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

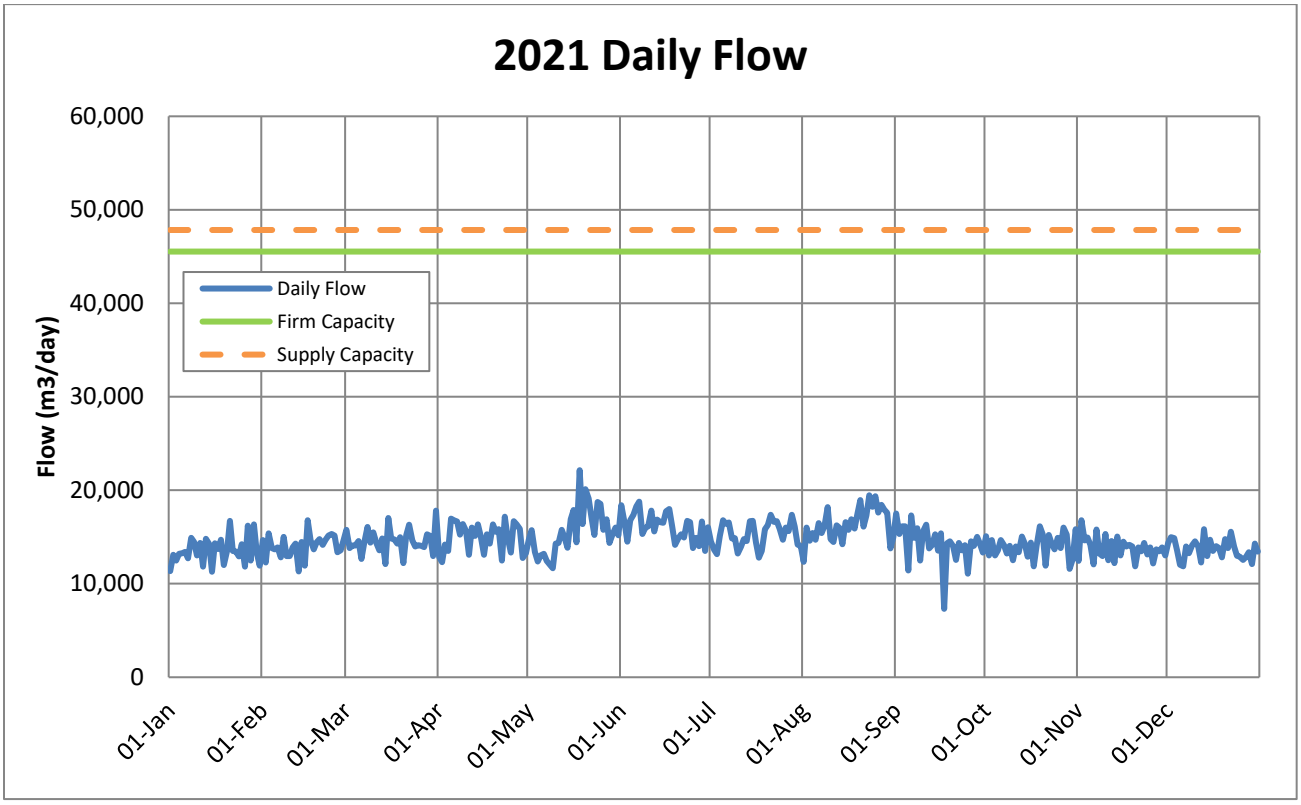
Parameter	*Result (ug/L) Thornton WTF November 22, 2021*	*MAC (ug/L)*	*MDL (ug/L)*
Diquat	ND	70	1
Diuron	ND	150	0.03
Glyphosate	ND	280	1
Malathion	ND	190	0.02
2-methyl-4chlorophenoxyacetic acid (MCPA)	ND	100	0.12
Metolachlor	ND	50	0.01
Metribuzin	ND	80	0.02
Monochlorobenzene	ND	80	0.30
Paraquat	ND	10	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

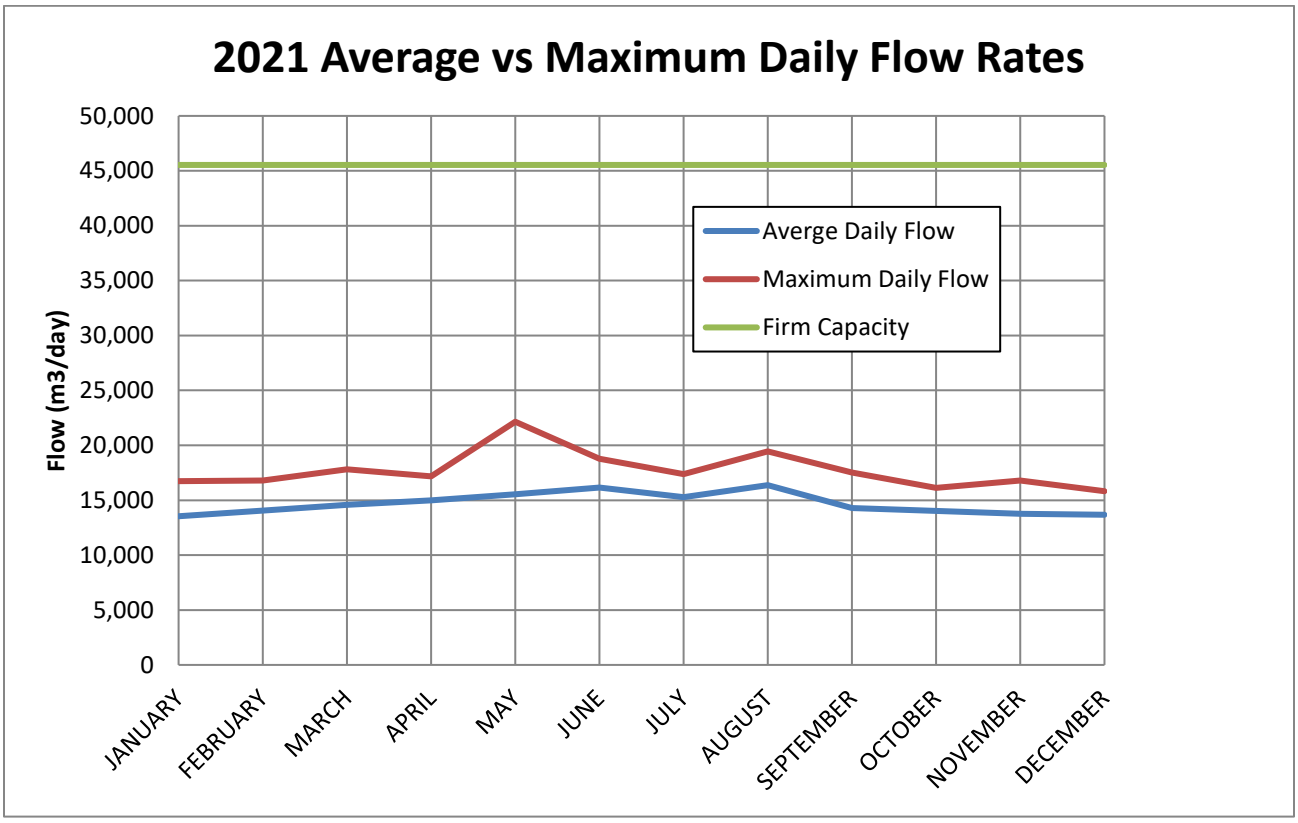
The following Table is a summary of Organic parameters in Schedule 24 sampled during this reporting period or the most recent sample results. Testing is required annually every 3 years for secure, Non-GUDI wells at Southside, Sutherland and Trillium Line.

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

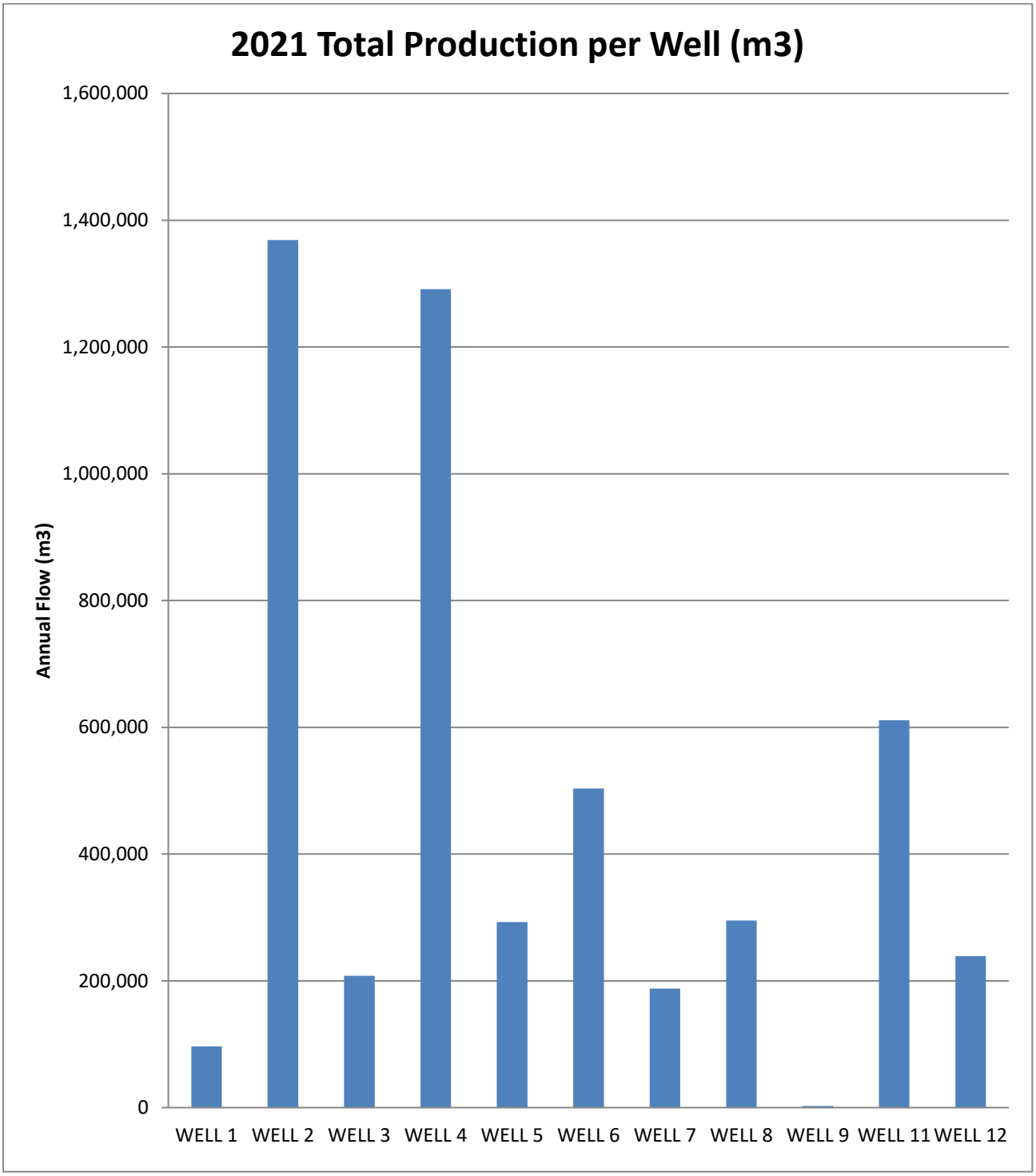
Parameter	*Result (ug/L) Trillium Line WTF February 19, 2019*	*Result (ug/L) Southside WTF November* 29, 2019	*2019 MDL (ug/L)*	*Result (ug/L) Sutherland WTF June 7, 2021*	*2021MDL (ug/L)*	*MAC (ug/L)*
Glyphosate	ND	ND	1	ND	1	280
Malathion	ND	ND	0.02	ND	0.02	190
2-methyl-4chlorophenoxyacetic acid (MCPA)	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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