2022 Annual Drinking Water System Summary Report

Ingersoll Drinking Water System

1. GENERAL INFORMATION

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

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

Drinking Water System:	Ingersoll Drinking Water System
Drinking Water System Number:	220000692
Reporting Period:	January 1, 2022 – December 31, 2022

Drinking Water System Owner & Contact Information:

Oxford County Public Works Department - Water Services
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1.1 System Description

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

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

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

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

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

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

1.2 Major Expenses

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

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

Town of Ingersoll capital improvement projects included:

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

Capital Improvement projects for all County systems included:

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

2. MICROBIOLOGICAL TESTING

2.1 E. coli and Total Coliform

Bacteriological tests for *E. coli* and total coliforms are required weekly from the raw and treated water at the facility and from the distribution system. Extra samples are taken after major repairs or maintenance work. Any *E. coli* or total coliform results above 0 in treated water sample must be reported to the Ministry of Environment, Conservation and Parks (MECP) and Medical Officer of Health (MOH). Resamples and any other required actions are taken as quickly as possible. There was one adverse test result from 580 treated water samples taken in 2022. The corrective for which is summarized in section 6.2. The results from the 2022 sampling program are shown on the table below.

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

2.2 Heterotrophic Plate Count (HPC)

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

	Number of Samples	*Range of HPC Min - Max*
Treated	**260**	**0 - 21**
Distribution	**67**	**0 -13**

3. CHEMICAL TESTING

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

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

3.1 Sodium

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

When sodium levels are above 20 mg/L the MECP and MOH are notified. Southwestern Public Health maintains an information page on sodium in drinking water at https://www.swpublichealth.ca/en/partners-and-professionals/resources/Health-Care-Providers/Alerts-Advisories-Updates/Advisories/ADV_HIA-Sodium-20201203.pdf in order to help people on sodium restricted diets control their sodium intake. The average sodium level in the water is 59 mg/L (ranging from 31 to 91 mg/L) and the test results for each treatment facility are provided in Appendix A.

3.2 Fluoride

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

The County does not add fluoride to the water at any of its drinking water systems. The Ingersoll system has naturally occurring fluoride levels averaging 1.8 mg/L (ranging from 0.8 to 2.4 mg/L). The test results for each treatment facility are provided in Appendix A.

3.3 Hardness

This is an aesthetic parameter that may affect the appearance of the water but is not related to health. Well water commonly has high levels of hardness and other minerals from being in contact with underground rock formations. Many households have water softeners to help reduce white calcium deposits and improve the efficiency of soaps. This information is included here to help set the water softener at the level recommended by the manufacturer. Samples for hardness are collected at a minimum every 3 years from raw water. Raw water hardness for the Ingersoll Drinking Water System was tested in 2022 and ranged from 355 - 495 mg/L (21 – 30 grains/gallon). Water in the Ingersoll System is considered very hard (>180 mg/L).

3.4 Additional Testing Required by MECP

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

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

4. OPERATIONAL MONITORING

4.1 Chlorine Residual

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

4.2 Turbidity

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

Parameter	*Number of Tests or Monitoring Frequency*	*Range of Results (Min – Max) and Average*
Merritt St. WTF, Well 2		
Chlorine residual after treatment (mg/L)	Continuous	(0.54 – 2.64) 1.28
Turbidity before treatment (NTU)	52	(0.13 – 0.78) 0.35
Turbidity after treatment (NTU)	Continuous	(0.07 – 6.78) 0.48
Hamilton Rd. WTF, Well 3		
Chlorine residual after treatment (mg/L)	Continuous	(0.39 – 2.45) 1.38
Turbidity before treatment (NTU)	52	(0.10 – 1.26) 0.41
Turbidity after treatment (NTU)	Continuous	(0.04 – 4.00) 0.17
Canterbury St. WTF, Well 5		
Chlorine residual after treatment (mg/L)	Continuous	(0.74 – 3.54) 1.46
Turbidity before treatment (NTU)	52	(0.08 – 2.10) 0.75
Turbidity after treatment (NTU)	Continuous	(0.04 – 2.83) 0.10
West St. WTF, Well 7		
WTF not operational in 2022	Offline	Offline
Dunn's Rd. WTF, Well 8		
Chlorine residual after treatment (mg/L)	Continuous	(0.66 – 2.08) 1.35
Turbidity before treatment (NTU)	52	(0.13 – 1.45) 0.46
Turbidity after treatment (NTU)	Continuous	(0.04 – 2.98) 0.08
Thompson Rd. WTF, Well 10		
Chlorine residual after treatment (mg/L)	Continuous	(0.79 – 2.91) 1.51

Parameter	*Number of Tests or Monitoring Frequency*	*Range of Results (Min – Max) and Average*
Turbidity before treatment (NTU)	52	(0.13 – 0.74) 0.26
Turbidity after treatment (NTU)	Continuous	(0.04 – 3.58) 0.14
Wallace Line WTF, Well 11		
WTF not operational in 2022	Offline	Offline
Distribution System		
Chlorine residual in distribution (mg/L)	Continuous	(0.25 - 2.61) 1.11

5. WATER QUANTITY

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

Flow Summary	*Municipal Drinking Water Licence (m^3/day)*	*2022 Max Daily Flow (m^3/day)*	*2022 Average Daily Flow (m^3/day)*	*2022 Average Monthly Flow (m^3/month)*	*2022 Total Yearly Flow (m^3/year)*
Merritt WTF	2,946	2,228	734	22,331	267,967
Dunn's Rd. WTF	3,273	1,639	634	19,282	231,384
Canterbury St. WTF	3,273	1,925	800	24,335	292,020
West St. WTF	4,582	0	0	0	0
Hamilton WTF	3,283	1,712	685	20,848	250,179
Thompson Rd. WTF	4,582	2,405	1,306	39,736	476,828
Wallace Ln. WTF	4,582	0	0	0	0
Ingersoll DWS*	**26,521**	**5,944**	**4,160**	**126,532**	**1,518,378**

*DWS stands for Drinking Water System

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 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 seven supply wells with only five active wells. Wells 2, 3, 5 and 8 were used to calculate Firm Capacity.

6. NON-COMPLIANCE FINDINGS AND ADVERSE RESULTS

This section documents any known incidents of non-compliance or adverse results and the associated correction actions taken to resolve the issue. Non-compliance issues are typically identified by either the Operating Authority or the MECP Drinking Water

Inspectors. The issues and associated required actions are documented by the Inspectors in the system's Annual Inspection Report. All non-compliance issues are investigated, corrective actions taken and documented using the County's Drinking Water Quality Management System (DWQMS) procedures.

6.1 Non-Compliance Findings

The annual MECP inspection took place in November 2022. At the time this report was written the inspection report findings and rating were not available.

6.2 Adverse Results

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

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

APPENDIX A: SUMMARY OF CHEMICAL RESULTS

UNDERSTANDING CHEMICAL TEST RESULTS

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

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

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

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

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

Parameter	*Annual Average*	*Result Value (µg/L)*	*MAC (µg/L)*	*MDL (µg/L)*
Trihalomethane (THM)	2022	20.0	100	0.37
Haloacetic Acids (HAA)	2022	5.2	80	5.3

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

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

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

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

Parameter	*Result Range (Min - Max)*	*Number of Samples*	*Acceptable Level*
Distribution Alkalinity 2022	203 – 243	8	30 – 500mg/L
Distribution pH 2022	7.06 – 7.74	8	6.5 – 8.5
Distribution Lead 2021	ND – 0.57	8	10 µg/L MAC

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

Parameter	*Result Value (µg/L)*					*MAC (µg/L)*	*MDL (µg/L)*
	Merritt St. WTF May 30, 2022	*Hamilton Rd. WTF May 30, 2022*	*Canterbury St. WTF May 30, 2022*	*Dunn's Rd. WTF May 30, 2022*	*Thompson Rd. WTF May 30, 2022*		
Antimony	ND	ND	ND	ND	ND	6	0.6
Arsenic	ND	ND	0.3	ND	ND	10	0.2
Barium	45.3	114	67.4	25.8	71.8	1000	0.02
Boron	124	93	75	167	104	5000	2
Cadmium	ND	ND	ND	ND	ND	5	0.003
Chromium	0.14	0.17	0.17	0.26	0.15	50	0.08
Mercury	ND	ND	ND	ND	ND	1	0.01
Selenium	ND	ND	ND	ND	ND	50	0.04
Uranium	0.047	0.078	0.384	0.029	0.142	20	0.002

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

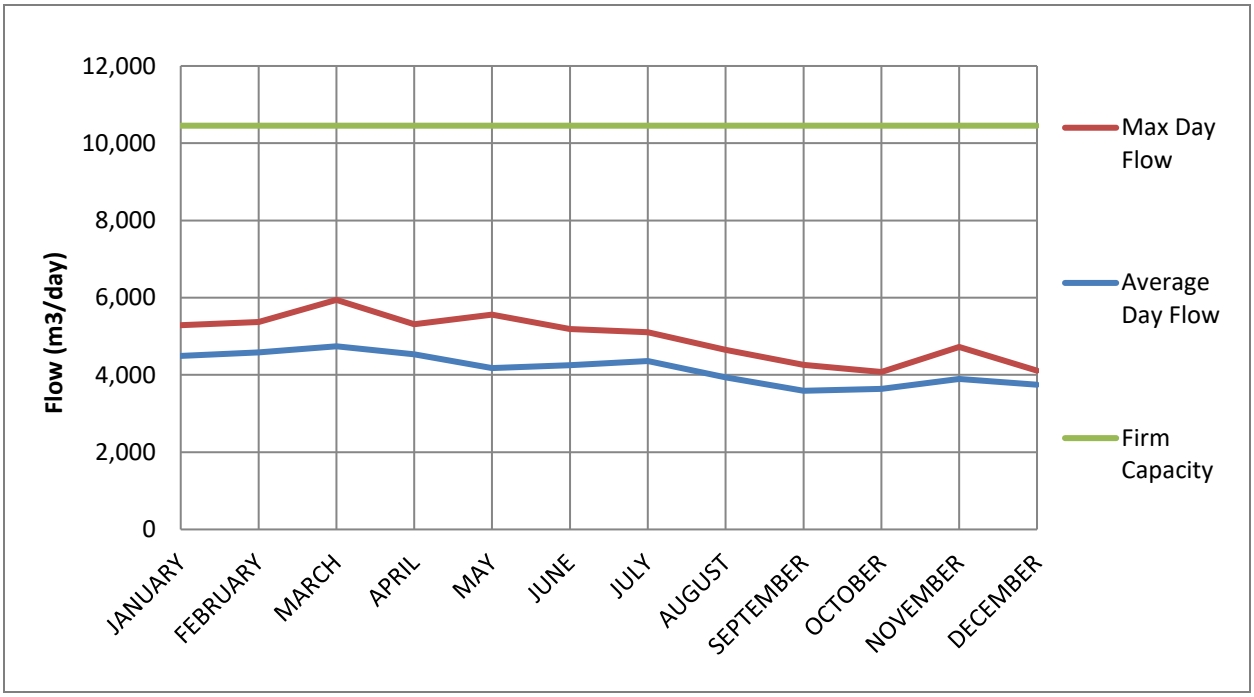
Parameter	*Result Value (µg/L)*					*MAC (µg/L)*	*MDL (µg/L)*
	Merritt St. WTF Aug. 16, 2021	*Hamilton Rd. WTF June 7, 2021*	*Canterbury St. WTF* May 20, 2021	*Dunn's Rd WTF* June 7, 2021	*Thompson Rd WTF* June 7, 2021		
Alachlor	ND	ND	ND	ND	ND	5	0.02
Atrazine + N-dealkylatedmetobolites	ND	ND	ND	ND	ND	5	0.01
Azinphos-methyl	ND	ND	ND	ND	..ND	20	0.05
Benzene	ND	ND	ND	ND	ND	1	0.32
Benzo(a)pyrene	ND	ND	ND	ND	ND	0.01	0.004
Bromoxynil	ND	ND	ND	ND	ND	5	0.33
Carbaryl	ND	ND	ND	ND	ND	90	0.05
Carbofuran	ND	ND	ND	ND	ND	90	0.01
Carbon Tetrachloride	ND	ND	ND	ND	ND	2	0.17
Chlorpyrifos	ND	ND	ND	ND	ND	90	0.02
Chlorpyrifos	ND	ND	ND	ND	ND	90	0.02
Diazinon	ND	ND	ND	ND	ND	20	0.02
Dicamba	ND	ND	ND	ND	ND	120	0.20
1,2-Dichlorobenzene	ND	ND	ND	ND	ND	200	0.41
1,4-Dichlorobenzene	ND	ND	ND	ND	ND	5	0.36
1,2-Dichloroethane	ND	ND	ND	ND	ND	5	0.35
1,1-Dichloroethylene (vinylidene chloride)	ND	ND	ND	ND	ND	14	0.33
Dichloromethane	ND	ND	ND	ND	ND	50	0.35
2-4 Dichlorophenol	ND	ND	ND	ND	ND	900	0.15
2,4-Dichlorophenoxy acetic acid (2,4-D)	ND	ND	ND	ND	ND	100	0.19
Diclofop-methyl	ND	ND	ND	ND	ND	9	0.40
Dimethoate	ND	ND	ND	ND	ND	20	0.06
Diquat	ND	ND	ND	ND	ND	70	1
Diuron	ND	ND	ND	ND	ND	150	0.03
Glyphosate	ND	ND	ND	ND	ND	280	1
Malathion	ND	ND	ND	ND	ND	190	0.02
2-methyl-4chlorophenoxyacetic acid (MCPA)	ND	ND	ND	ND	ND	100	0.12
Metolachlor	ND	ND	ND	ND	ND	50	0.01
Metribuzin	ND	ND	ND	ND	ND	80	0.02
Monochlorobenzene	ND	ND	ND	ND	ND	80	0.30
Paraquat	ND	ND	ND	ND	ND	10	1
Pentachlorophenol	ND	ND	ND	ND	ND	60	0.15
Phorate	ND	ND	ND	ND	ND	2	0.01
Picloram	ND	ND	ND	ND	ND	190	1
Polychlorinated Biphenyls(PCB)	ND	ND	ND	ND	ND	3	0.04
Prometryne	ND	ND	ND	ND	ND	1	0.03
Simazine	ND	ND	ND	ND	ND	10	0.01
Terbufos	ND	ND	ND	ND	ND	1	0.01
Tetrachloroethylene	ND	ND	ND	ND	ND	10	0.35

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

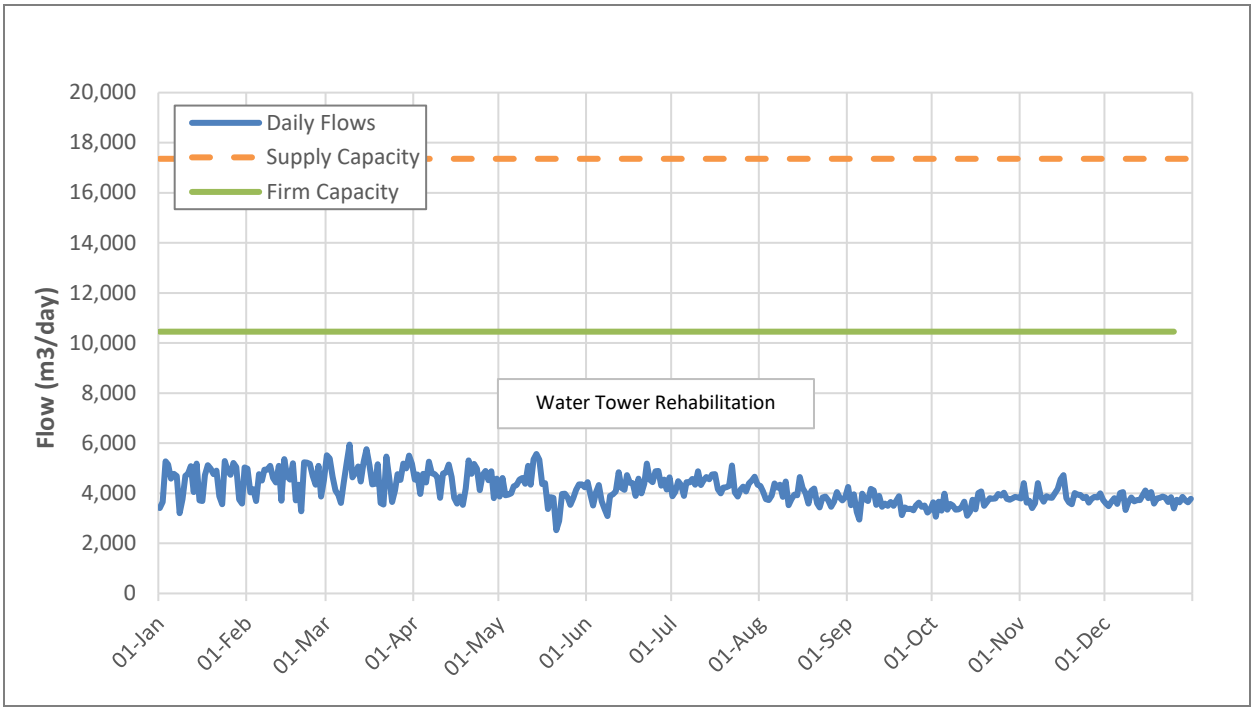
APPENDIX B: WATER QUANTITY SUMMARY

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

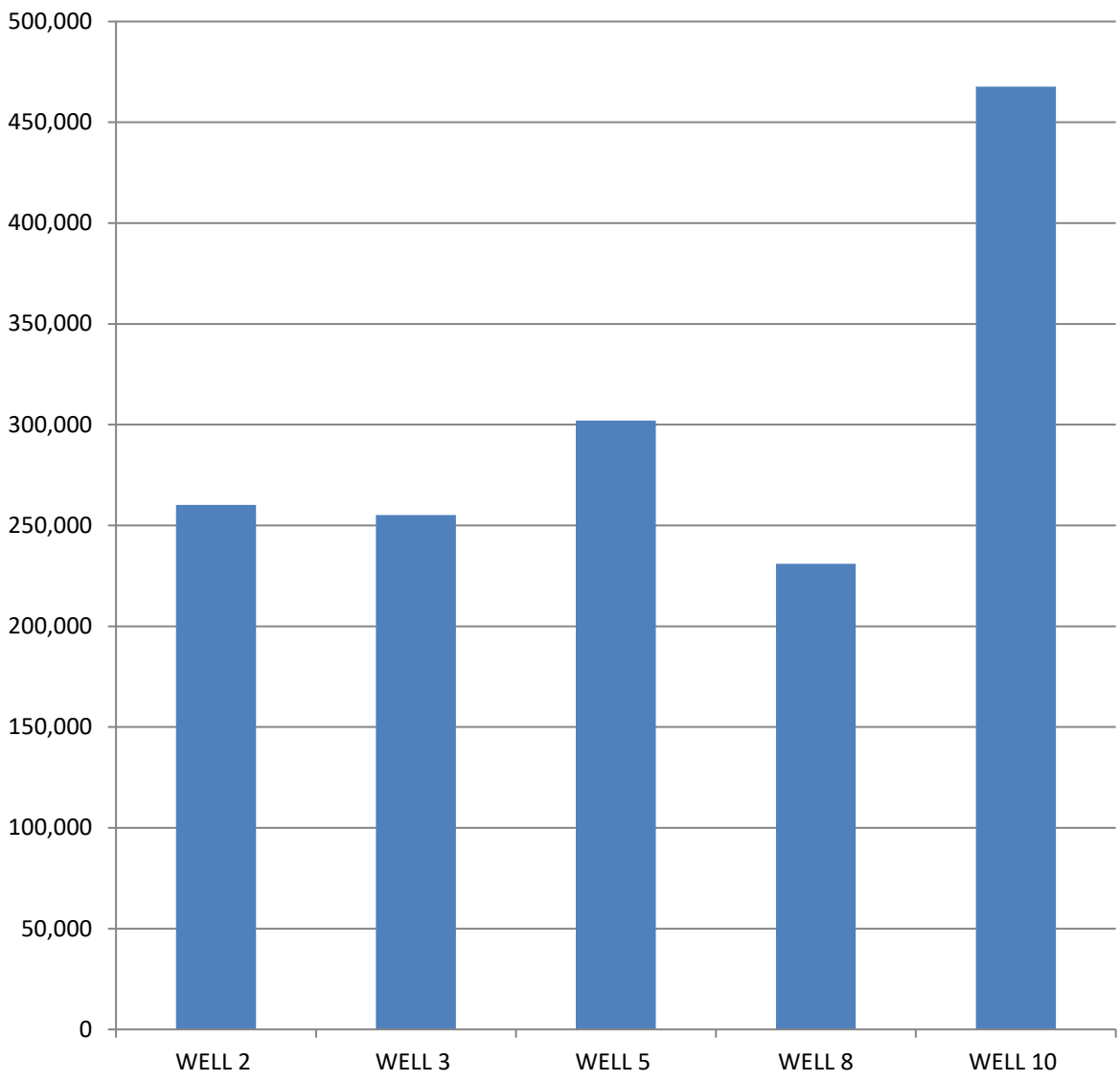
2022 Average vs Maximum Daily Flow Rates



2022 Daily Flow



2022 Total Production by Well



Note: Well 7 and Well 11 were not used in 2022.