REVISED APRIL 2021
2020 ANNUAL DRINKING WATER SYSTEM SUMMARY REPORT
Ingersoll 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:	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, 2020 – December 31, 2020

1.1. System Description

The Ingersoll Water System is a Large Municipal Water system as defined by Regulation 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 2020)
Dunn's Road WTF – Well 8
Thompson Road WTF – Well 10
Wallace Line WTF – Well 11 (Not operational in 2020)

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 2020, approximately 198,501 litres of sodium hypochlorite (liquid chlorine) and 1,020 kg of chlorine gas 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.

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 2020 the Ingersoll Water System had forecasted operating and maintenance expenditures of approximately $1,300,000. Capital Improvement projects included:

- $53,000 for improvements to water facilities
- $20,000 for copper corrosion control study
- $760,000 Town Projects (reconstruction and repairs)
- $25,000 for consulting for tower repair & painting

Capital Improvement projects for all systems included:

- $280,000 to develop Countywide SCADA Master Plan for all water systems
- $50,000 Updated Water Modelling
- $10,000 Asset Management valuation for all treatment, pumping and storage facilities
- $75,000 Two mobile generators
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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 2020 sampling program are shown in the table below. There were no adverse test result from 497 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	188	0	0
Treated	194	0	0
Distribution	303	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. 2020 results are shown in the table below.

	Number of Samples	*Range of HPC Min - Max*
Treated	193	0 - 9
Distribution	114	0 – 5

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 52 mg/L (ranging from 45 to 61 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

Oxford County does not add fluoride to the water at any of its drinking water systems however the Ingersoll system has naturally occurring fluoride levels averaging 1.6 mg/L (ranging from 0.8 to 2.1 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. The Hardness in the system is 277 mg/L (equivalent to 19 grains/gallon).

3.4. Additional Testing Required by MECP

Additional testing for Sulfides is required for the Ingersoll Water System. 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	Offline	-	-	0.05	0.006
Sulfides – Hamilton Rd	Dec 7, 2020	ND	ND	0.05	0.006
Sulfides – Canterbury St	Dec 7, 2020	0.03	ND	0.05	0.006
Sulfides – Dunn's Rd	Jan 13, 2020	2.07	ND	0.05	0.006
Sulfides – Thompson Rd	Dec 7, 2020	0.13	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 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 2020 is provided in the table below.

Parameter	*Monitoring Frequency*	*Range of Results (Min – Max) and Average*
Chlorine Residual in Distribution (mg/L)	Continuous	(0.38 – 2.04) 0.98
Chlorine – Merritt St. WTF (mg/L)	Continuous	(0.23 – 3.41) 0.85
Chlorine – Hamilton Rd. WTF (mg/L)	Continuous	(0.46 – 2.44) 1.32
Chlorine – Canterbury St. WTF (mg/L)	Continuous	(0.64 – 2.58) 1.33
Chlorine – Dunn's Rd. WTF (mg/L)	Continuous	(0.35 – 2.57) 1.10
Chlorine – Thompson Rd. WTF (mg/L)	Continuous	(0.92 – 2.29) 1.48
Turbidity – Merritt St. WTF (NTU)	Continuous	(0.08 – 5.52) 0.39
Turbidity – Hamilton Rd. WTF (NTU)	Continuous	(0.04 – 2.54) 0.12
Turbidity – Canterbury St. WTF (NTU)	Continuous	(0.04 – 3.62) 0.11
Turbidity – Dunn's Rd. WTF (NTU)	Continuous	(0.07 – 4.73) 1.83
Turbidity – Thompson Rd. WTF (NTU)	Continuous	(0.04 – 0.44) 0.08

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 Regulation 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 2020 flows are provided in the Table below and presented graphically in Appendix B.

Flow Summary	*Quantity*
Permit to Take Water Limit	26,367 m^3/d
Municipal Drinking Water License Limit	26,512 m^3/d
2020 Average Daily Flow	4,786 m^3/d
2020 Maximum Daily Flow	6,816 m^3/d
2020 Average Monthly Flow	145,199 m^3
2020 Total Amount of Water Supplied	1,742,393 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.

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 2020 MECP annual inspection took place in February 2021. Due to Covid-19 restrictions the field inspection was not conducted until March 2021. There were no non-compliance findings and the 2020 Inspection Report rating was 100%.

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. Below is a summary of the adverse/reportable occurrences for 2020 along with the corresponding resolution.

Incident/Date	*Corrective Action*	*Resolution/Date*
Low Chlorine Residual in Distribution System		
January 10, 2020	Report, flush and retest	Acceptable chlorine residual restored January 10, 2020

APPENDIX A: SUMMARY OF CHEMICAL RESULTS

UNDERSTANDING CHEMICAL TEST RESULTS

The following tables summarize the laboratory results of the chemical testing Oxford 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.

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.	Offline	Offline	1.0	0.003
Hamilton Rd.	ND	ND	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.	Offline	Offline	10.0	0.006
Hamilton Rd.	0.008 – 0.009	0.009	10.0	0.006
Canterbury St.	0.008 – 0.014	0.010	10.0	0.006
Dunn's Rd.	ND – 0.008	0.007	10.0	0.006
Thompson Rd.	ND – 0.090	0.027	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)	2020	21	100	0.37
Haloacetic Acids (HAA)	2020	6.6	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 & 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	219 – 250	8	30 – 500mg/L
Distribution pH	7.4 – 7.6	8	6.5 – 8.5
Distribution Lead 2018	0.04 – 3.25	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) June 4, 2018*	***Well 3*** *Result Value (ug/L) June 4, 2018*	***Well 5*** *Result Value (ug/L) June 4,2018*	*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 4, 2018*	***Well 10*** *Result Value (ug/L) June 4, 2018*	*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