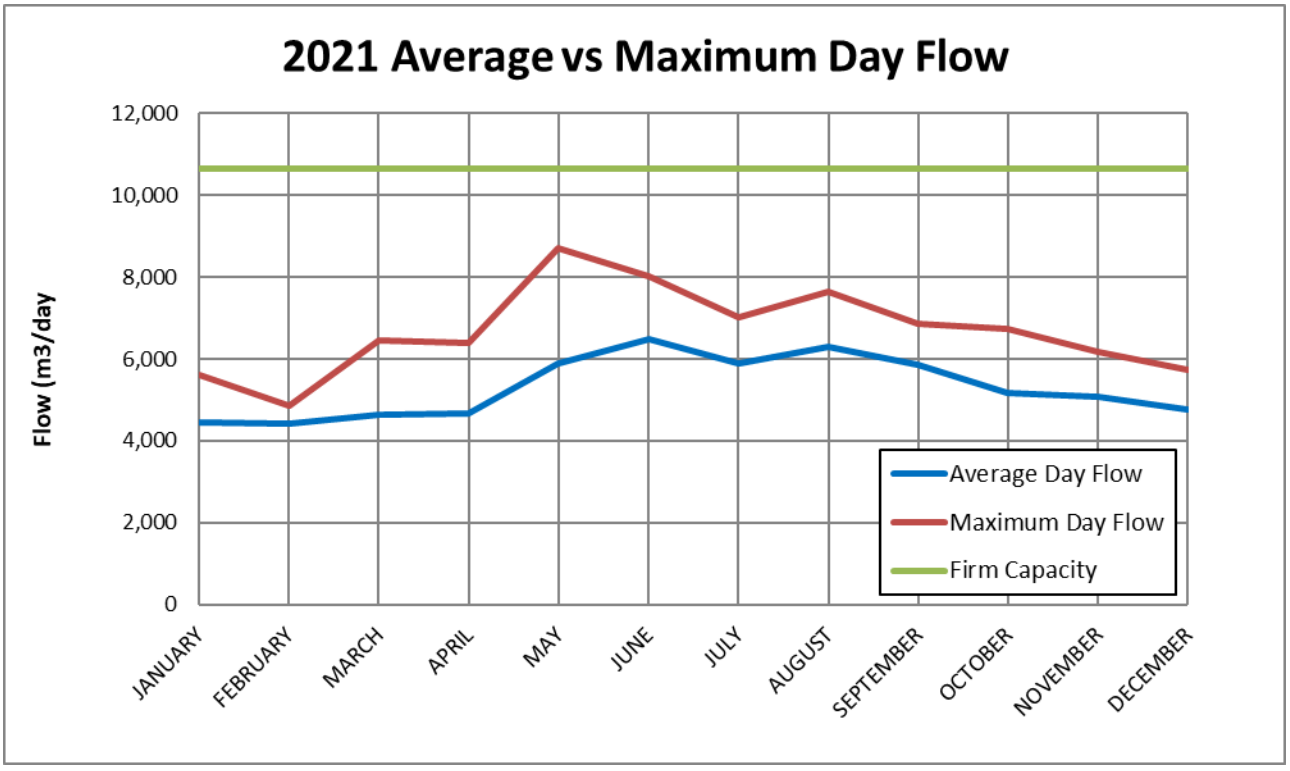
Parameter	*Results (ug/L) Plank Line WTF June 6, 2016 ***	*Plank MDL (ug/L)*	*Results (ug/L) Rokeby Road WTF June 7, 2021*	*MAC (ug/L)*	*Rokeby MDL (ug/L)*
Alachlor	ND	0.02	ND	5	0.02
Atrazine + N-dealkylatedmetobolites	ND	0.01	0.02	5	0.01
Azinphos-methyl	ND	0.01	ND	20	0.05
Benzene	ND	0.32	ND	1	0.32
Benzo(a)pyrene	ND	0.004	ND	0.01	0.004
Bromoxynil	ND	0.33	ND	5	0.33
Carbaryl	ND	0.05	ND	90	0.05
Carbofuran	ND	0.01	ND	90	0.01
Carbon Tetrachloride	ND	0.16	ND	2	0.17
Chlorpyrifos	ND	0.002	ND	90	0.02
Diazinon	ND	0.02	ND	20	0.02
Dicamba	ND	0.02	ND	120	0.20
1,2-Dichlorobenzene	ND	0.20	ND	200	0.41
1,4-Dichlorobenzene	ND	0.41	ND	5	0.36
1,2-Dichloroethane	ND	0.36	ND	5	0.35

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

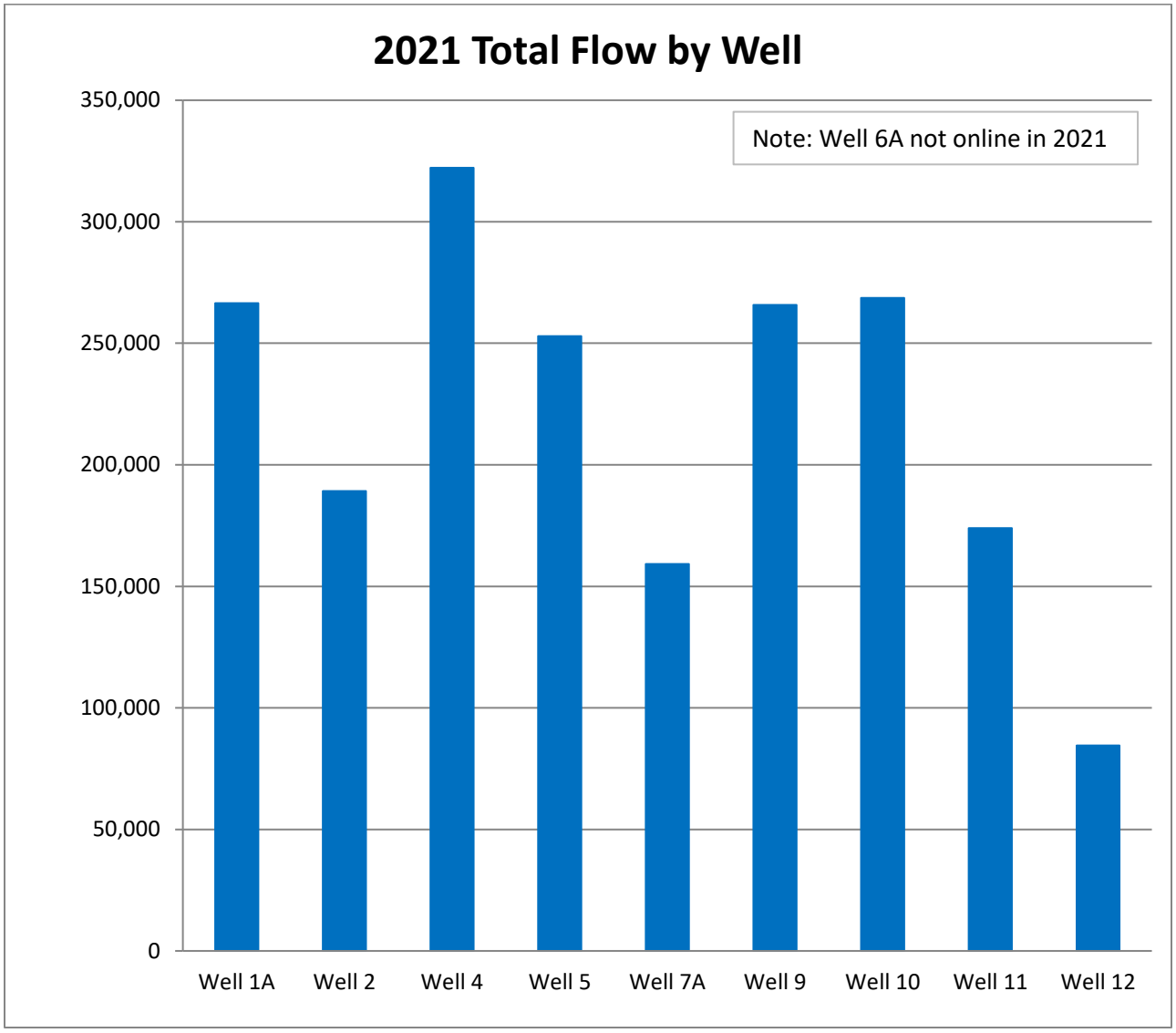
***not running in 2021, * MCPA was added in 2017*

APPENDIX B: WATER QUANTITY SUMMARY





Tillsonburg Firm Capacity 10,627 m^3/day
Tillsonburg Water Supply Capacity 15,300 m^3/day



Tillsonburg Firm Capacity 10,627 m^3/day
Tillsonburg Water Supply Capacity 15,300 m^3/day

2021 ANNUAL DRINKING WATER SYSTEM SUMMARY REPORT
Woodstock 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 publicworks@oxfordcounty.ca

Drinking Water System:	Woodstock Water System
Drinking Water System Number:	220000709
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: publicworks@oxfordcounty.ca
Reporting Period:	January 1, 2021 – December 31, 2021

1.1. System Description

The Woodstock Water System is a Large Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and serves a population of approximately 44,790. The system consists of 11 well sources, six of which are classified as GUDI (Groundwater Under Direct Influence of surface water) and five are secure groundwater wells.

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 2021, approximately 9,588 kg of chlorine gas and 3,895 L of sodium hypochlorite was used in the water treatment process.

Approximately 32,745 m^3 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 maintain pressure and monitor chlorine residual in segments of the distribution

system. Chlorine gas and sodium hypochlorite are certified to meet standards set by the Standards Council of Canada or American National Standards Institute.

1.2. Major Expenses

In 2021 the Woodstock Water System had operating and maintenance expenditures of approximately $5,200,000. Operations and maintenance expenditures included:

- $30,000 for the replacement of general operating equipment

In addition to regular operational and maintenance expenditures Capital Improvement projects for Woodstock totaled $3,780,000 for improvements to water treatment systems and replacement of distribution mains in the Woodstock System. Woodstock Capital Improvement projects included:

- $30,000 for facilities improvements
- $2,100,000 for the replacement of aging watermains
- $2,800,000 for the expansion of the water distribution system and servicing
- $400,000 for feeder main replacement study

Capital Improvement projects for all systems included:

- $720,000 develop Countywide SCADA Master Plan for all water systems
- $14,000 updated water system modeling

2. MICROBIOLOGICAL TESTING

2.1. *E. coli* and Total Coliform

Bacteriological tests for *E. coli* and total coliforms are taken weekly from the raw and treated water at the facility. 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 2021 sampling program are shown in the table below. There was one adverse test result from 1,503 treated water samples collected in this reporting period. A summary of this incident and resolution can be found in section 6.2 of this report.

	Number of Samples	*Range of E. coli Results Min - Max MAC = 0*	*Range of Total Coliform Results Min - Max MAC = 0*
Raw	572	0	0 - 9
Treated	502	0	0 - 4
Distribution	1,001	0	0 - 4

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. The 2021 results are shown in the table below.

	Number of Samples	*Range of HPC Min - Max*
Treated	207	0 - 19
Distribution	162	0 - 29

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 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 maintain 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 Woodstock Sutherland WTF averages 83.3 mg/L from samples collected in 2021. These results are reported to the MECP and MOH. All other locations had sodium levels 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 water hardness are collected at least every three years. The average hardness in the Woodstock Water System is approximately 404 mg/L (equivalent to 24 grains).

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 2021 nitrate results ranged from 4.44 to 6.73 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 WTF. In the distribution system, free chlorine is checked twice weekly at various locations. As a target, free chlorine residuals 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 2021. 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. The turbidity of untreated water from the well is checked weekly. Turbidity is measured

in nephelometric turbidity units (NTU). Under O.Reg. 170/03 turbidity in groundwater 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 2021 is provided in the table below.

Parameter & Location	*Monitoring Frequency*	*Range of Results (Min – Max) and Average*
Chlorine residual in distribution (mg/L)	Continuous	(0.48 – 3.80) 1.17
Thornton WTF after treatment		
Chlorine mg/L	Continuous	(0.94 – 1.54) 1.29
Turbidity NTU	Continuous	(0.01 – 4) 0.03
Southside WTF after treatment		
Chlorine mg/L	Continuous	(0.49 – 1.69) 1.24
Turbidity NTU	Continuous	(0.02 – 3.93) 0.05
Sutherland WTF after treatment		
Chlorine mg/L	Continuous	(0.19– 2.36) 1.13
Turbidity NTU	Continuous	(0.05 – 2.38) 0.09
Trillium Line WTF after treatment		
Chlorine mg/L	Continuous	(0.51 – 3.06) 1.27
Turbidity NTU	Continuous	(0.03 – 5) 0.06

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 2021.

5. WATER QUANTITY

Continuous monitoring of flow rates from supply wells 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 2021 flows are provided in the Table below and presented graphically in Appendix B.

Flow Summary	*Quantity*
Permit to Take Water Limit	57,775 m^3/d
Municipal Drinking Water License Limit	56,325 m^3/d
2021 Average Daily Flow	14,692 m^3/d
2021 Maximum Daily Flow	22,147 m^3/d
2021 Average Monthly Flow	446,876 m^3
2021 Total Amount of Water Supplied	5,362,512 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 m^3/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, six of which are GUDI. The GUDI wells contribute 30,772 m^3/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

The annual MECP inspection took place in September 2021. There were no non-compliance findings and the 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 two adverse or reportable occurrences in 2021. A summary of these events and their corrective actions can be found in the table below.

Incident / Date	Corrective Action	Resolution / Date
Treated Water Sample with Chemistry Exceedance		
August 24, 2021 Sodium of 73 mg/L taken at the Sutherland WTF.	Reported result and a second sample was collected for confirmation.	Re-sample result was confirmed (93.5 mg/L) September 7, 2021. The results were discussed with Southwestern Public Health who will update health advisory information for area residents.
Treated or Distribution Water Sample with Positive Test for *E. Coli* or *Total Coliform* Bacteria		
June 30, 2021 2 TC cfu/100mL in a treated distribution sample result. The free chlorine at the time the sample was 1.25 mg/L	Reported and resamples were taken.	Resample results acceptable July 2, 2021.

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 https://cvc.ca/wp-content/uploads/2011/03/std01_079707.pdf PSIB4449e01 titled "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines".

Results are shown as concentrations with units of either milligrams per litre (mg/L) or micrograms per litre (ug/L). 1 mg/L is equal to 1000 ug/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 normally required every 3 months of operation. Weekly nitrate sampling is required at the Thornton WTF.

Parameter & Location	*Result Range* Min – Max *(mg/L)*	*Average Result (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Nitrite			1.0	0.003
Thornton WTF	ND – 0.010	0.05		
Southside WTF	ND	ND		
Sutherland WTF	ND	ND		
Trillium Line WTF	ND – 0.003	0.003		
Nitrate			10.0	0.006
Thornton WTF	4.44 – 6.73	5.84		
Southside WTF	4.28 – 5.10	4.76		
Sutherland WTF	0.01 – 0.013	0.01		
Trillium Line WTF	1.97 – 2.08	2.04		

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

Parameter	*Annual Average*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Trihalomethane (THM)	2021	8.2	100	0.37
Haloacetic Acids (HAA)	2021	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.

Parameter & Location	*Sample Date*	*Result Value (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Sodium			20.0*	0.01
Thornton WTF	May 27, 2019	14.4		
Southside WTF	March 12, 2018	17.0		
Sutherland WTF	August 16, 2021 +	83.3 +		
Trillium Line WTF	August 16, 2021	16.9		
Fluoride			1.5**	0.06
Thornton WTF	May 27/19	0.27		
Southside WTF	Mar 12/18	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.

Parameter	*Result Range (Min - Max)*	*Number of Samples*	*Acceptable Level*
Distribution Alkalinity	248 – 290	8	30 – 500mg/L
Distribution pH	7.28 - 7.58	8	6.5 – 8.5
Distribution Lead 2021	0.08 – 1.32	8	10 ug/L MAC

The following Table summarizes the most recent test results for Schedule 23. Testing is required annually for GUDI wells at Thornton.

Parameter	*Result (ug/L) Thornton WTF November 22, 2021*	*MAC (ug/L)*	*MDL (ug/L)*
Antimony	ND	6	0.09
Arsenic	0.3	10	0.2
Barium	52.7	1000	0.02
Boron	14	5000	2
Cadmium	ND	5	0.003
Chromium	0.30	50	0.08
Mercury	ND	1	0.01
Selenium	0.39	5	0.04
Uranium	0.737	20	0.002

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

Parameter	*Result (ug/L) Trillium Line WTF February 19, 2019*	*Result (ug/L) Southside WTF November* 29, 2019	*Result (ug/L) Sutherland WTF June 7, 2021*	*MAC (ug/L)*	*MDL (ug/L)*
Antimony	ND	ND	ND	6	0.09
Arsenic	0.4	0.2	0.4	10	0.2
Barium	60.9	44.7	172	1000	0.02
Boron	9	41	77	5000	2
Cadmium	0.004	ND	ND	5	0.003
Chromium	ND	0.28	0.21	50	0.08
Mercury	ND	ND	ND	1	0.01
Selenium	0.16	0.26	ND	5	0.04
Uranium	1.07	0.690	0.142	20	0.002

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.

Parameter	*Result (ug/L) Thornton WTF November 22, 2021*	*MAC (ug/L)*	*MDL (ug/L)*
Alachlor	ND	5	0.02
Atrazine + N-dealkylatedmetobolites	ND	5	0.01
Azinphos-methyl	ND	20	0.05
Benzene	ND	1	0.32
Benzo(a)pyrene	ND	0.01	0.004
Bromoxynil	ND	5	0.33
Carbaryl	ND	90	0.05
Carbofuran	ND	90	0.05
Carbon Tetrachloride	ND	2	0.17
Chlorpyrifos	ND	90	0.02
Diazinon	ND	20	0.02
Dicamba	ND	120	0.20
1,2-Dichlorobenzene	ND	200	0.41
1,4-Dichlorobenzene	ND	5	0.36
1,2-Dichloroethane	ND	5	0.35
1,1-Dichloroethylene (vinylidene chloride)	ND	14	0.33
Dichloromethane	ND	50	0.35
2-4 Dichlorophenol	ND	900	0.15
2,4-Dichlorophenoxy acetic acid (2,4-D)	ND	100	0.19
Diclofop-methyl	ND	9	0.40
Dimethoate	ND	20	0.06

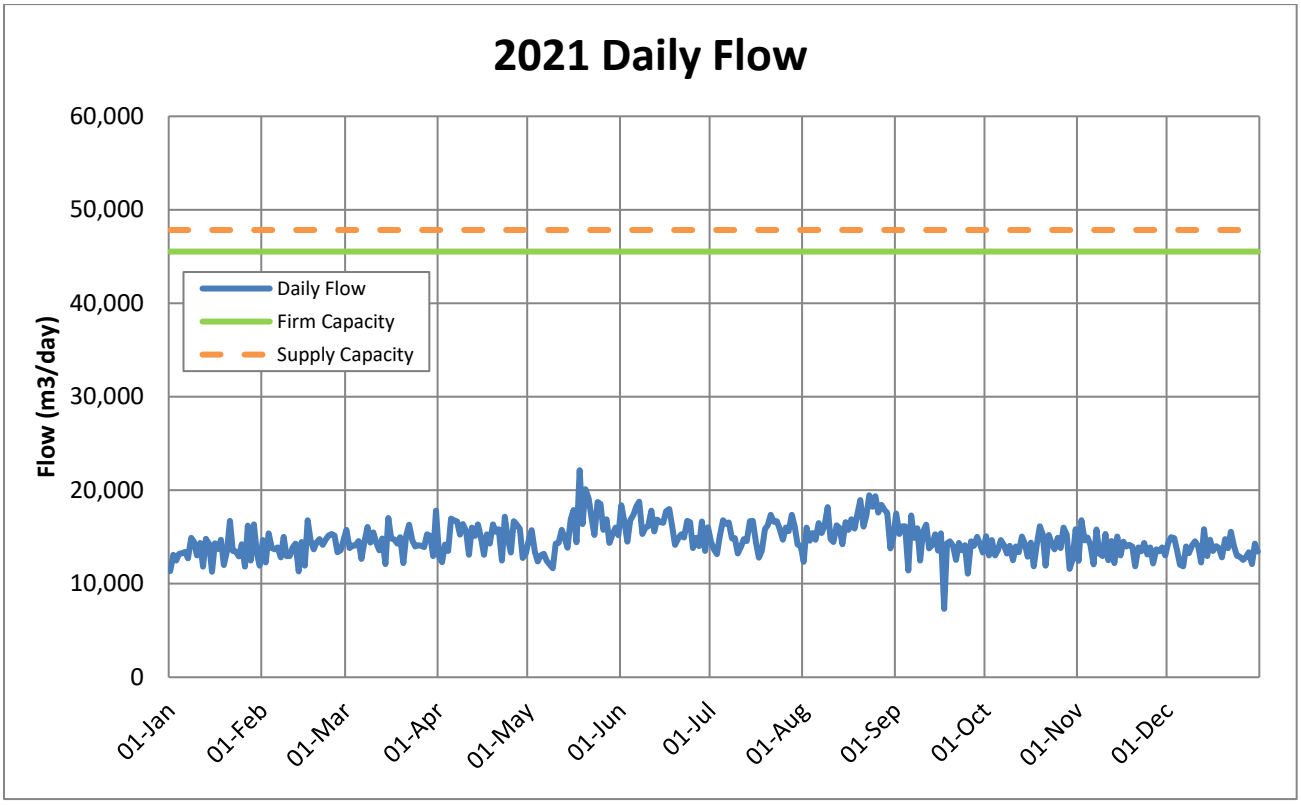
Parameter	*Result (ug/L) Thornton WTF November 22, 2021*	*MAC (ug/L)*	*MDL (ug/L)*
Diquat	ND	70	1
Diuron	ND	150	0.03
Glyphosate	ND	280	1
Malathion	ND	190	0.02
2-methyl-4chlorophenoxyacetic acid (MCPA)	ND	100	0.12
Metolachlor	ND	50	0.01
Metribuzin	ND	80	0.02
Monochlorobenzene	ND	80	0.30
Paraquat	ND	10	1
Pentachlorophenol	ND	60	0.15
Phorate	ND	2	0.01
Picloram	ND	190	1
Polychlorinated Biphenyls(PCB)	ND	3	0.04
Prometryne	ND	1	0.03
Simazine	ND	10	0.01
Terbufos	ND	1	0.01
Tetrachloroethylene	ND	10	0.35
2,3,4,6-Tetrachlorophenol	ND	100	0.20
Triallate	ND	230	0.01
Trichloroethylene	ND	5	0.44
2,4,6-Trichlorophenol	ND	5	0.25
Trifluralin	ND	45	0.02
Vinyl Chloride	ND	1	0.17

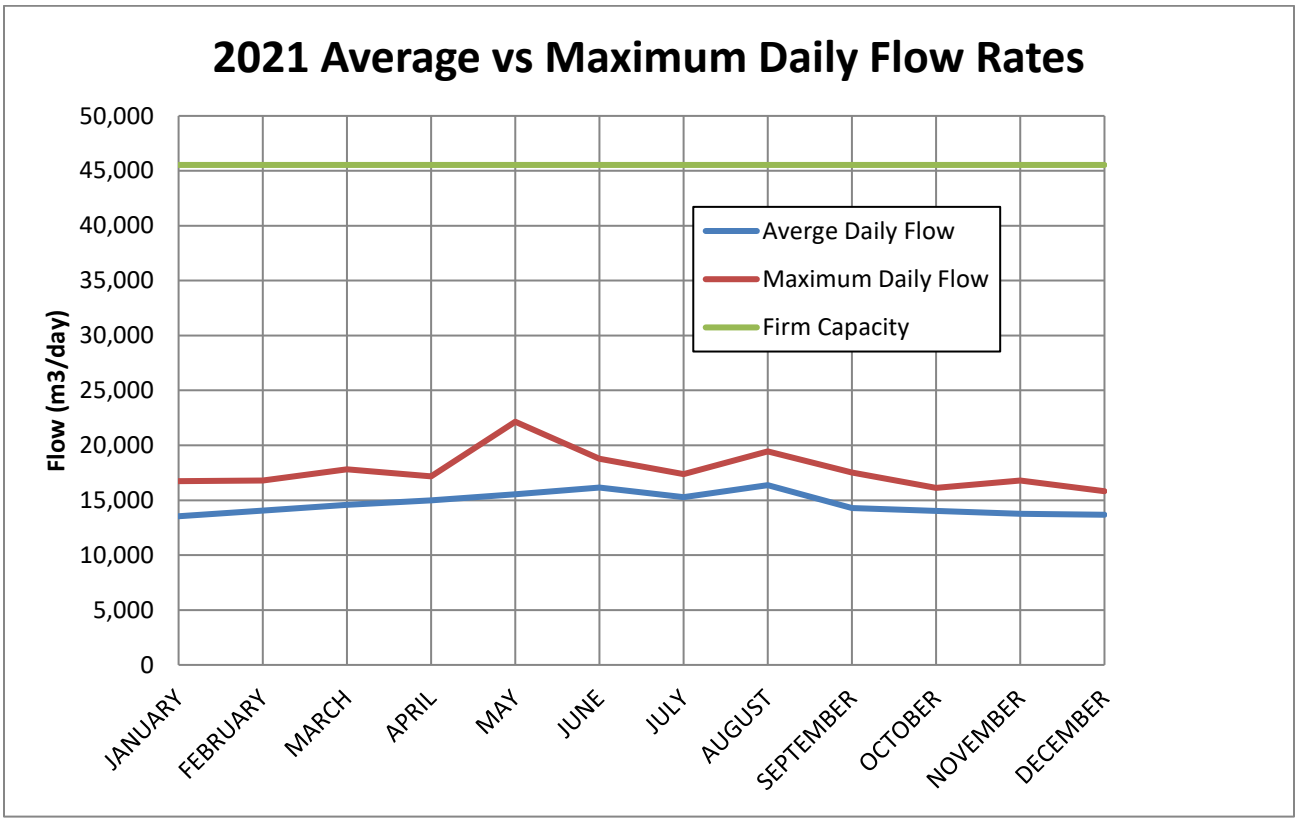
The following Table is a summary of Organic parameters in Schedule 24 sampled during this reporting period or the most recent sample results. Testing is required annually every 3 years for secure, Non-GUDI wells at Southside, Sutherland and Trillium Line.

Parameter	*Result (ug/L) Trillium Line WTF February 19, 2019*	*Result (ug/L) Southside WTF November* 29, 2019	*2019 MDL (ug/L)*	*Result (ug/L) Sutherland WTF June 7, 2021*	*2021MDL (ug/L)*	*MAC (ug/L)*
Alachlor	ND	ND	0.02	ND	0.02	5
Atrazine + N-dealkylatedmetobolites	ND	ND	0.01	ND	0.01	5
Azinphos-methyl	ND	ND	0.02	ND	0.05	20
Benzene	ND	ND	0.32	ND	0.32	1
Benzo(a)pyrene	ND	ND	0.004	ND	0.004	0.01
Bromoxynil	ND	ND	0.33	ND	0.33	5
Carbaryl	ND	ND	0.01	ND	0.05	90
Carbofuran	ND	ND	0.01	ND	0.01	90
Carbon Tetrachloride	ND	ND	0.16	ND	0.17	2
Chlorpyrifos	ND	ND	0.02	ND	0.02	90
Diazinon	ND	ND	0.02	ND	0.02	20
Dicamba	ND	ND	0.20	ND	0.20	120
1,2-Dichlorobenzene	ND	ND	0.41	ND	0.41	200
1,4-Dichlorobenzene	ND	ND	0.36	ND	0.36	5
1,2-Dichloroethane	ND	ND	0.35	ND	0.35	5
1,1-Dichloroethylene (vinylidene chloride)	ND	ND	0.33	ND	0.33	14
Dichloromethane	ND	ND	0.35	ND	0.35	50
2-4 Dichlorophenol	ND	ND	0.15	ND	0.15	900
2,4-Dichlorophenoxy acetic acid (2,4-D)	ND	ND	0.19	ND	0.19	100
Diclofop-methyl	ND	ND	**0.40**	ND	0.40	9
Dimethoate	ND	ND	0.03	ND	0.06	20
Diquat	ND	ND	1	ND	1	70
Diuron	ND	ND	0.03	ND	0.3	150

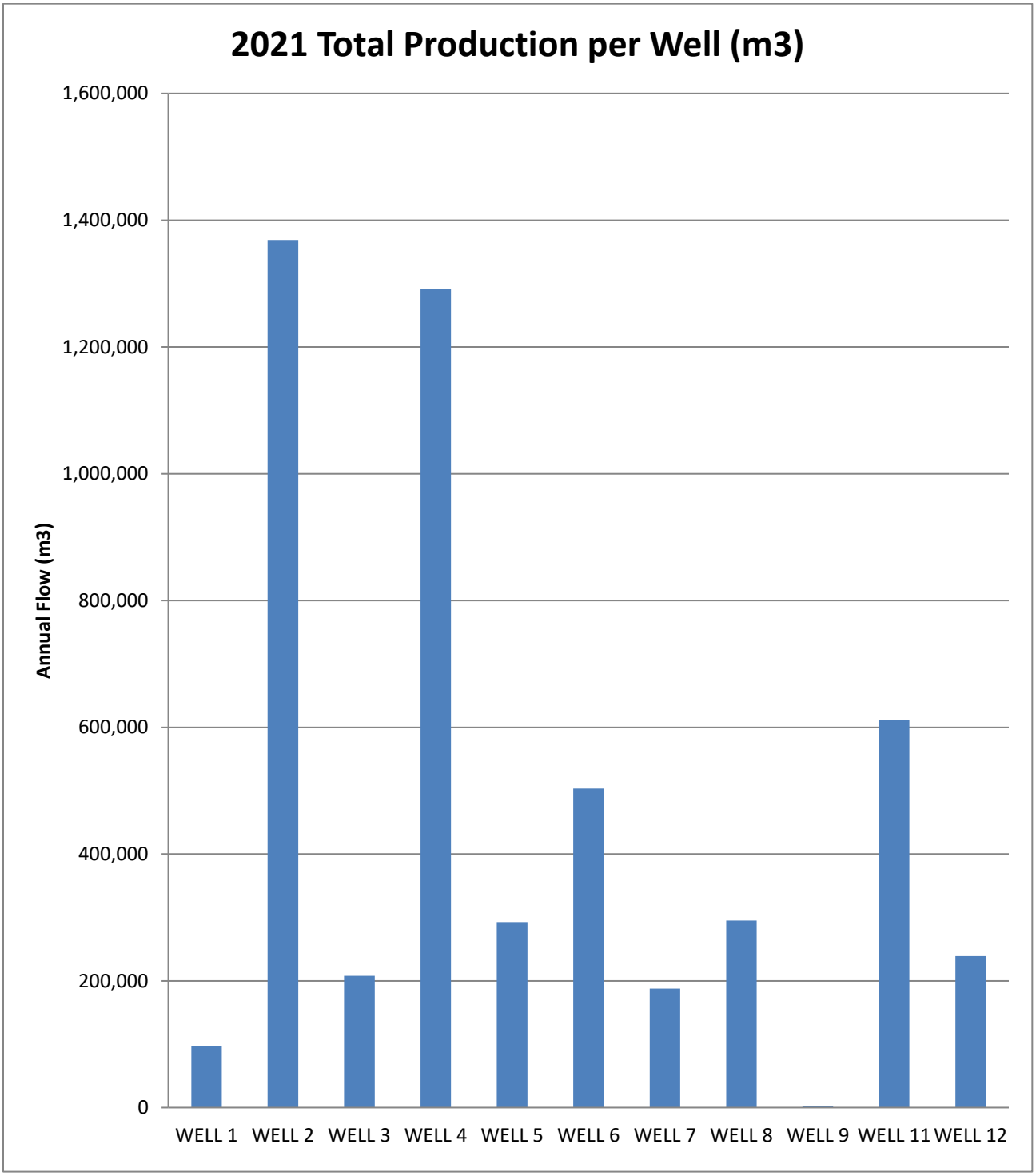
Parameter	*Result (ug/L) Trillium Line WTF February 19, 2019*	*Result (ug/L) Southside WTF November* 29, 2019	*2019 MDL (ug/L)*	*Result (ug/L) Sutherland WTF June 7, 2021*	*2021MDL (ug/L)*	*MAC (ug/L)*
Glyphosate	ND	ND	1	ND	1	280
Malathion	ND	ND	0.02	ND	0.02	190
2-methyl-4chlorophenoxyacetic acid (MCPA)	ND	ND	0.12	ND	0.12	100
Metolachlor	ND	ND	0.01	ND	0.01	50
Metribuzin	ND	ND	0.02	ND	0.02	80
Monochlorobenzene	ND	ND	0.30	ND	0.30	80
Paraquat	ND	ND	1	ND	1	10
Pentachlorophenol	ND	ND	0.15	ND	0.15	60
Phorate	ND	ND	0.01	ND	0.01	2
Picloram	ND	ND	1	ND	1	190
Polychlorinated Biphenyls(PCB)	ND	ND	0.04	ND	0.04	3
Prometryne	ND	ND	0.03	ND	0.03	1
Simazine	ND	ND	0.01	ND	0.01	10
Terbufos	ND	ND	0.01	ND	0.01	1
Tetrachloroethylene	ND	ND	0.35	ND	0.35	10
2,3,4,6-Tetrachlorophenol	ND	ND	0.14	ND	0.20	100
Triallate	ND	ND	0.01	ND	0.01	230
Trichloroethylene	ND	ND	0.44	0.85	0.44	5
2,4,6-Trichlorophenol	ND	ND	0.14	ND	0.25	5
Trifluralin	ND	ND	0.02	ND	0.02	45
Vinyl Chloride	ND	ND	0.17	ND	0.17	1

APPENDIX B: WATER QUANTITY SUMMARY





Woodstock Firm Capacity 45,533 m^3/day
Woodstock Water Supply Capacity 47,842 m^3 /day



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