2021 ANNUAL DRINKING WATER SYSTEM SUMMARY REPORT
Tillsonburg 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:	Tilsonburg Water System
Drinking Water System Number:	220000683
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 Tillsonburg Water System is a Large Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and services a population of approximately 16,950. The system consists of ten well sources, seven of which are classified as GUDI (Groundwater Under Direct Influence of surface water) and three are secure groundwater wells. The treatment for each site is summarized below.

Treatment Facility	*Wells*	*Treatment*
Mall Road WTF	1A & 2	Filtration for iron removal and disinfection with ultraviolet (UV) and chlorine gas.
Fairview WTF	4, 5 & 7A	Disinfection with UV and chlorine gas. Sodium hypochlorite is added for disinfection at Well 7A and for secondary disinfection.
Plank Line WTF	6A	Disinfection with chlorine gas
Bell Mill Road WTF	9, 10 & 11	Filtration for iron removal and disinfection with UV and chlorine gas.
Rokeby Road WTF	12	Disinfection with chlorine gas.

The treatment facilities each house high lift pumps, monitoring and treatment equipment for the supply wells. Three standby generators are available to run facilities in the event of a power failure. Water storage is provided by a 9,100 m^3 reservoir located north of the Town of Tillsonburg. There is a pressure boosting station on Fairview Street.

In 2021, approximately 4,080 kg of chlorine gas and 7,585 L of sodium hypochlorite were used in the water treatment process. The chemicals are certified to meet standards set by the Standards Council of Canada or American National Standards Institute.

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 a failure of critical operational requirements.

1.2. Major Expenses

In 2021, the Tillsonburg Water System had operations and maintenance expenditures of $2,500,000. Operations and maintenance expenditures included:

- $60,000 for the replacement of general operating equipment and well rehabilitations

In addition to regular operational and maintenance expenditures, Capital Improvement projects for Tillsonburg totaled $1,700,000 for improvements to water treatment systems and distribution mains in the water system. Capital improvement projects included:

- $1,300,000 for the replacement of aging watermains
- $125,000 for bulk water station
- $20,000 for standby power
- $30,000 for facilities improvements

Capital Improvement projects for all drinking water systems included:

- $720,000 develop Countywide SCADA Master Plan for all water systems
- $14,000 Updated Water Modelling

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 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 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 on the table below. There were 0 adverse test results from 611 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	451	0	0 - 7
Treated	252	0	0
Distribution	359	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. 2021 results are shown in the table below.

	Number of Samples	*Range of HPC Min - Max*
Treated	250	0 - 23
Distribution	99	0 - 190

3. CHEMICAL TESTING

The Safe Drinking Water Act requires periodic testing of the water for approximately 50 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 Tillsonburg Water System is provided below.

3.2. 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 Tillsonburg Fairview WTF is 40.8 mg/L. Well 6A at Plank Line has sodium at 39.3 mg/L, however it was not running in 2021. All other locations are under 20 mg/L.

3.3. 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 or treated water. The average hardness for the Tillsonburg Drinking Water System is 251 mg/L (15 grains/gallon) based on samples collected from 2006 to 2019.

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 at least 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. A summary of the chlorine residual readings is provided in the table below.

A precautionary boil water advisory was enacted following a watermain break that could have impacted the free chlorine residual. A summary of this incident can be found in section 6.2.

4.2. Turbidity

Turbidity of treated water is continuously monitored at the treatment facility, as a change in turbidity can indicate an operational problem. 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	(0.19 – 2.65) 1.23
Bell Mill Road WTF		
Chlorine mg/L	Continuous	(0.37 – 1.43) 2.44
Turbidity NTU	Continuous	(0.03 – 0.04) 0.72
Fairview WTF/North Street West		
Chlorine mg/L	Continuous	(0.19 – 2.65) 1.18
Turbidity NTU	Continuous	(0.03 – 1.04) 0.06
Mall Road WTF		
Chlorine mg/L	Continuous	(0.96 – 1.93) 1.43
Turbidity NTU	Continuous	(0.02 – 2.69) 0.05
Plank Line WTF		
Chlorine mg/L	Continuous	Not running
Turbidity NTU	Continuous	Not running
Rokeby Road WTF		
Chlorine mg/L	Continuous	(0.34 – 1.69) 1.19
Turbidity NTU	Continuous	(0.03 – 4) 0.08

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/cm^2 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 flowrates 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	17,913 m^3/d
Municipal Drinking Water License Limit	17,440 m^3/d
2021 Average Daily Flow	5,315 m^3/d
2021 Maximum Daily Flow	8,694 m^3/d
2021 Average Monthly Flow	161,679 m^3/d
2021 Total Amount of Water Supplied	1,940,152 m^3/d

In order to meet the long-term growth need of the Town, the County intends to construct a transmission main from Tillsonburg to the Oxford South system in Springford. The construction is currently anticipated to occur within the 20-year planning horizon.

Firm Capacity of this system is rated at 10,627 m^3/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 m^3/day if necessary to maintain system integrity. This system comprises of 10 supply wells, seven of which are GUDI. The GUDI wells contribute 6,739 m^3/day to 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 of this report being drafted the annual MECP inspection had not taken place for 2021. No inspection report rating was available.

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 one adverse/reportable occurrences for 2021 along with the corresponding resolution.

Operational Incident: Low Pressure Event and Precautionary Boil Water Advisory		
Potential contamination following a watermain break on May 5, 2021. The watermain was damaged when a third party contractor was excavating in the area.	A precautionary boil water advisory for 12 residents was enacted while bacteriological samples were collected to confirm that there was no contamination to the drinking water system. The break was repaired, flushed, and water samples were collected.	All samples were acceptable on May 6, 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 at https://cvc.ca/wp-content/uploads/2011/03/std01_079707.pdf PSIB 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. 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 & Location	*Result Range* Min – Max *(mg/L)*	*Average Result (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Nitrite			1.0	0.003
Bell Mill Road WTF	ND	ND		
Fairview WTF	ND	ND		
Mall Road WTF	ND	ND		
Plank Line WTF+	NA	NA		
Rokeby Road WTF	ND	ND		
Nitrate			10.0	0.006
Bell Mill Road WTF	2.98 – 4.28	3.63		
Fairview WTF	6.52 – 8.72	7.15		
Mall Road WTF	1.50 – 1.96	1.76		
Plank Line WTF+	NA	NA		
Rokeby Road WTF	5.28 – 5.57	5.45		

+not running in 2020

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	24.8	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
Bell Mill Road WTF	August 16, 2021	6.52		
Fairview WTF	May 27, 2019	40.8		
Mall Road WTF	August 16, 2021	11.1		
Plank Line WTF+	August 22, 2016	39.3		
Rokeby Road WTF	August 16, 2021	2.55		
Fluoride			1.5**	0.06
Bell Mill Road WTF	August 16, 2021	0.07		
Fairview WTF	May 27, 2019	0.35		
Mall Road WTF	August 16, 2021	ND		
Plank Line WTF+	August 22, 2016	1.51		
Rokeby Road WTF	August 16, 2021	ND		

*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.

+not running in 2021

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	172 – 249	8	30 – 500mg/L
Distribution pH	7.32 – 7.56	8	6.5 – 8.5
Distribution Lead 2021	0.07– 2.29	8	10 ug/L MAC

The following Table summarizes the most recent test results for Schedules 23. Testing is required annually for GUDI wells at Bell Mill Road, Fairview and Mall Road.

Parameter	*Results (ug/L) Bell Mill Road WTF November 22, 2021*	*Results (ug/L) Fairview WTF November 22, 2021*	*Results (ug/L) Mall Road WTF November 22, 2021*	*MAC (ug/L)*	*MDL (ug/L)*
Antimony	ND	ND	ND	6	0.09
Arsenic	ND	1.7	ND	10	0.02
Barium	31.6	126	60.5	1000	0.01
Boron	18	68	22	5000	2.0
Cadmium	ND	0.008	0.003	5	0.003
Chromium	0.30	0.40	0.12	50	0.08
Mercury	ND	ND	ND	1	0.01
Selenium	0.18	0.39	0.07	5	0.04
Uranium	0.571	0.345	1.79	20	0.002

The following Table summarizes the most recent test results for Schedules 23.Testing is required every 3 years in secure, Non-GUDI wells at Plank Line and Rokeby Road.

Parameter	*Results (ug/L) Plank Line WTF June 6/16+*	*Results (ug/L) Rokeby Road WTF May 27/19*	*MAC (ug/L)*	*MDL (ug/L)*
Antimony	ND	ND	6	0.02
Arsenic	10.0	1.2	10	0.2
Barium	52.4	29.6	1000	0.01
Boron	153	14	5000	2.0
Cadmium	ND	ND	5	0.003
Chromium	3.94	0.52	50	0.03
Mercury	ND	ND	1	0.01
Selenium	0.09	0.26	5	0.04
Uranium	0.185	1.63	20	0.002

+not running in 2021

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 Bells Mill Road, Fairview and Mall Road.

Parameter	*Results (ug/L) Bell Mill Rd. WTF November 22, 2021*	*Results (ug/L) Fairview WTF November 22, 2021*	*Results (ug/L) Mall Road WTF November 22, 2021*	*MAC (ug/L)*	*MDL (ug/L)*
Alachlor	ND	ND	ND	5	0.02
Atrazine + N-dealkylatedmetobolites	0.01	0.01	ND	5	0.01
Azinphos-methyl	ND	ND	ND	20	0.05
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	0.05
Carbofuran	ND	ND	ND	90	0.01
Carbon Tetrachloride	ND	ND	ND	2	0.17
Chlorpyrifos	ND	ND	ND	90	0.02
Diazinon	ND	ND	ND	120	0.02
Dicamba	ND	ND	ND	200	0.20
1,2-Dichlorobenzene	ND	ND	ND	5	0.41
1,4-Dichlorobenzene	ND	ND	ND	30	0.36
1,2-Dichloroethane	ND	ND	ND	14	0.35

Parameter	*Results (ug/L) Bell Mill Rd. WTF November 22, 2021*	*Results (ug/L) Fairview WTF November 22, 2021*	*Results (ug/L) Mall Road WTF November 22, 2021*	*MAC (ug/L)*	*MDL (ug/L)*
1,1-Dichloroethylene (vinylidene chloride)	ND	ND	ND	50	0.33
Dichloromethane	ND	ND	ND	900	0.35
2-4 Dichlorophenol	ND	ND	ND	100	0.15
2,4-Dichlorophenoxy acetic acid (2,4-D)	ND	ND	ND	9	0.19
Diclofop-methyl	ND	ND	ND	20	0.40
Dimethoate	ND	ND	ND	10	0.06
Diquat	ND	ND	ND	150	1
Diuron	ND	ND	ND	280	0.03
Glyphosate	ND	ND	ND	3	1
Malathion	ND	ND	ND	900	0.02
2-methyl-4chlorophenoxyacetic acid (MCPA)	ND	ND	ND	100	0.12
Metolachlor	ND	ND	ND	80	0.01
Metribuzin	ND	ND	ND	80	0.02
Monochlorobenzene	ND	ND	ND	10	0.30
Paraquat	ND	ND	ND	50	1
Pentachlorophenol	ND	ND	ND	2	0.15
Phorate	ND	ND	ND	190	0.01
Picloram	ND	ND	ND	3	1
Polychlorinated Biphenyls(PCB)	ND	ND	ND	1	0.04
Prometryne	ND	ND	ND	10	0.03
Simazine	ND	ND	ND	280	0.01
Terbufos	ND	ND	ND	30	0.01
Tetrachloroethylene	ND	ND	ND	100	0.35
2,3,4,6-Tetrachlorophenol	ND	ND	ND	230	0.20
Triallate	ND	ND	ND	5	0.01
Trichloroethylene	ND	ND	ND	5	0.44
2,4,6-Trichlorophenol	ND	ND	ND	280	0.25
Trifluralin	ND	ND	ND	2	0.02
Vinyl Chloride	ND	ND	ND	1	0.17

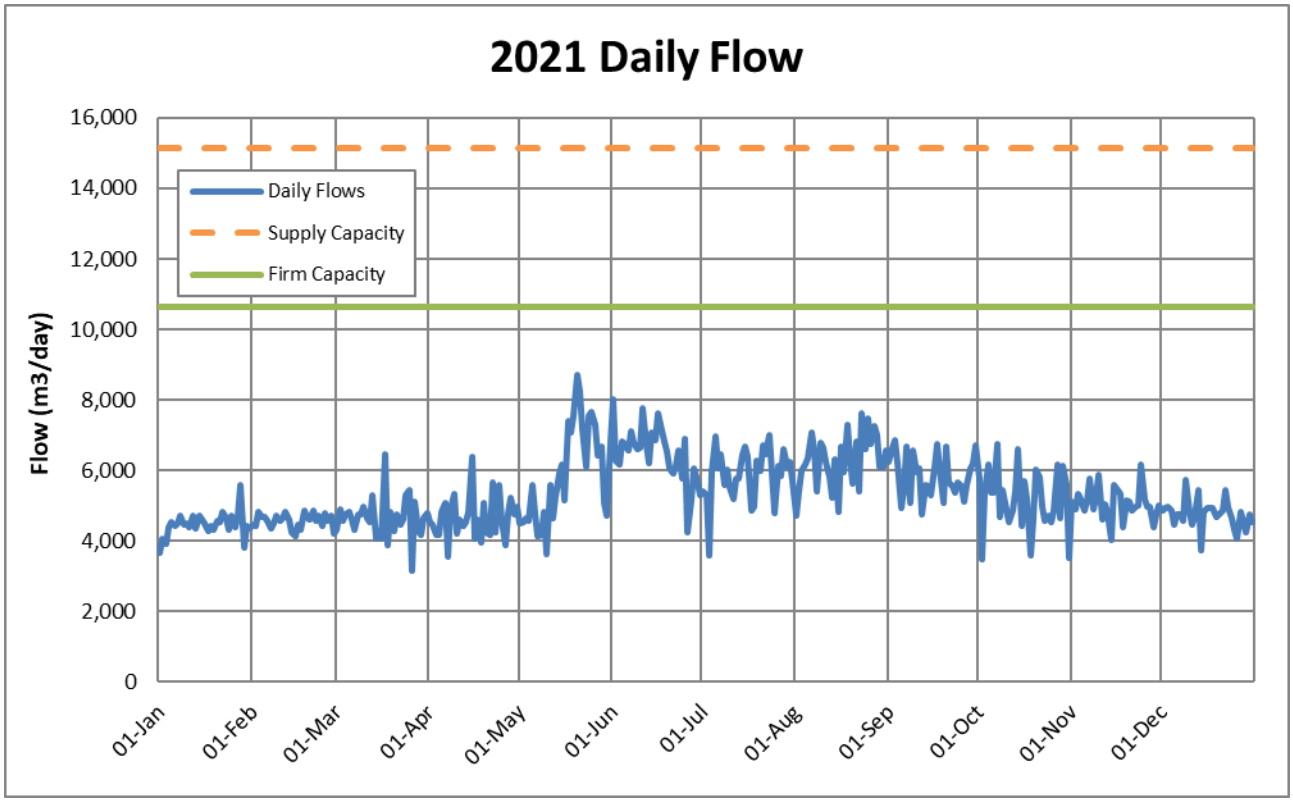
Summary of Organic parameters in Schedule 24 sampled during this reporting period or the most recent sample results. Testing is required every 3 years in secure, Non-GUDI wells at Plank Line and Rokeby Road.

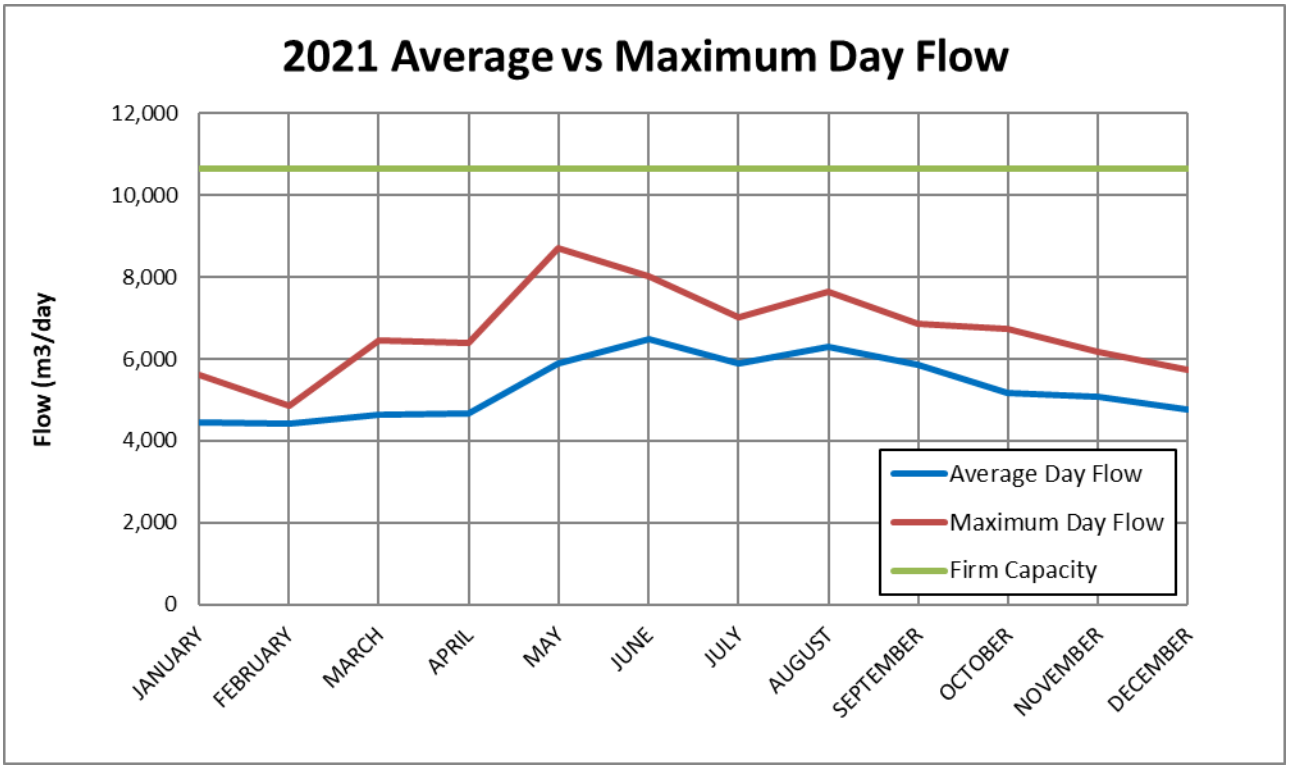
Parameter	*Results (ug/L) Plank Line WTF June 6, 2016 ***	*Plank MDL (ug/L)*	*Results (ug/L) Rokeby Road WTF June 7, 2021*	*MAC (ug/L)*	*Rokeby MDL (ug/L)*
Alachlor	ND	0.02	ND	5	0.02
Atrazine + N-dealkylatedmetobolites	ND	0.01	0.02	5	0.01
Azinphos-methyl	ND	0.01	ND	20	0.05
Benzene	ND	0.32	ND	1	0.32
Benzo(a)pyrene	ND	0.004	ND	0.01	0.004
Bromoxynil	ND	0.33	ND	5	0.33
Carbaryl	ND	0.05	ND	90	0.05
Carbofuran	ND	0.01	ND	90	0.01
Carbon Tetrachloride	ND	0.16	ND	2	0.17
Chlorpyrifos	ND	0.002	ND	90	0.02
Diazinon	ND	0.02	ND	20	0.02
Dicamba	ND	0.02	ND	120	0.20
1,2-Dichlorobenzene	ND	0.20	ND	200	0.41
1,4-Dichlorobenzene	ND	0.41	ND	5	0.36
1,2-Dichloroethane	ND	0.36	ND	5	0.35

Parameter	*Results (ug/L) Plank Line WTF June 6, 2016 ** *	*Plank MDL (ug/L)*	*Results (ug/L) Rokeby Road WTF June 7, 2021*	*MAC (ug/L)*	*Rokeby MDL (ug/L)*
1,1-Dichloroethylene (vinylidene chloride)	ND	0.35	ND	14	0.33
Dichloromethane	ND	0.33	ND	50	0.35
2-4 Dichlorophenol	ND	0.35	ND	900	0.15
2,4-Dichlorophenoxy acetic acid (2,4-D)	ND	0.15	ND	100	0.19
Diclofop-methyl	ND	0.19	ND	9	0.40
Dimethoate	ND	0.40	ND	20	0.06
Diquat	ND	0.03	ND	70	1
Diuron	ND	1	ND	150	0.03
Glyphosate	ND	0.03	ND	280	1
Malathion	ND	1	ND	190	0.02
2-methyl-4chlorophenoxyacetic acid (MCPA) *	*	0.02	ND	100	0.12
Metolachlor	ND	0.12	ND	50	0.01
Metribuzin	ND	0.01	ND	80	0.02
Monochlorobenzene	ND	0.02	ND	80	0.30
Paraquat	ND	0.30	ND	10	1
Pentachlorophenol	ND	1	ND	60	0.15
Phorate	ND	0.15	ND	2	0.01
Picloram	ND	0.01	ND	190	1
Polychlorinated Biphenyls(PCB)	ND	1	ND	3	0.04
Prometryne	ND	0.04	ND	1	0.03
Simazine	ND	0.03	ND	10	0.01
Terbufos	ND	0.01	ND	1	0.01
Tetrachloroethylene	ND	0.01	ND	10	0.35
2,3,4,6-Tetrachlorophenol	ND	0.35	ND	100	0.20
Triallate	ND	0.14	ND	230	0.01
Trichloroethylene	ND	0.01	ND	5	0.44
2,4,6-Trichlorophenol	ND	0.43	ND	5	0.25
Trifluralin	ND	0.25	ND	45	0.02
Vinyl Chloride	ND	0.02	ND	1	0.17
		0.17			

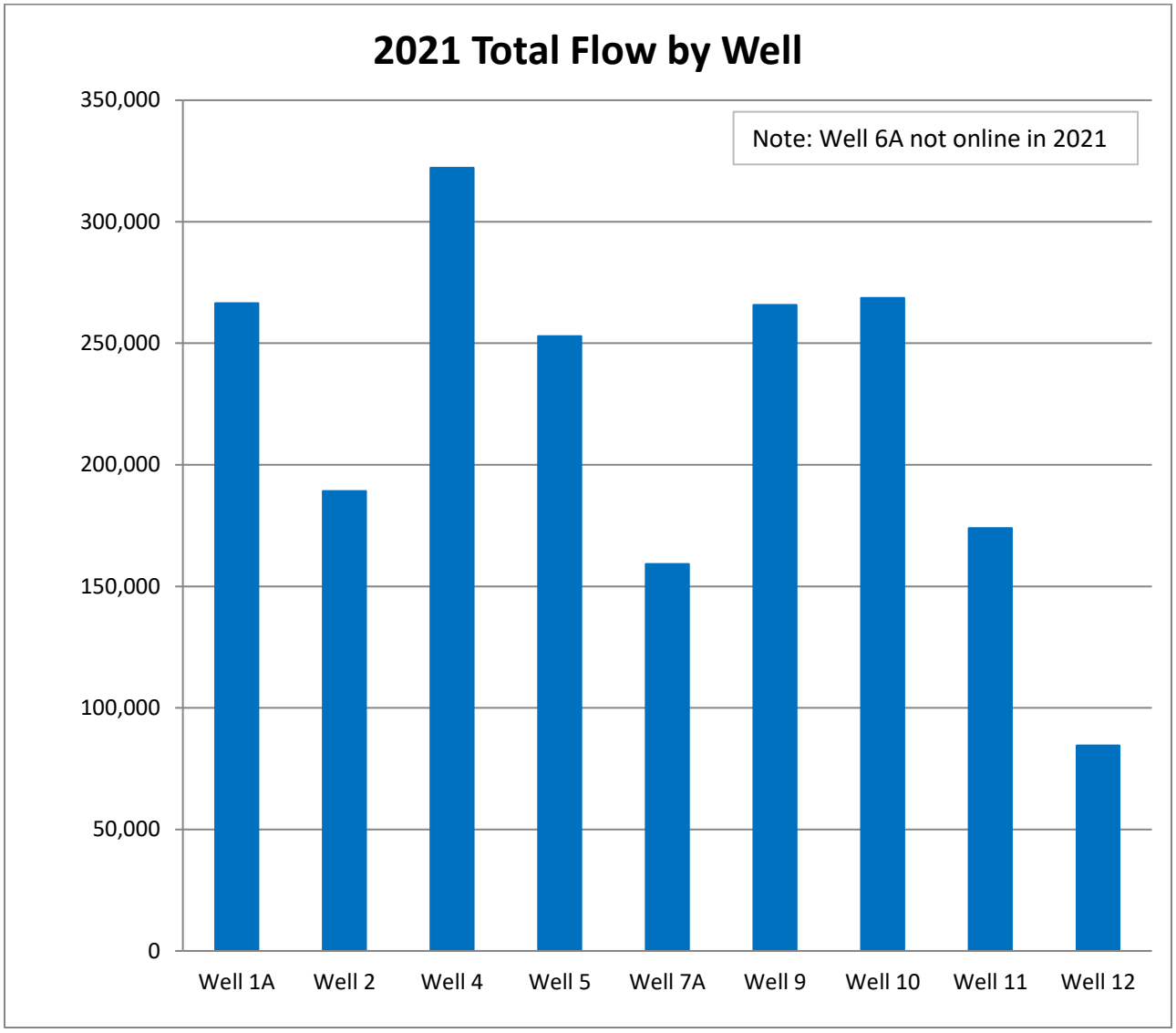
***not running in 2021, * MCPA was added in 2017*

APPENDIX B: WATER QUANTITY SUMMARY





Tillsonburg Firm Capacity 10,627 m^3/day
Tillsonburg Water Supply Capacity 15,300 m^3/day



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