2022 Annual Drinking Water System Summary Report

Woodstock Drinking Water System

1. GENERAL INFORMATION

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

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

Drinking Water System:	Woodstock Drinking Water System
Drinking Water System Number:	220000709
Reporting Period:	January 1, 2022 – December 31, 2022

Drinking Water System Owner & Contact Information:

Oxford County Public Works Department - Water Services
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1.1 System Description

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

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

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

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

Approximately 32,745 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 maintains pressure and monitors chlorine residual in segments of the distribution system.

1.2 Major Expenses

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

Operations and maintenance expenditures included:

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

Woodstock Capital Improvement Projects included:

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

Capital Improvement projects for all County systems included:

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

2. MICROBIOLOGICAL TESTING

2.1 E. coli and Total Coliform

Bacteriological tests for *E. coli* and total coliforms are required weekly from the raw and treated water at the facility and from the distribution system. Extra samples are taken after major repairs or maintenance work. Any *E. coli* or total coliform results above 0 in treated water sample must be reported to the Ministry of Environment, Conservation and Parks (MECP) and Medical Officer of Health (MOH). Resamples and any other required actions are taken as quickly as possible. The results from the 2022 sampling program are shown on the table below. There were no adverse test results from 1,343 treated water samples in this reporting period.

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

2.2 Heterotrophic Plate Count (HPC)

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

	Number of Samples	*Range of HPC Min - Max*
Treated	**208**	**0 - 310**
Distribution	**185**	**0 - 145**

3. CHEMICAL TESTING

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

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

3.1 Sodium

Sodium levels in drinking water are tested once every five years. The aesthetic objective is 200 mg/L meaning at levels less than this the sodium will not impair the taste of the water. When sodium levels are above 20 mg/L the MECP and MOH are notified. Southwestern Public Health maintains an information page on sodium in drinking water https://www.swpublichealth.ca/en/partners-and-professionals/resources/Health-Care-Providers/Alerts-Advisories-Updates/Advisories/ADV_HIA-Sodium-20201203.pdf in order to help people on sodium-restricted diets to control their sodium intake.

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

3.2 Hardness

This is an aesthetic parameter that may affect the appearance of the water but is not related to health. Well water commonly has high levels of hardness and other minerals from being in contact with underground rock formations. Many households have water softeners to help reduce white calcium deposits and improve the efficiency of soaps. This information is included here to help set the water softener at the level recommended by the manufacturer. Samples for hardness are collected at a minimum every 3 years from raw water.

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

3.3 Additional Testing Required by MECP

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

4. OPERATIONAL MONITORING

4.1 Chlorine Residual

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

4.2 Turbidity

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

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

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

4.3 Ultra Violet (UV) Disinfection

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

5. WATER QUANTITY

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

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)*
Thornton WTF	44,669	19,297	12,736	387,389	4,648,671
Sutherland WTF	3,888	1,042	493	14,990	179,882
Southside WTF	4,493	2,279	1,426	43,359	520,309
Trillium WTF	3,275	1,018	592	17,998	215,977
Woodstock DWS*	**56,325**	**22,840**	**15,246**	**463,737**	**5,564,839**

**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 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, 6 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

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

6.2 Adverse Results

Any adverse results from bacteriological, chemical samples or observations of operational conditions that indicate adverse water quality are reported as required and corrective actions are taken. There were no adverse or reportable occurrences in 2022.

APPENDIX A: SUMMARY OF CHEMICAL RESULTS

UNDERSTANDING CHEMICAL TEST RESULTS

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

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

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

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

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

Parameter	*Annual Average*	*Result Value (µg/L)*	*MAC (µg/L)*	*MDL (µg/L)*
Trihalomethane (THM)	2022	7.1	100	0.37
Haloacetic Acids (HAA)	2022	ND	80	5.3

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

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

*Sodium levels between 20 – 200 mg/L must be reported every 5 years.
**Natural levels of fluoride between 1.5 – 2.4 mg/L must be reported every 5 years.
+ Average result, the date indicates the date the first sample was taken

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

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

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

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

*2022 Method Detection Limit (MDL) Stated

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

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

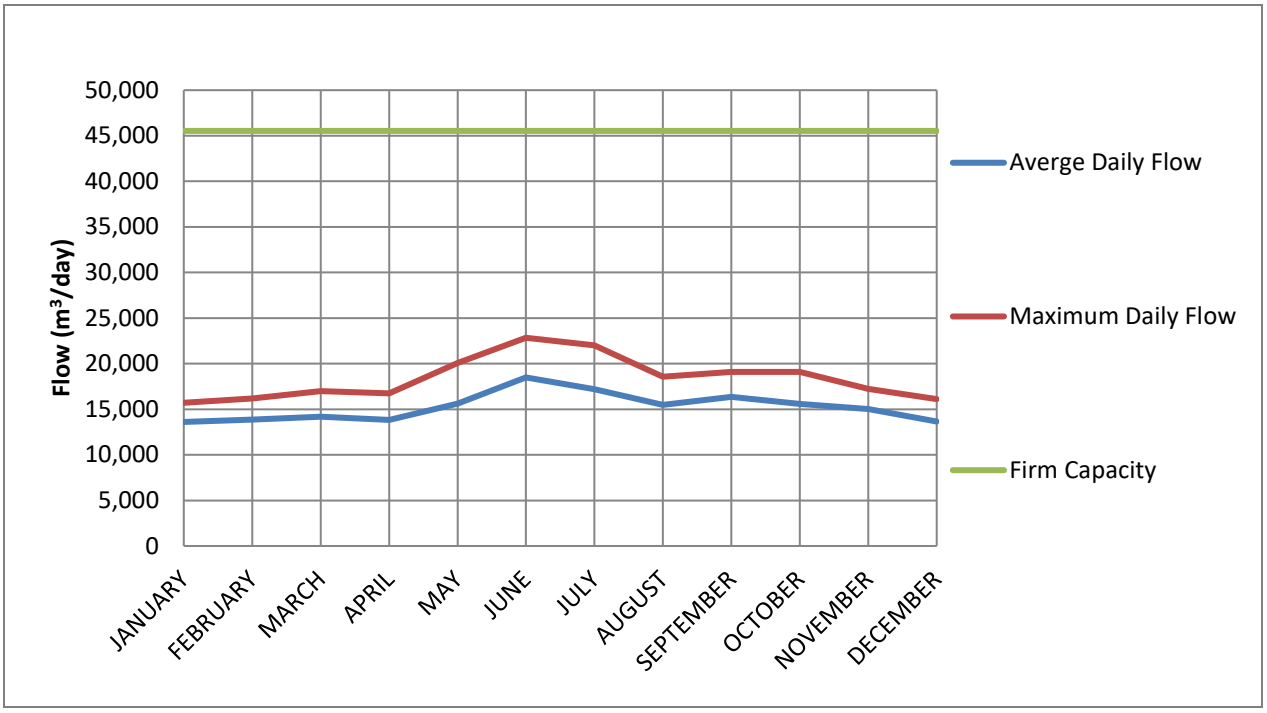
Parameter	*Results (µg/L) Thornton WTF (Nov. 21, 2022)*	*Results (µg/L) Southside WTF* (Nov. 21, 2022)	*Results (µg/L) Sutherland WTF (June 7, 2021)*	*Results (µg/L) Trillium Line WTF (Feb. 22, 2022)*	*MAC (µg/L)*	*MDL* (µg/L)*
Terbufos	ND	ND	ND	ND	1	0.01
Tetrachloroethylene	ND	ND	0.85	ND	10	0.35
2,3,4,6-Tetrachlorophenol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

*2022 Method Detection Limit (MDL) Stated

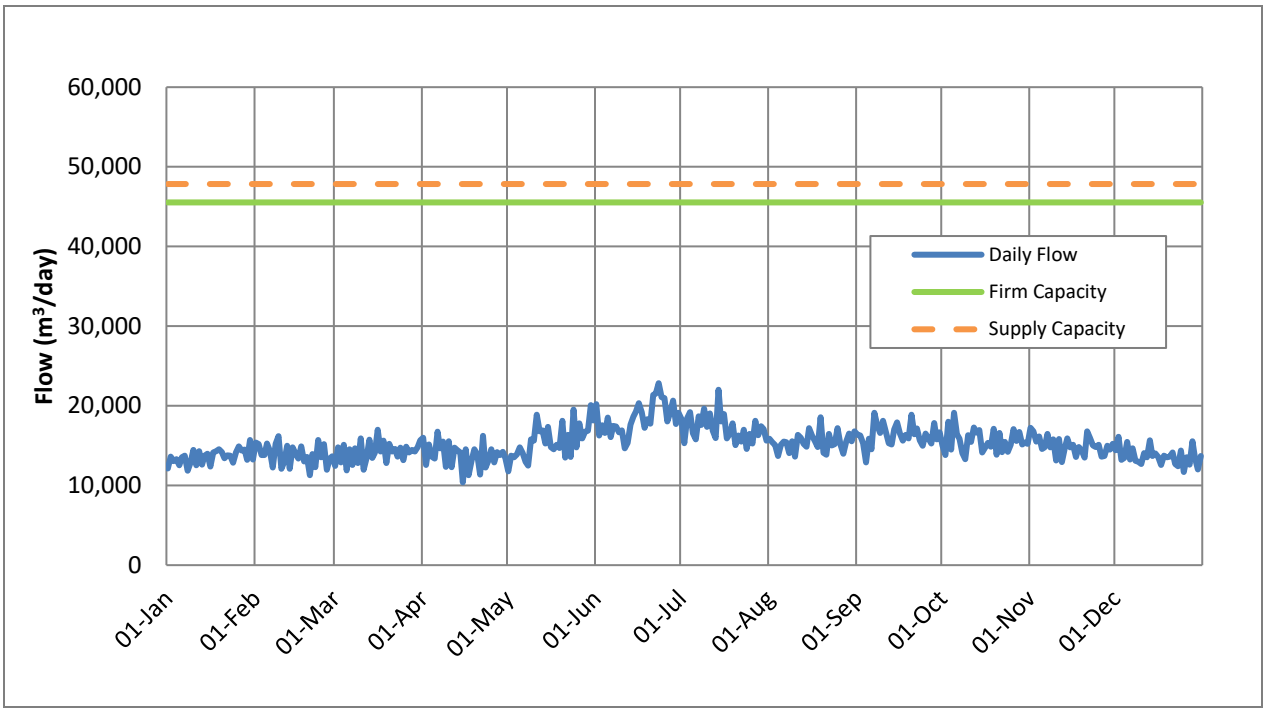
APPENDIX B: WATER QUANTITY SUMMARY

Woodstock Drinking Water System Firm Capacity 45,553 m^3/ day
Woodstock Drinking Water System Supply Capacity 47,842 m^3/ day

2022 Average vs Maximum Daily Flow Rates



2022 Daily Flow



2022 Total Production by Well (m^3)