



2022 Annual Drinking Water System Summary Report

Oxford South Drinking Water System

1. GENERAL INFORMATION

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

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

Drinking Water System:	Oxford South Drinking Water System
Drinking Water System Number:	220000601
Reporting Period:	January 1, 2022 – December 31, 2022

Drinking Water System Owner & Contact Information:

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1.1 System Description

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

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

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

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

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

Standby generators are available at Norwich Pitcher Street and Otterville to run the facilities in the event of a power failure. The system is maintained by licensed water system operators, who operate treatment and monitoring equipment and collect samples as specified by the Regulation. Alarms automatically notify operators in the event of failure of critical operational requirements.

1.2 Major Expenses

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

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

Township Capital Improvement Projects included:

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

Capital Improvement projects for all systems included:

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

2. MICROBIOLOGICAL TESTING

2.1 E. coli and Total Coliform

Bacteriological tests for *E. coli* and total coliforms are required weekly from the raw and treated water at the facility and from the distribution system. Extra samples are taken after major repairs or maintenance work. Any *E. coli* or total coliform results above 0 in treated water sample must be reported to the Ministry of Environment, Conservation and Parks (MECP) and Medical Officer of Health (MOH). Resamples and any other required actions are taken as quickly as possible. The results from the 2022 sampling program are shown on the table below. There were no adverse test results from the 500 treated water samples in this reporting period.

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

2.2 Heterotrophic Plate Count (HPC)

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

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

3. CHEMICAL TESTING

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

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

3.1 Sodium

When sodium levels are above 20 mg/L the MECP and MOH are notified. Southwestern Public Health maintains an information page on sodium in drinking water at https://www.swpublichealth.ca/en/partners-and-professionals/resources/Health-Care-Providers/Alerts-Advisories-Updates/Advisories/ADV_HIA-Sodium-20201203.pdf in order to help people on sodium restricted diets control their sodium intake. The sodium levels in the Oxford South drinking water system range from 17.9 to 52.5 mg/L.

3.2 Fluoride

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

The County does not add fluoride to the water at any of its drinking water systems. The Springford Water Treatment facility has naturally occurring fluoride levels that average 1.57 mg/L.

3.3 Hardness, Iron, and Manganese

These are aesthetic parameters that may affect the appearance of the water but is not related to health. Well water commonly has high levels of hardness and other minerals from being in contact with underground rock formations. Many households have water softeners to help reduce white calcium deposits and improve the efficiency of soaps. This information is included here to help set the water softener at the level recommended by the manufacturer. Samples for hardness are collected at a minimum

every 3 years from raw or treated water. The hardness for the Oxford South system was tested in 2022, the Oxford South system hardness depends on the wells being used.

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

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

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

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

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

3.4 Additional Testing Required by MECP

None.

4. OPERATIONAL MONITORING

4.1 Chlorine Residual

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

4.2 Turbidity

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

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

5. WATER QUANTITY

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

<i>Flow Summary</i>	<i>Municipal Drinking Water Licence (m³/day)</i>	<i>2022 Max Daily Flow (m³/day)</i>	<i>2022 Average Daily Flow (m³/day)</i>	<i>2022 Average Monthly Flow (m³/month)</i>	<i>2022 Total Yearly Flow (m³/year)</i>
Springford WTF	518	56	18	535	6,416
Otterville WTF	1,310	787	296	9,011	108,128
Norwich Main St. WTF	2,291	721	224	6,800	81,596
Norwich Pitcher St. WTF	2,454	1,744	723	21,977	263,727
Oxford South DWS*	6,573	2,686	1,260	38,322	459,867

**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 2,454 m³/day. Firm Capacity is defined as the removal of the highest producing well in an emergency or operational / maintenance situation with the ability to transport a maximum of 100 m³/day if necessary to maintain system integrity. This system comprises of seven supply wells with only three active in the Village of Norwich. Wells located in Otterville and Springford are currently operational at this time however are not used in the firm capacity rating as their supply remains unreliable due to elevated nitrate levels (Otterville wells) and water quantity issues (Springford wells).

6. NON-COMPLIANCE FINDINGS AND ADVERSE RESULTS

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

6.1 Non-Compliance Findings

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

6.2 Adverse Results

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

- Springford - A treated water sample for fluoride had a concentration of 1.57 mg/L. Although drinking water is considered safe for consumption at fluoride levels up

to 2.4 mg/L, levels greater than 1.5 mg/L are required to be reported to the MECP and MOH. A confirmatory resample was taken and also had fluoride concentration of 1.57 mg/L. While Oxford County does not add fluoride to its municipal drinking water, naturally occurring levels of Fluoride are common in groundwater sources.

APPENDIX A: SUMMARY OF CHEMICAL RESULTS

UNDERSTANDING CHEMICAL TEST RESULTS

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

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

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

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

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

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

<i>Parameter</i>	<i>Annual Average</i>	<i>Result Value (µg/L)</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Trihalomethane (THM)	2022	16	100	0.37
Haloacetic Acids (HAA)	2022	ND	80	5.3

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

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

*Sodium levels between 20 – 200 mg/L must be reported every 5 years.

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

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

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

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

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

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

*Annual average of all samples collected in 2022

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

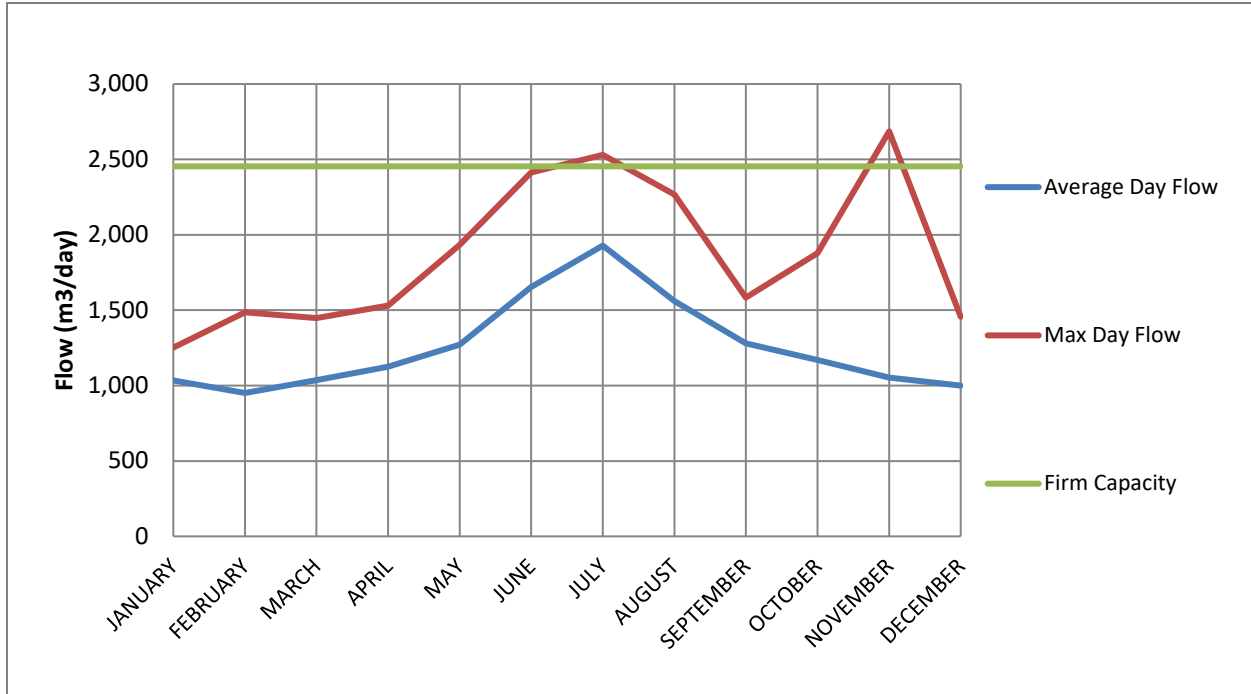
<i>Parameter</i>	<i>Results (µg/L) Norwich Pitcher St. Dec. 7, 2020</i>	<i>Results (µg/L) Norwich Main St. Dec. 7, 2020</i>	<i>Results (µg/L) Otterville WTF June 7, 2021</i>	<i>Results (µg/L) Springford WTF July 6, 2020</i>	<i>MAC (µg/L)</i>	<i>MDL (µg/L)</i>
Alachlor	ND	ND	ND	ND	5	0.02
Atrazine + N-dealkylated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

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

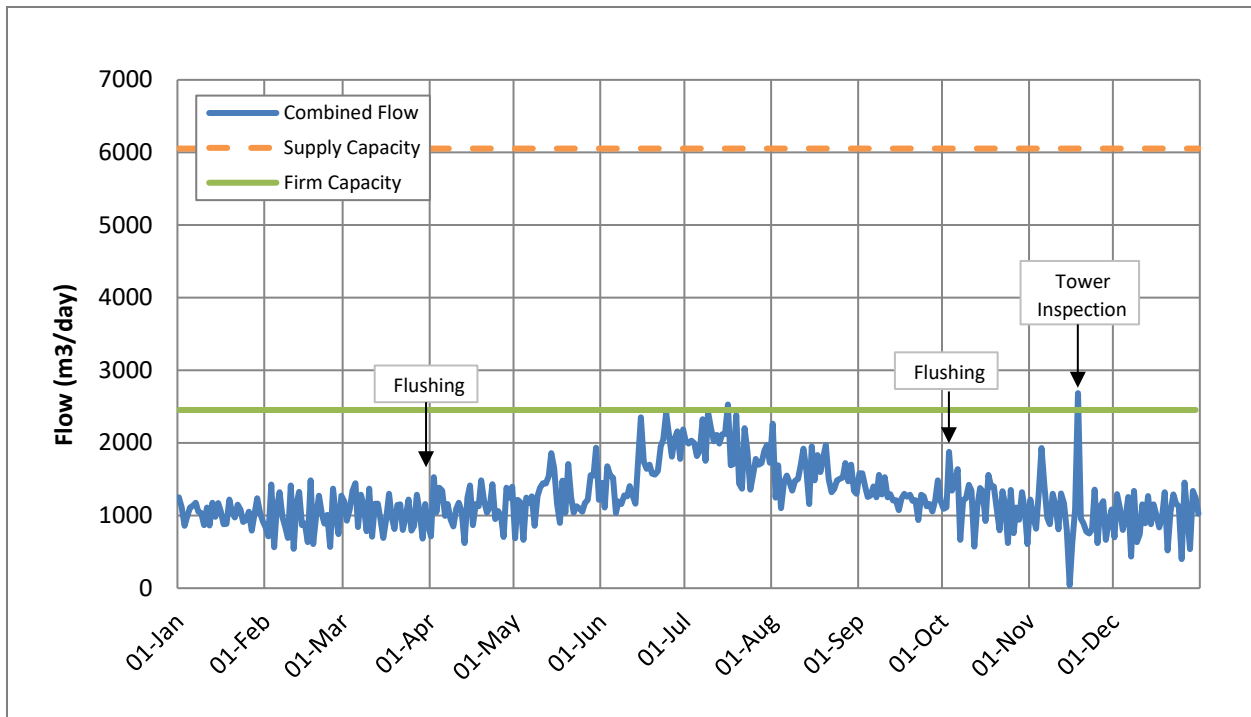
APPENDIX B: WATER QUANTITY SUMMARY

Oxford South Drinking Water System Firm Capacity 2,454 m³/ day
Oxford South Drinking Water System Supply Capacity 6,054 m³/ day

Average vs Maximum Daily Flow Rates



2022 Daily Flow



2022 Total Production by Well

