2021 ANNUAL DRINKING WATER SYSTEM SUMMARY REPORT
Bright 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:	Bright Water System
Drinking Water System Number:	220009050
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 Bright Water System is a Large Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and serves a population of approximately 436. The system consists of two well sources which are secure groundwater wells. The water is treated with sodium hypochlorite for disinfection and sodium silicate to sequester iron. In 2021, approximately 820 L of sodium hypochlorite and 820 L (1,160 kg) of sodium silicate were used in the water treatment process. These chemicals are certified to meet standards set by the Standards Council of Canada and American National Standards Institute.

The well facility houses pumps and treatment equipment. A separate pumping station houses high lift pumps, monitoring equipment, an 86 m^3 in-ground reservoir and a 180 m^3 standpipe. A standby generator is available to run the pump station in the event of a power failure. 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 failure of critical operational requirements.

1.2. Major Expenses

The Bright Water System is one of 14 water systems that have revenues and expenses pooled for the economy of scale purposes. The systems are combined into the Township Water financial system and in 2021 had operating and maintenance expenditures of approximately $3,000,000.

Operations and maintenance expenditures included:

- $175,000 for the replacement of general operating equipment and well rehabilitations

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Townships systems totaled $1,500,000 for improvements to water treatment systems and replacement of distribution mains in the Township Systems.

Township Capital Improvement Projects included:

- $65,000 groundwater modeling
- $350,000 for facilities improvements

Capital Improvement projects for all systems included:

- $720,000 to develop Countywide SCADA Master Plan for all water systems
- $14,000 for updated water systems modeling

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 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 no adverse test results from 164 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	104	0	0
Treated	52	0	0
Distribution	112	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	52	0 - 10
Distribution	26	0 - 4

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 Bright 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 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 average sodium level in Bright is 62.7 mg/L.

3.2. Hardness, Iron, and Manganese

These are aesthetic parameters that may affect the appearance of the water but are 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, improve the efficiency of soaps and reduce iron levels. This information is included here to help set the water softener at the level recommended by the manufacturer. Levels of iron less than 0.30 mg/L (ppm) are not considered to cause aesthetic problems such as discoloured water. In Bright, sodium silicate is added to keep the iron in suspension. Manganese is commonly found in conjunction with iron and also causes discoloured water. Manganese levels in this system are at or above the aesthetic objective of 0.05 mg/L

- Samples for hardness are collected at a minimum every 3 years from raw or treated water. The average hardness for the Bright Drinking Water System is 425 mg/L (25 grains/gallon) based on samples collected from 2006 to 2019.
- Iron level was measured at 0.492 mg/L (ppm) in 2021
- Manganese level is 0.04 mg/L (ppm) in 2021

3.3. 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 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 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 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 2021 is provided in the table below.

Parameter	*Number of Tests or Monitoring Frequency*	*Range of Results (Min – Max) and Average*
Chlorine residual in distribution (mg/L)	Continuous	(0.70 – 2.10) 1.19
Chlorine residual after treatment (mg/L)	Continuous	(0.69 – 1.75) 1.30
Turbidity after treatment (NTU)	Continuous	(0.24 – 4.00) 0.50

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 2021 flows are provided in the Table below and presented graphically in Appendix B.

Flow Summary	*Quantity*
Permit to Take Water Limit	327 m^3/d
Municipal Drinking Water License Limit	589 m^3/d
2021 Average Daily Flow	70 m^3/d
2021 Maximum Daily Flow	185 m^3/d
2021 Average Monthly Flow	2,142 m^3
2021 Total Amount of Water Supplied	25,699 m^3

While the PTTW for the system is 327 m^3/day though the wells are not capable of producing this quantity. A more realistic maximum capacity of the system is approximately 296 m^3/day. The County has begun exploration for an additional source.

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 two supply wells. Well 4A is removed for Firm Capacity calculations. The remaining Well 5 has a water taking limit of 86 m^3/day. Firm Capacity of this system is rated at 186 m^3/day with storage capacity of 266 m^3.

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 for 2021 took place in August 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 is reported as required and corrective actions are taken. Below is a summary of the one adverse/reportable occurrence for 2021 along with the corresponding resolution.

Operational Incident: Low Pressure Event and Precautionary Boil Water Advisory		
Prolonged low pressure following a watermain break on September 29, 2021. The watermain was damaged by a third party contractor who was working in the area.	A precautionary boil water advisory for all residents was enacted while bacteriological samples were collected to confirm that there was no contamination to the drinking water system.	All samples were acceptable on October 1, 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 (MDL). 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	*Result Range* Min – Max *(mg/L)*	*Average Result (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Nitrite	ND	ND	1.0	0.003
Nitrate	0.65-0.73	0.70	10.0	0.006

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	20.8	100	0.37
Haloacetic Acids (HAA)	2021	5.83	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	May 21/19	66.2	20.0*	0.01
Fluoride	"	0.09	1.5**	0.06

*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.

Parameter	*Result Range (Min - Max)*	*Number of Samples*	*Acceptable Level*
Distribution Alkalinity	331 - 378	2	30 – 500mg/L
Distribution pH	7.45 -7.53	2	7.5 – 7.53
Distribution Lead 2021	1.01 – 1.90	2	10 ug/L MAC

The following Table summarizes the most recent test results for Schedule 23. Testing is required every 3 years for secure groundwater wells.

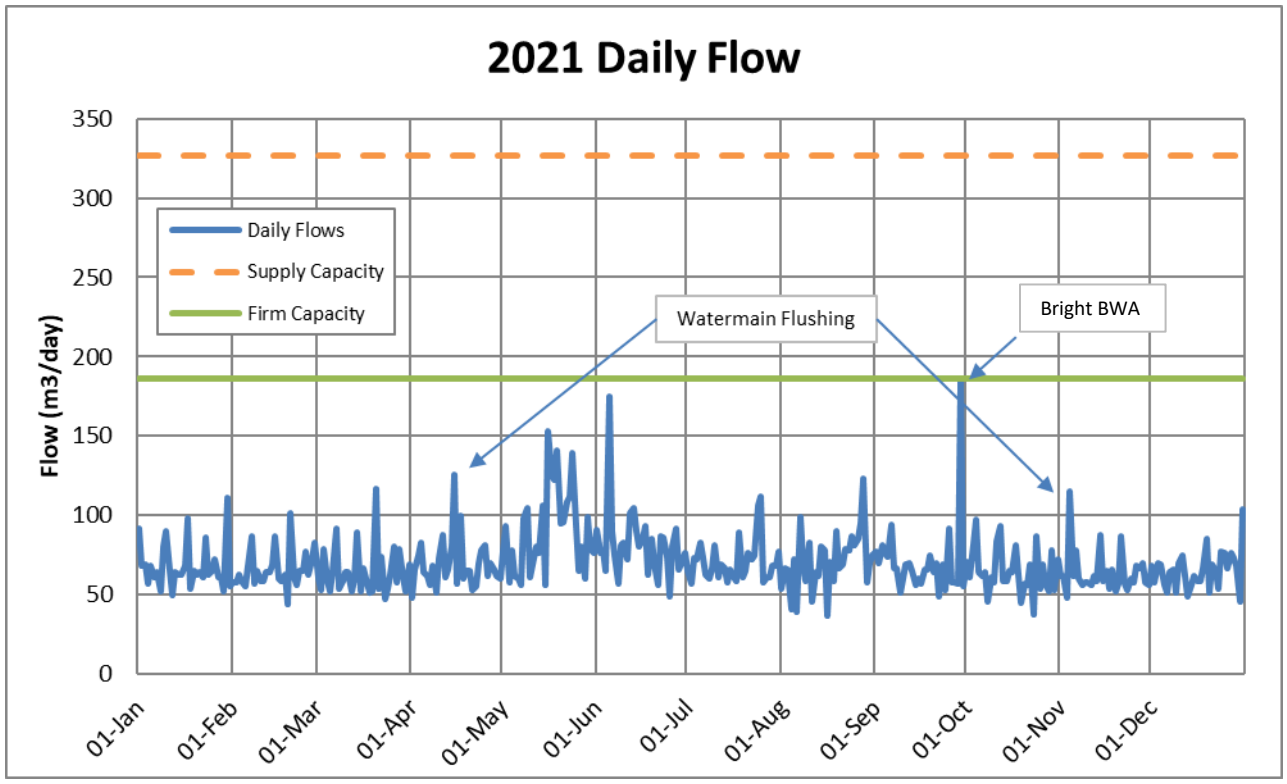
Parameter	*Sample Date*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Antimony	May 21/19	ND	6	0.09
Arsenic	"	1.9	10	0.2
Barium	"	135	1000	0.01
Boron	"	48	5000	2
Cadmium	"	0.014	5	0.003
Chromium	"	0.13	50	0.03
Mercury	"	ND	1	0.01

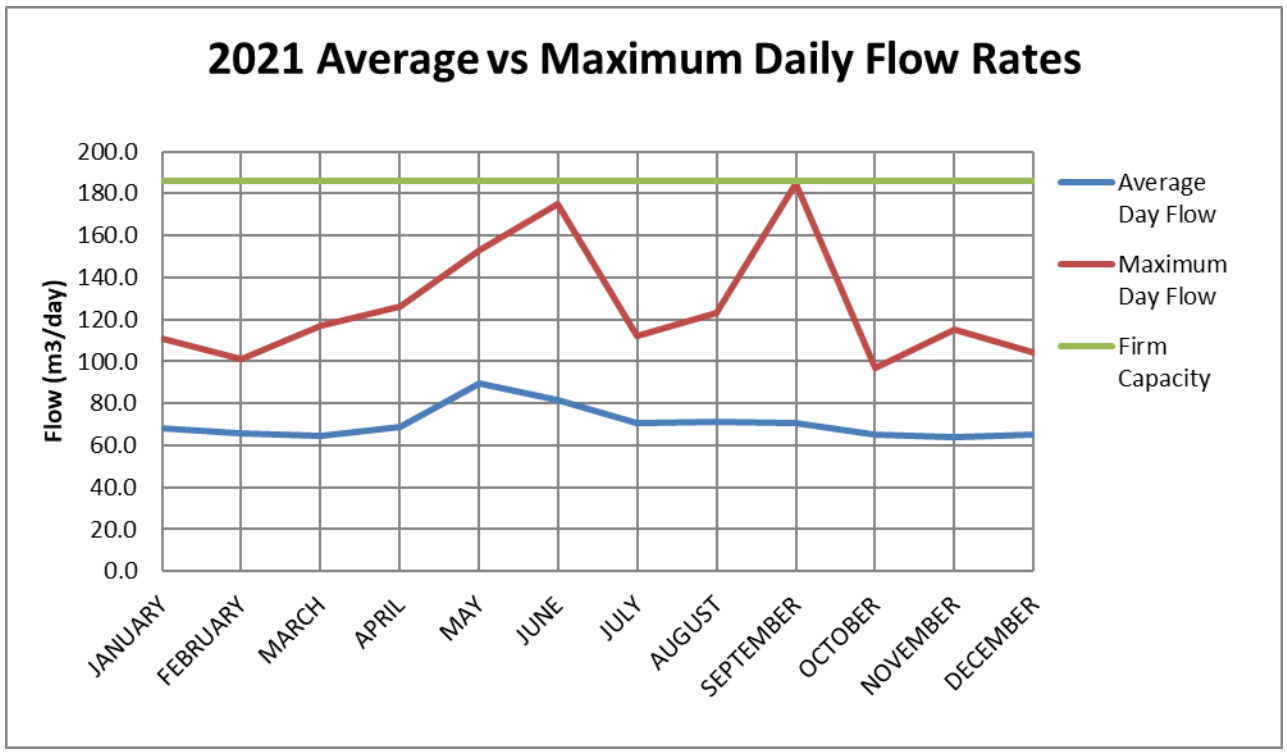
Parameter	*Sample Date*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Selenium	“	0.15	5	0.04
Uranium	“	2.02	20	0.002

The following Table summarizes the most recent test results for Schedule 24. Testing is required every 3 years for secure groundwater wells.

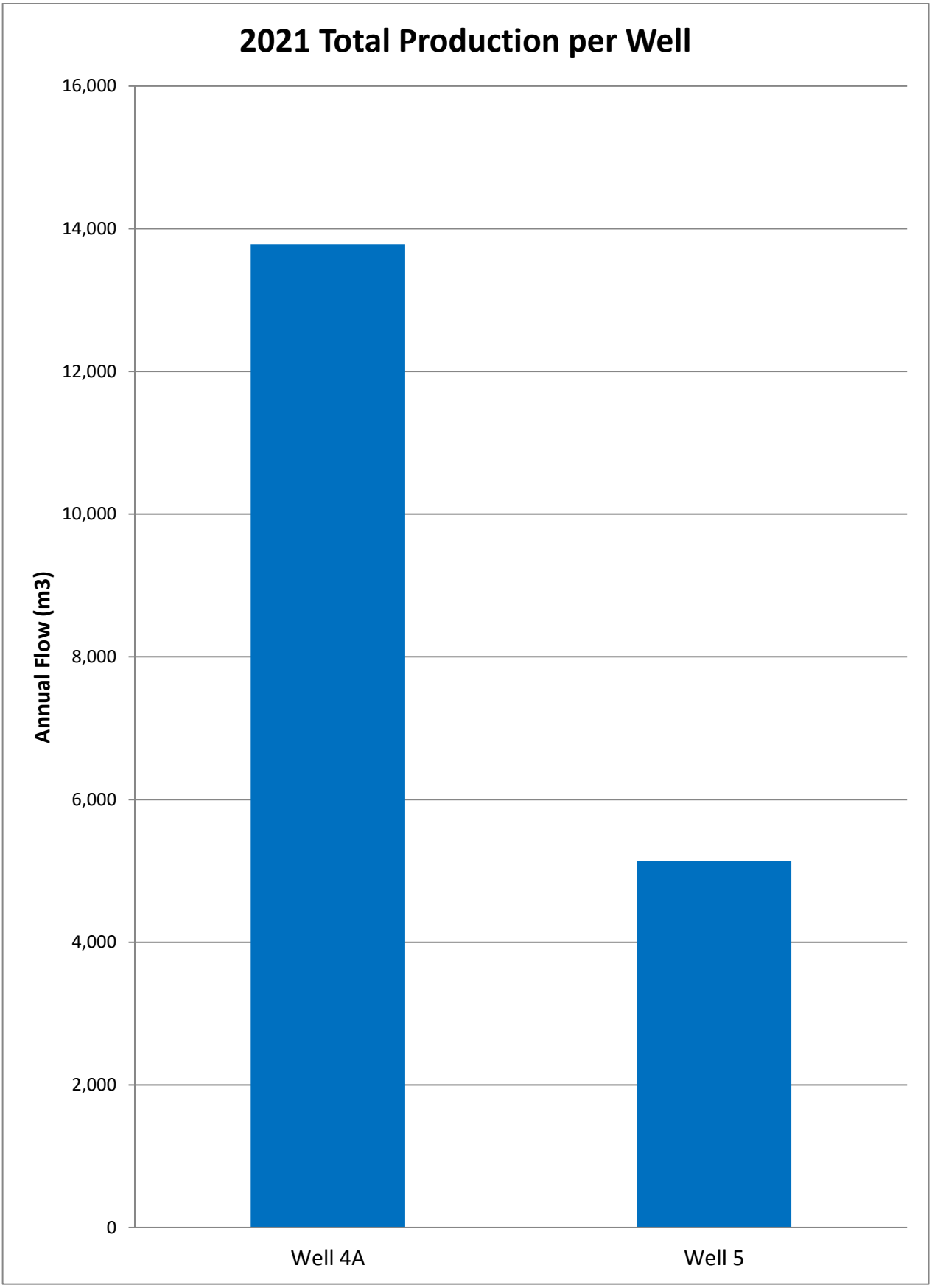
Parameter	*Sample Date*	*Result Value (ug/L)*	*MAC (ug/L)*	*MDL (ug/L)*
Alachlor	June 7, 2021	ND	5	0.02
Atrazine + N-dealkylatedmetobolites	“	ND	5	0.01
Azinphos-methyl	“	ND	20	0.05
Benzene	“	ND	1	0.32
Benzo(a)pyrene	“	ND	0.01	0.004
Bromoxynil	“	ND	5	0.33
Carbaryl	“	ND	90	0.05
Carbofuran	“	ND	90	0.01
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	0.21
1,2-Dichloroethane	“	ND	5	0.36
1,1-Dichloroethylene(vinylidene chloride)	“	ND	14	0.35
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
Diquat	“	ND	70	1
Diuron	“	ND	150	0.03
Glyphosate	“	ND	280	1
Malathion	“	ND	190	0.02
Metolachlor	“	ND	50	0.01
2-methyl-4chlorophenoxyacetic acid (MCPA)	“	ND	100	0.12
Metribuzin	“	ND	80	0.02
Monochlorobenzene	“	ND	80	0.3
Paraquat	“	ND	10	1
Pentachlorophenol	“	ND	60	0.01
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	0.20
Trifluralin	“	ND	45	0.02
Vinyl Chloride	“	ND	1	0.17

APPENDIX B: WATER QUANTITY SUMMARY





Bright Water System Firm Capacity 186 m^3/ day
Bright Water System Supply Capacity 327 m^3 /day



Bright Water System Firm Capacity 186 m^3/ day
Bright Water System Supply Capacity 327 m^3 /day