



REVISED APRIL 2018
2017 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. 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, 2017 – December 31, 2017

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 42,000. 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 2017, approximately 9,996 kg of chlorine gas and 5.1 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 St., Nellis St. 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.

Standby generators are available to run treatment facilities in the event of a power failure. The system is maintained by licensed water system operators, who operate monitoring and treatment 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

In 2017 the Woodstock Water System had operating and maintenance expenditures of approximately \$4,390,000. Capital expenditures for the replacement of aging water mains totaled approximately \$3,600,000.

2. MICROBIOLOGICAL TESTING

2.1. *E. coli* and Total Coliform

Bacteriological tests for *E. coli* and total coliforms are required weekly on 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 and Climate Change (MOECC) and Medical Officer of Health (MOH). Resamples and any other required actions are taken as quickly as possible. The results from the 2017 sampling program are shown on the table below. There was one adverse test result for *E. coli* and four adverse test results for total coliforms from 904 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	561	0	0 - 35
Treated	208	0	0
Distribution	696	1 (NDOGN)*	0 - 201

*NDOGN Means non target bacteria growth obscured the result and target colonies could not be counted. These results are treated as adverse for both *E. coli* and total coliforms.

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. 2017 results are shown in the table below.

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

3. CHEMICAL TESTING

The Safe Drinking Water Act requires periodic testing of the water for approximately 70 different chemical parameters. The latest results for all parameters are provided in Appendix A. Results for inorganic and organic chemical parameters listed in Schedules 23 and 24 of Reg. 170/03 are provided in Appendix A. The sampling frequency varies for different types and sizes of water systems. 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 MOECC 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 MOECC 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 MOECC and MOH are notified. Oxford County Public Health and Emergency Services maintain an information page on sodium in drinking water at www.oxfordcounty.ca/healthyplaces/water/sodium.aspx 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. Hardness in the Woodstock System is approximately 482 mg/L (equivalent to 34 grains).

3.3 Additional Testing Required by MOECC

Weekly nitrate samples of the treated water from Thornton WTF are required by the Municipal Drinking Water License issued December 1, 2017. The ODWS requires nitrate levels to be less than 10.0mg/L. The 2017 nitrate results ranged from 5.73 to 6.62 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 continuously monitored in several 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 2017. 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 facilities as a change in turbidity can indicate an operational problem. The turbidity of untreated water from each 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 2017 is in the table below.

<i>Parameter and Location</i>	<i>Monitoring Frequency</i>	<i>Range of Results (Min – Max) and Average</i>
Chlorine Residual in Distribution mg/L	Continuous	(0.27 – 2.22) 1.10
Thornton WTF after treatment		
Chlorine mg/L	Continuous	(0.42 – 2.06) 1.36
Turbidity NTU	Continuous	(0.02 – 3.03) 0.03
Southside WTF after treatment		
Chlorine mg/L	Continuous	(0.61 – 2.16) 1.24
Turbidity NTU	Continuous	(0.03 – 2.12) 0.05
Sutherland WTF after treatment		
Chlorine mg/L	Continuous	(0.25 – 2.24) 1.35
Turbidity NTU	Continuous	(0.03 – 1.12) 0.06
Trillium Line WTF after treatment		
Chlorine mg/L	Continuous	(0.63 – 3.46) 1.22
Turbidity NTU	Continuous	(0.03 – 3.97) 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 must be reported as inadequate disinfection. There were no occurrences of inadequate UV disinfection in this reporting period.

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 MOECC regulate the amount of water that can be utilized over a given time period. A summary of the 2017 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
2017 Average Daily Flow	13,579 m ³ /d
2017 Maximum Daily Flow	22,308 m ³ /d
2017 Average Monthly Flow	412,853 m ³
2017 Total Amount of Water Supplied	4,954,241 m ³

A review of the available capacity and the anticipated growth forecasted for the community indicates the system has sufficient capacity of 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 MOECC 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 Drinking Water Quality Management System (DWQMS) procedures.

6.1. Non-Compliance Findings

The 2017 MOECC Inspection was completed in November 2017. There was one non-compliance finding. A bacteriological sample was not taken following a repair to piping in the treatment facility. The inspection report rating received 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 2017 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 <i>E.Coli</i> and Total Coliform		
NDOGN* cfu/100mL – distribution sample Feb 01, 2017	Reported and resamples were taken	Resample results acceptable. Feb 6, 2017
Treated or Distribution Water Sample with Positive Test for Total Coliform		
20 cfu/100mL and >200 – 2 distribution samples March 22, 2017	Reported and resamples were taken	Resample results acceptable. March 24, 2017
1 cfu/100mL - distribution sample Sept 25, 2017	Reported and resamples were taken	Resample results acceptable. Sept 27, 2017

*NDOGN Means non target bacteria growth obscured the result and target colonies could not be counted. These results are treated as adverse for both *E.coli* and total coliforms.

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 MOECC 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 MOECC 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 – 0.005	ND		
Southside WTF	ND – 0.004	ND		
Sutherland WTF	ND	ND		
Trillium Line WTF	ND	ND		
Nitrate			10.0	0.006
Thornton WTF	5.73 – 6.62	6.08		
Southside WTF	5.1 – 6.15	5.45		
Sutherland WTF	0.01 – 0.19	0.06		
Trillium Line WTF	1.87 – 1.99	1.93		

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)	2017	9.3	100	0.37
Haloacetic Acids (HAA)	2017	ND	80	5.3

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 quarter quality is consistent and does not facilitate the 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	253 – 268	8	30 – 500 mg/L
Distribution pH	7.1 – 7.3	8	6.5 – 8.5
Distribution Lead 2015	ND – 14.6 (Avg. 8.2)	9	10 ug/L MAC

The following Tables summarize 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 (ug/L)</i>	<i>MDL (ug/L)</i>
Sodium			20.0*	0.01
Thornton WTF	June 2/14	9.6		
Southside WTF	Feb 11/13	10.5		
Sutherland WTF	June 1/15	54.8		
Trillium Line WTF	Oct 21/16	14.9		

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

<i>Parameter & Location</i>	<i>Sample Date</i>	<i>Result Value (mg/L)</i>	<i>MAC (ug/L)</i>	<i>MDL (ug/L)</i>
Fluoride			1.5**	0.06
Thornton WTF	June 2/14	0.24		
Southside WTF	Feb 11/13	0.22		
Sutherland WTF	June 1/15	1.08		
Trillium Line WTF	Oct 21/16	0.46		

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

The following Tables summarize the most recent test results for Schedule 23. Testing is required annually for GUDI wells at Thornton.

<i>Parameter</i>	<i>Results (ug/L) Thornton WTF Nov 20 /17</i>	<i>MAC (ug/L)</i>	<i>MDL (ug/L)</i>
Antimony	ND	6	0.02
Arsenic	ND	25	0.2
Barium	53.4	1000	0.02
Boron	11	5000	0.2
Cadmium	0.008	5	0.003
Chromium	0.31	50	0.03
Mercury	ND	1	0.01
Selenium	0.35	5	0.04
Uranium	0.822	20	0.002

The following Tables summarize the most recent test results for Schedule 23. Testing is required every 3 years for Non GUDI wells at Southside, Sutherland & Trillium Line.

<i>Parameter</i>	<i>Results (ug/L) Trillium Line Jan 11/16</i>	<i>Results (ug/L) Southside WTF Nov 28/16</i>	<i>Results (ug/L) Sutherland WTF June 1/15</i>	<i>MAC (ug/L)</i>	<i>MDL (ug/L)</i>
Antimony	ND	0.03	ND	6	0.02
Arsenic	0.4	0.4	0.4	25	0.2
Barium	63.2	53.6	165	1000	0.01
Boron	12.5	35	76.8	5000	2
Cadmium	0.004	ND	ND	5	0.003
Chromium	ND	0.57	ND	50	0.03
Mercury	ND	ND	ND	1	0.01
Selenium	0.26	0.33	ND	5	0.04
Uranium	0.970	0.662	0.111	20	0.002

Summary of 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>Sample Date</i>	<i>Result Thornton (ug/L)</i>	<i>MAC (ug/L)</i>	<i>MDL (ug/L)</i>
Alachlor	Nov 20/17	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
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>Sample Date</i>	<i>Result Thornton (ug/L)</i>	<i>MAC (ug/L)</i>	<i>MDL (ug/L)</i>
1,4-Dichlorobenzene	Nov 20/17	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

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 Non GUDI wells at Southside, Sutherland & Trillium Line.

<i>Parameter</i>	<i>Results (ug/L) Trillium Ln Jan 11/16</i>	<i>Results (ug/L) Southside Nov 28/16</i>	<i>Results (ug/L) Sutherland June 1/15</i>	<i>MAC (ug/L)</i>	<i>MDL (ug/L)</i>
Alachlor	ND	ND	ND	5	0.02
Aldicarb *	NA	ND**	ND	9	0.01
Aldrin + Dieldrin *	NA	ND**	ND	0.7	0.01
Atrazine + N-dealkylated metabolites	ND	ND	ND	5	0.01
Azinphos-methyl	ND	ND	ND	20	0.02
Bendiocarb *	NA	ND	ND	40	0.01
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
Chlordane (Total) *	NA	NA	ND	7	0.01
Chlorpyrifos	ND	ND	ND	90	0.02
Cyanazine *	NA	ND	ND	10	0.03
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

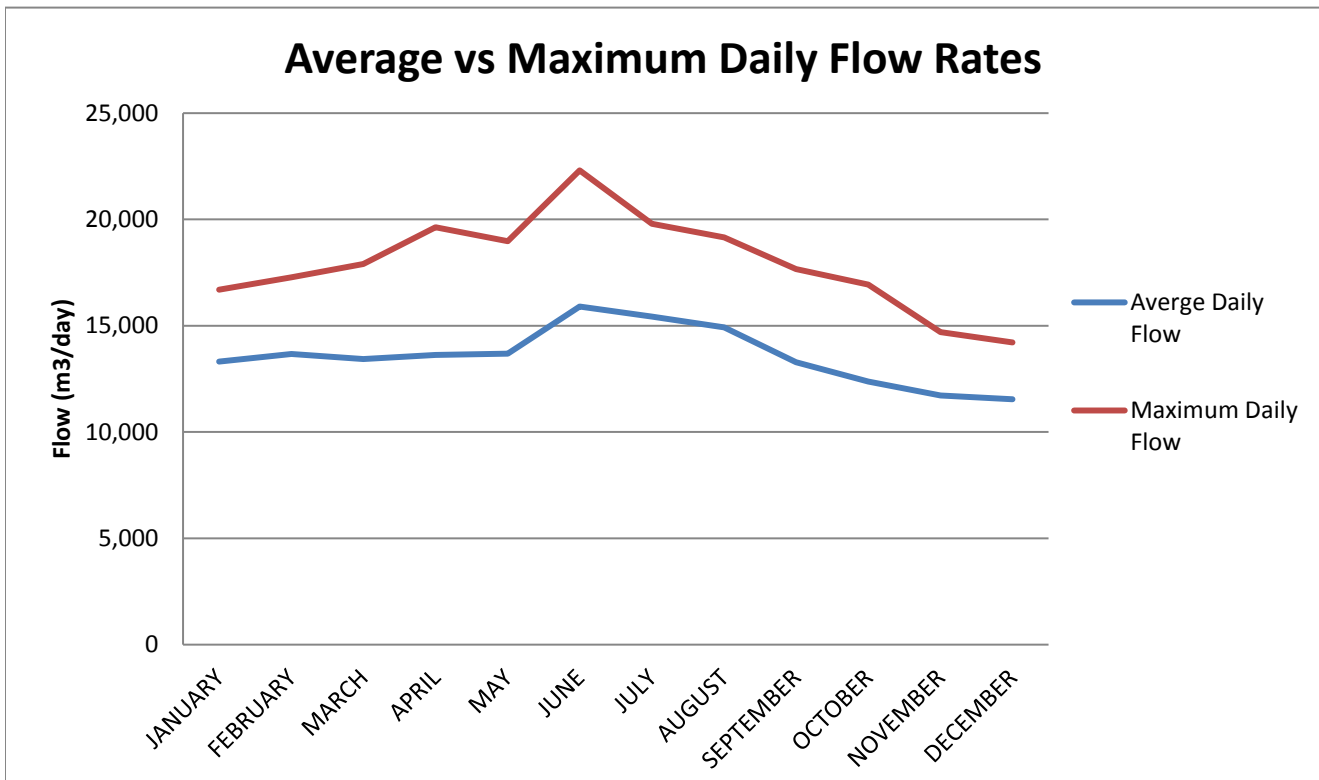
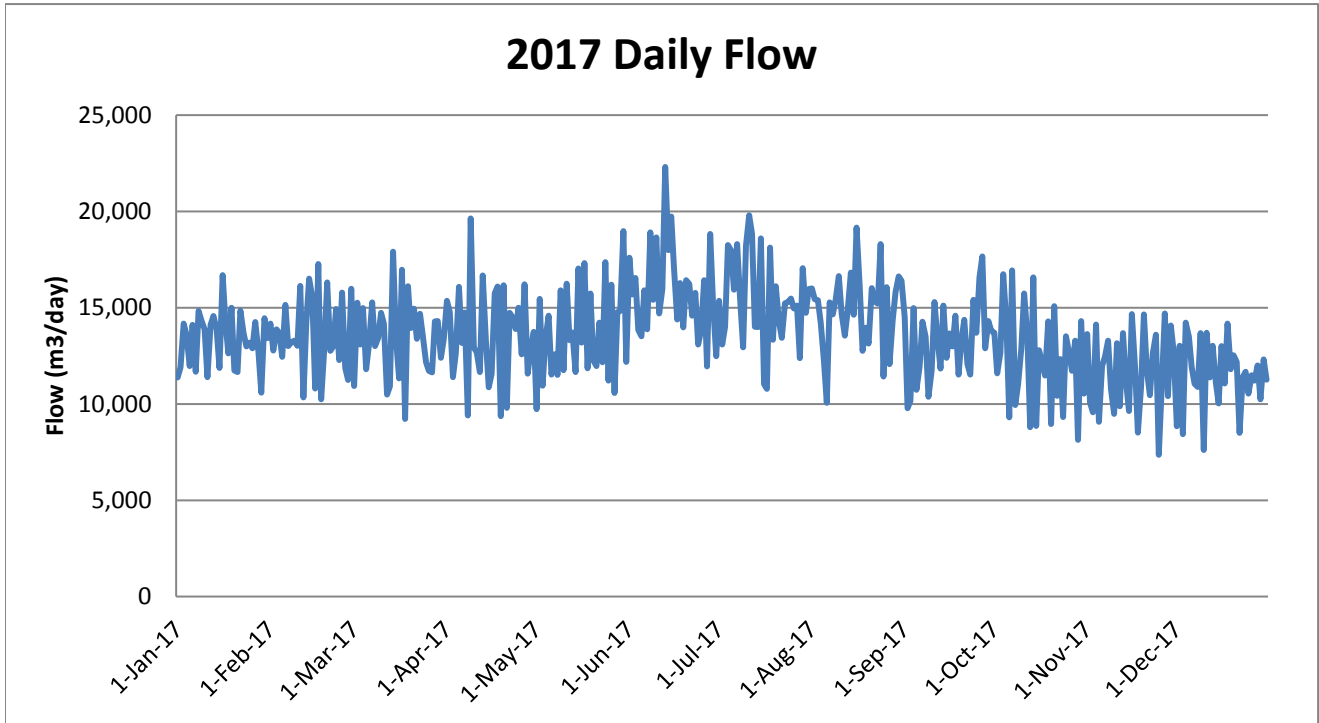
<i>Parameter</i>	<i>Results (ug/L) Trillium Ln Jan 11/16</i>	<i>Results (ug/L) Southside Nov 28/16</i>	<i>Results (ug/L) Sutherland June 1/15</i>	<i>MAC (ug/L)</i>	<i>MDL (ug/L)</i>
Dichlorodiphenyltrichloroethane (DDT) + metabolites *	NA	ND**	ND	30	0.01
1,2-Dichloroethane	ND	ND	ND	5	0.35
1,1-Dichloroethylene (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
Dinoseb *	NA	NA	ND	10	0.36
Diquat	ND	ND	ND	70	1
Diuron	ND	ND	ND	150	0.03
Glyphosate	ND	ND	ND	280	1
Heptachlor + Heptachlor Epoxide *	NA	NA	ND	3	0.01
Lindane (Total) *	NA	NA	ND	4	0.01
Malathion	ND	ND	ND	190	0.02
Methoxychlor	ND	ND	ND	900	0.01
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
Parathion *	NA	NA	ND	50	0.02
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
Temephos *	NA	NA	ND	280	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	ND	5	0.44
2,4,6-Trichlorophenol	ND	ND	ND	5	0.14
2,4,5-Trichlorophenoxy acetic acid (2,4,5-T) *	NA	NA	ND	280	0.22
Trifluralin	ND	ND	ND	45	0.02
Vinyl Chloride	ND	ND	0.18	1	0.17

Note: * the parameter was removed from Schedule 24 sample requirements in 2016

ND was Not Detected;

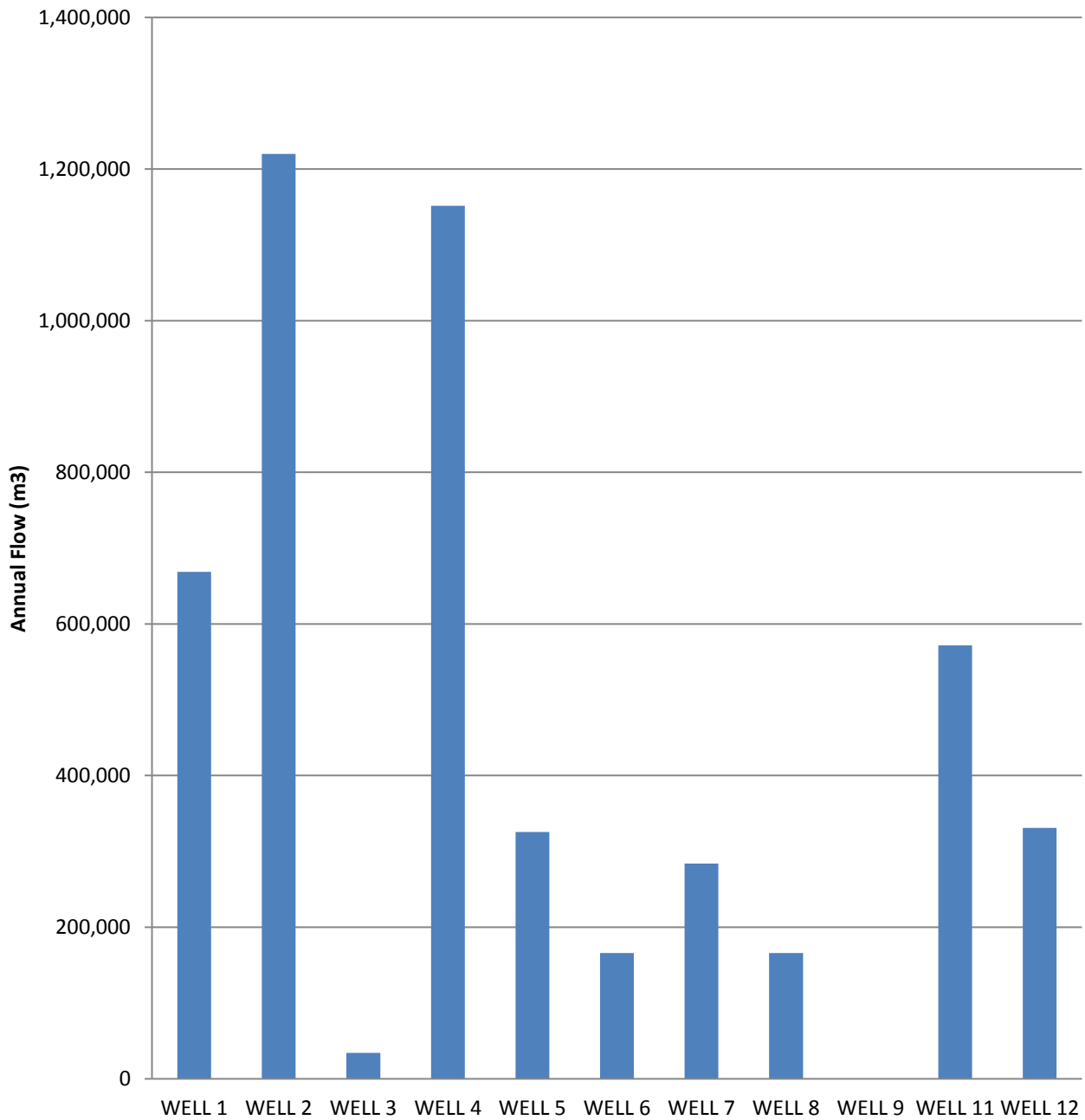
NA means Not Applicable

APPENDIX B: 2017 WATER QUANTITY SUMMARY



Woodstock Water System Capacity 53,050 m³/d

2017 Total Production per Well (m3)



Notes: Volumes pumped in 2017

Well 9: 527 m³

Woodstock Water System Capacity 53,050 m³/d