



2018 ANNUAL DRINKING WATER SYSTEM SUMMARY REPORT Woodstock 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:	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, 2018 – December 31, 2018

1.1. System Description

The Woodstock Water System is a Large Municipal Water system as defined by Regulation 170/03 and serves a population of approximately 44,790. The system consists of eleven well sources, six of which are classified as GUDI (Groundwater Under Direct Influence of surface water) and five are secure groundwater wells.

The system consists of four water treatment facilities (WTF), as follows:

<i>Treatment Facility</i>	<i>Wells</i>	<i>Treatment</i>
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
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 2018, approximately 9,996 kg of chlorine gas and 5.2 m³ of sodium hypochlorite was used in the water treatment process.

Approximately 35,000 m³ 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 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 2018 the Woodstock Water System had operating and maintenance expenditures of approximately \$5,140,000. In addition to regular operational and maintenance expenditures Capital Improvement projects included:

- \$130,000 to develop Countywide SCADA Master Plan for all water systems
- \$58,000 on Asset Management valuation for all treatment, pumping and storage facilities
- \$3,840,000 for new, replaced or rehabilitated watermains
- \$800,000 for a new pressure booster station

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 2018 sampling program are shown on the table below. There were four adverse test results from 915 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	573	0	0 - 7
Treated	210	0	0 - 1
Distribution	705	0	0 - 2

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. 2018 results are shown in the table below.

	<i>Number of Samples</i>	<i>Range of HPC Min - Max</i>
Treated	208	0 - >500
Distribution	157	0 - 170

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 and Emergency Services maintain an information page on sodium in drinking water at https://www.swpublichealth.ca/sites/default/files/file-attachments/basic-page/adv_hia_sodium_20181023_0.pdf in order to help people on sodium restricted diets control their sodium intake. The sodium level at the Woodstock Sutherland WTF is 54.8 mg/L. All other locations are 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. The Hardness in the Woodstock System is approximately 482 mg/L (equivalent to 34 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 December 1, 2018. Nitrate concentrations must be less than 10.0 mg/L. The 2018 nitrate results ranged from 5.43 to 6.38 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 2018. 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 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 2018 is provided in the table below.

<i>Parameter & Location</i>	<i>Monitoring Frequency</i>	<i>Range of Results (Min – Max) and Average</i>
Chlorine residual in distribution (mg/L)	Continuous	(0.44 – 2.10) 1.04
Thornton WTF after treatment		
Chlorine mg/L	Continuous	(0.62 – 1.89) 1.24
Turbidity NTU	Continuous	(0.01 – 0.89) 0.03
Southside WTF after treatment		
Chlorine mg/L	Continuous	(0.65 – 2.41) 1.16
Turbidity NTU	Continuous	(0.02 – 3.19) 0.05

<i>Parameter & Location</i>	<i>Monitoring Frequency</i>	<i>Range of Results (Min – Max) and Average</i>
Sutherland WTF after treatment		
Chlorine mg/L	Continuous	(0.22 – 2.57) 1.27
Turbidity NTU	Continuous	(0.03 – 1.65) 0.06
Trillium Line WTF after treatment		
Chlorine mg/L	Continuous	(0.56 – 2.30) 1.23
Turbidity NTU	Continuous	(0.03 – 3.88) 0.06

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 2018 flows are provided in the Table below and presented graphically in Appendix B.

<i>Flow Summary</i>	<i>Quantity</i>
Permit to Take Water Limit	57,775 m ³ /d
Municipal Drinking Water License Limit	56,325 m ³ /d
2018 Average Daily Flow	14,203 m ³ /d
2018 Maximum Daily Flow	22,599 m ³ /d
2018 Average Monthly Flow	431,786 m ³
2018 Total Amount of Water Supplied	5,181,427 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 annual MECP inspection took place in December 2018. There were no non-compliance findings and the 2018 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 taken. Below is a summary of the adverse/reportable occurrences for 2018 along with the corresponding resolution.

<i>Incident/Date</i>	<i>Corrective Action</i>	<i>Resolution/Date</i>
Treated or Distribution Water Sample with Positive Test for Total Coliform		
1 cfu/100mL – a treated sample June 27, 2018	Reported and resamples were taken	Resample results were acceptable June 29, 2018

<i>Incident/Date</i>	<i>Corrective Action</i>	<i>Resolution/Date</i>
Treated or Distribution Water Sample with Positive Test for Total Coliform		
3 cfu/100mL – a distribution sample July 18, 2018	Reported and resamples were taken	Resample results were acceptable July 20, 2018
1 cfu/100mL – a treated sample December 5, 2018	Reported and resamples were taken	Resample results were acceptable December 7,2018
Category 2 Watermain Break		
Category 2 break on a watermain during construction on Mill St. August 20, 2018	Reported, issued a precautionary boil water advisory for 12 homes, repaired break & collected confirmatory samples	Sample result was acceptable and the advisory was removed August 22, 2018
Category 2 break on a watermain during construction on Grosvenor St. August 20, 2018	Reported, issued a precautionary boil water advisory for 15 homes, repaired break & collected confirmatory samples	Sample result was acceptable and the advisory was removed August 22, 2018

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 at the MECP web site <http://www.ontla.on.ca/library/repository/mon/14000/263450.pdf> document # 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 normally required every 3 months of operation. Weekly nitrate sampling is required at the Thornton WTF.

<i>Parameter & Location</i>	<i>Result Range Min – Max (mg/L)</i>	<i>Average Result (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Nitrite			1.0	0.003
Thornton WTF	ND – 0.006	ND		
Southside WTF	ND	ND		
Sutherland WTF	ND	ND		
Trillium Line WTF	ND	ND		
Nitrate			10.0	0.006
Thornton WTF	5.43 – 6.38	5.90		
Southside WTF	4.68 – 5.18	4.96		
Sutherland WTF	0.01 – 0.35	0.10		
Trillium Line WTF	1.93 – 2.12	1.99		

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 (ug/L)</i>	<i>MAC (ug/L)</i>	<i>MDL (ug/L)</i>
Trihalomethane (THM)	2018	7.1	100	0.37
Haloacetic Acids (HAA)	2018	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 & Location</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
Thornton WTF	June 2/14	9.6		
Southside WTF	Mar 12/18	17.0		
Sutherland WTF	June 1/15	54.8		
Trillium Line WTF	Oct. 21/16	14.9		
Fluoride			1.5**	0.06
Thornton WTF	June 2/14	0.24		
Southside WTF	Mar 12/18	0.41		
Sutherland WTF	June 1/15	1.08		
Trillium Line WTF	Oct. 21/16	0.46		

*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	255 - 269	8	30 – 500mg/L
Distribution pH	7.2 - 7.5	8	6.5 – 8.5
Distribution Lead 2018	0.03 - 5.1	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.

<i>Parameter</i>	<i>Result (ug/L) Thornton WTF Nov. 26/18</i>	<i>MAC (ug/L)</i>	<i>MDL (ug/L)</i>
Antimony	0.02	6	0.02
Arsenic	0.03	10	0.2
Barium	61.4	1000	0.02
Boron	12	5000	0.2
Cadmium	0.008	5	0.003
Chromium	0.38	50	0.03
Mercury	ND	1	0.01
Selenium	0.34	5	0.04
Uranium	0.877	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.

<i>Parameter</i>	<i>Result (ug/L) Trillium Line WTF Nov. 20/17</i>	<i>Result (ug/L) Southside WTF Nov. 20/17</i>	<i>Result (ug/L) Sutherland WTF May30/18</i>	<i>MAC (ug/L)</i>	<i>MDL (ug/L)</i>
Antimony	ND	0.03	0.03	6	0.02
Arsenic	0.4	0.4	0.2	10	0.2
Barium	63.2	53.6	110	1000	0.02
Boron	12.5	35	72	5000	0.2
Cadmium	0.004	ND	ND	5	0.003
Chromium	ND	0.57	0.03	50	0.03
Mercury	ND	ND	0.02	1	0.01
Selenium	0.26	0.33	ND	5	0.04
Uranium	0.970	0.662	0.094	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.

<i>Parameter</i>	<i>Result (ug/L) Thornton WTF Nov. 26/18</i>	<i>MAC (ug/L)</i>	<i>MDL (ug/L)</i>
Alachlor	ND	5	0.02
Atrazine + N-dealkylatedmetabolites	ND	5	0.01
Azinphos-methyl	ND	20	0.01
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	0.01
Carbon Tetrachloride	ND	2	0.16
Chlorpyrifos	ND	90	0.02
Diazinon	ND	20	0.02
Dicamba	ND	120	0.20
1,2-Dichlorobenzene	ND	200	0.41

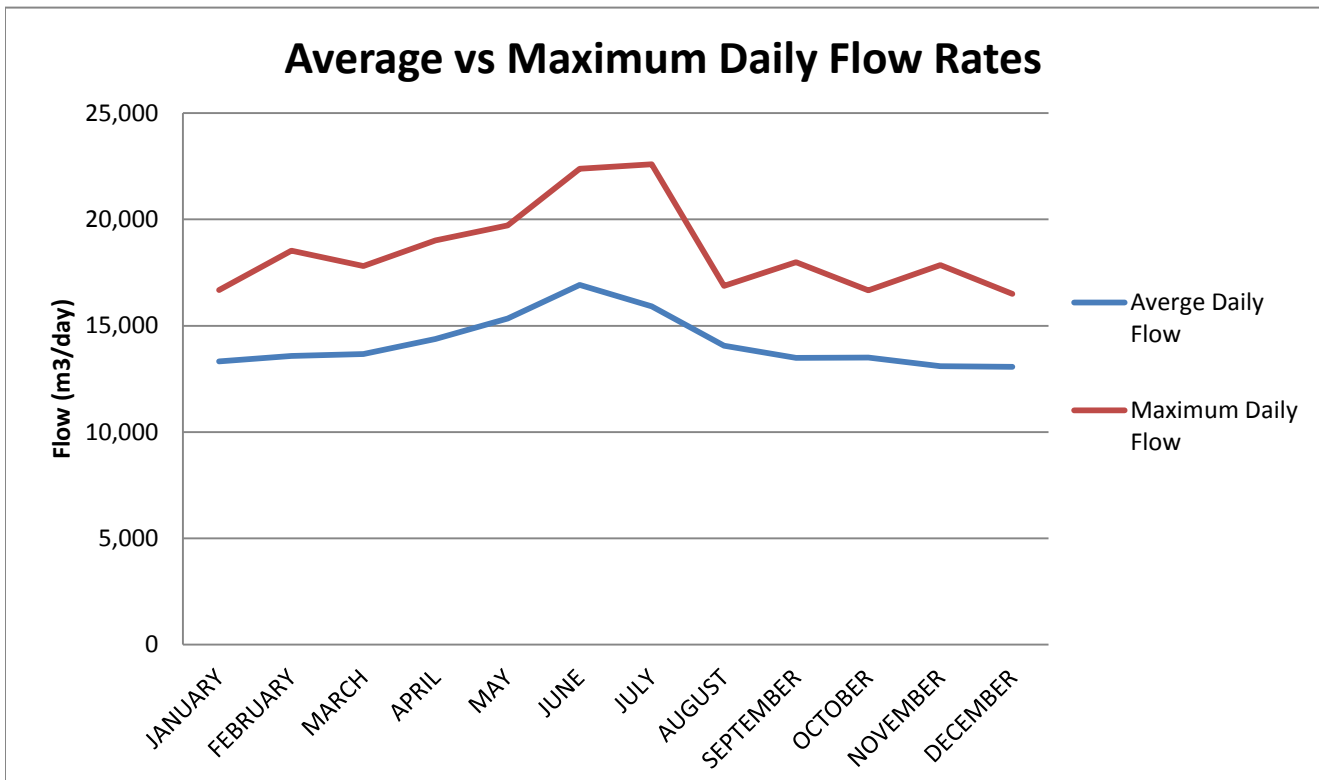
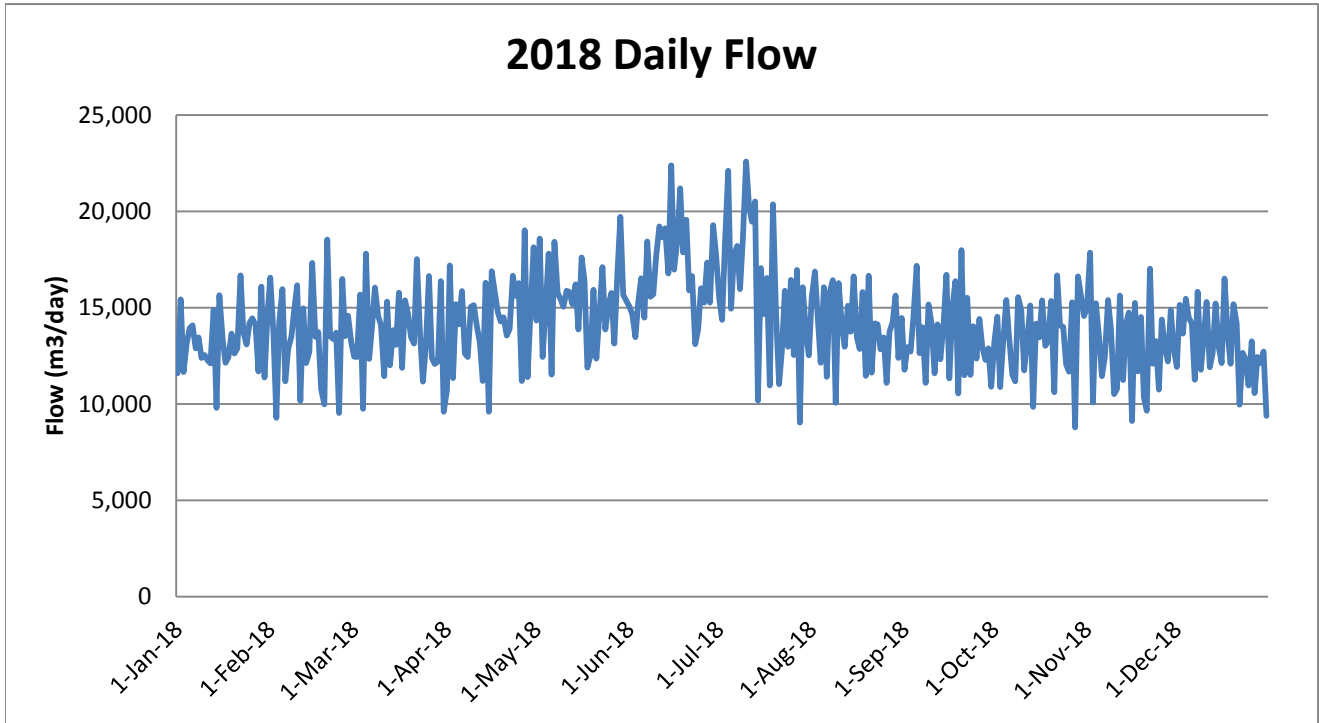
<i>Parameter</i>	<i>Result (ug/L) Thornton WTF Nov. 26/18</i>	<i>MAC (ug/L)</i>	<i>MDL (ug/L)</i>
1,4-Dichlorobenzene	ND	5	0.36
1,2-Dichloroethane	ND	5	0.35
1,1-Dichloroethylene (vinylidene chloride)	ND	14	0.33
Dichloromethane	ND	50	0.35
2,4 Dichlorophenol	ND	900	0.15
2,4-Dichlorophenoxy acetic acid (2,4-D)	ND	100	0.19
Diclofop-methyl	ND	9	0.40
Dimethoate	ND	20	0.03
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	0.14
Triallate	ND	230	0.01
Trichloroethylene	ND	5	0.43
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.

<i>Parameter</i>	<i>Result (ug/L) Trillium Line WTF Jan. 11/16</i>	<i>Result (ug/L) Southside WTF Nov. 28/16</i>	<i>Result (ug/L) Sutherland WTF May 30/18</i>	<i>MAC (ug/L)</i>	<i>MDL (ug/L)</i>
Alachlor	ND	ND	ND	5	0.02
Atrazine + N-dealkylatedmetabolites	ND	ND	ND	5	0.01
Azinphos-methyl	ND	ND	ND	20	0.02
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	0.01
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

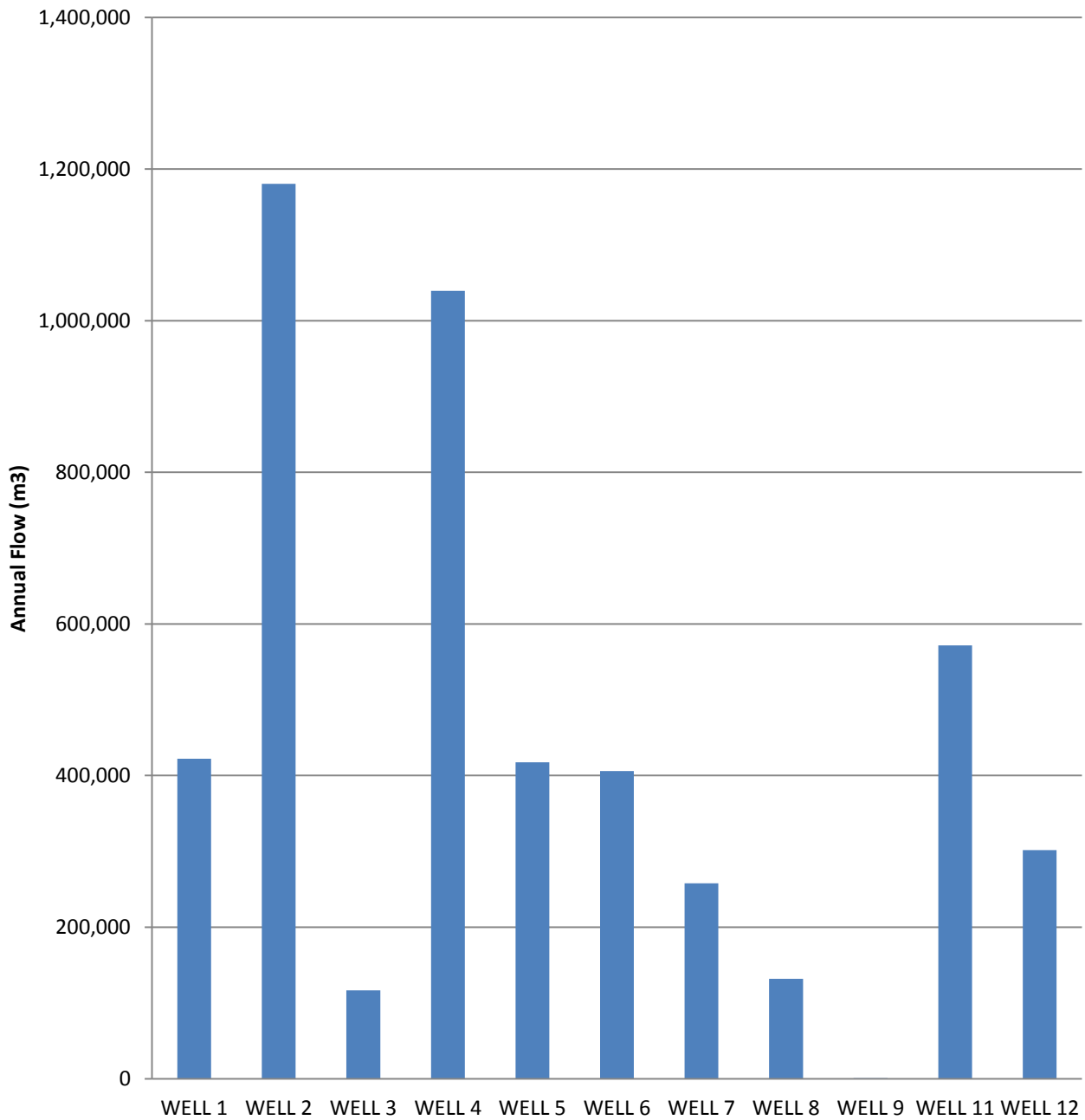
<i>Parameter</i>	<i>Result (ug/L) Trillium Line WTF Jan. 11/16</i>	<i>Result (ug/L) Southside WTF Nov. 28/16</i>	<i>Result (ug/L) Sutherland WTF May 30/18</i>	<i>MAC (ug/L)</i>	<i>MDL (ug/L)</i>
1,1-Dichloroethylene (vinylidene chloride)	ND	ND	ND	14	0.33
Dichloromethane	ND	ND	ND	50	0.35
2,4 Dichlorophenol	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	0.14
Triallate	ND	ND	ND	230	0.01
Trichloroethylene	ND	ND	0.48	5	0.44
2,4,6-Trichlorophenol	ND	ND	ND	5	0.14
Trifluralin	ND	ND	ND	45	0.02

APPENDIX B: 2018 WATER QUANTITY SUMMARY



Woodstock Water System Capacity 53,050 m³/d

2018 Total Production per Well (m3)



Notes: Volumes pumped in 2017

Well 9: 943 m³

Woodstock Water System Capacity 53,050 m³/d