



2019 ANNUAL DRINKING WATER SYSTEM SUMMARY REPORT Dereham Centre 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:	Dereham Centre Water System
Drinking Water System Number:	2200001510
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, 2019 – December 31, 2019

1.1. System Description

The Dereham Centre Water System is a Small Municipal Water system as defined by Regulation 170/03 and serves a population of approximately 48. The system consists of one groundwater well and a treatment facility. The water is treated with sodium hypochlorite for disinfection and sodium silicate to sequester iron. In addition, since 2018, an arsenic removal filtration system has been piloted at the facility, treating a portion of the supplied water.

In 2019 approximately 114 L of sodium hypochlorite and 113 L of sodium silicate was 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 treatment facility houses pumps, treatment and monitoring equipment and a 37 m³ underground reservoir. A standby generator is available to run the facility 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 Dereham Centre Water System is one of 14 water systems that have revenues and expenses pooled for economy of scale purposes. The systems are combined into the Township Water financial system and in 2019

had forecasted operating and maintenance expenditures of approximately \$2,600,000. In addition to regular operational and maintenance expenditures Capital Improvement projects included:

- \$87,000 for design and testing arsenic filtration at Dereham Centre
- \$35,000 for Township groundwater models
- \$75,000 for Township well rehabs

Capital Improvement projects for all systems included:

- \$65,000 to develop Countywide SCADA Master Plan for all water systems
- \$120,000 Asset Management valuation for all treatment, pumping and storage facilities
- \$76,000 Manganese Treatment study
- \$34,000 Updated Water Modelling software
- \$34,000 TSSA Genset Repairs

2. MICROBIOLOGICAL TESTING

2.1. *E. coli* and Total Coliform

Bacteriological tests for *E. coli* and total coliforms are taken weekly from the raw water at the facility and from the distribution system. Samples of treated water are not required for Small Municipal systems but may be taken periodically. 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 (MECP) and Medical Officer of Health (MOH). Resamples and any other required actions are taken as quickly as possible. The results from the 2019 sampling program are shown on the table below. There were no adverse test results from 59 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	52	0	0
Distribution	59	0	0

2.2. Heterotrophic Plate Count (HPC)

HPC analyses are completed weekly from the distribution water for small systems. 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. 2019 results are shown in the table below.

	<i>Number of Samples</i>	<i>Range of HPC Min - Max</i>
Distribution	53	0 - 13

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 Dereham Centre system is provided below.

3.1. Hardness and Iron

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 and improve the efficiency of soaps. 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 problems such as discoloured water. In Dereham Centre sodium silicate is added to keep iron in suspension.

- Hardness is 255 mg/L (equivalent to 18 grains)
- Iron is 0.58 mg/L

3.2. Additional Testing Required by MECP

In January of 2018, the Maximum Allowable Concentration (MAC) for arsenic was reduced from 25 ug/L to 10 ug/L. In Dereham Centre the average raw water arsenic level is above 10 ug/L, thus treatment is now required. Treated water samples for arsenic are collected weekly to monitor the efficacy of the filtration and various operations such as before and after backwash cycles. Arsenic results ranged from 3.5 to 18.8 ug/L and average 7.7 ug/L. Four treated samples were above the MAC of 10 ug/L. See section 6.2 Adverse Results.

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 2019. 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 2019 is provided in the table below.

<i>Parameter</i>	<i>Number of Tests or Monitoring Frequency</i>	<i>Range of Results (Min – Max) and Average</i>
Chlorine residual in distribution (mg/L)	104	(0.74 – 1.92) 1.13
Chlorine residual after treatment (mg/L)	Continuous	(0.13 – 2.02) 1.16
Turbidity after treatment (NTU)	Continuous	(0.04 – 1.57) 0.20

5. WATER QUANTITY

Continuous monitoring of flowrates from the well 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 2019 flows are provided in the Table below and presented graphically in Appendix B.

<i>Flow Summary</i>	<i>Quantity</i>
Water Taking Limit	50 m ³ /d
Municipal Drinking Water License Limit	78 m ³ /d
2019 Average Daily Flow	9 m ³ /d
2019 Maximum Daily Flow	51 m ³ /d
2019 Average Monthly Flow	280 m ³
2019 Total Amount of Water Supplied	3,359 m ³

In January excess water flows indicated a leak in the distribution system. It was very difficult to determine the location and on March 2 leaks were located and repaired.

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 for 2019 took place in January 2020. 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 taken. Below is a summary of the five adverse/reportable occurrences for 2019 along with the corresponding resolution.

<i>Incident / Date</i>	<i>Corrective Action</i>	<i>Resolution / Date</i>
Treated Water Sample with Chemistry Exceedance		
Arsenic of 10.7 and 10.6 ug/L from samples taken Jan 30 & 31, 2019	Reported. Sample results taken prior to receiving the adverse results showed increasing Arsenic levels and the pilot test had been halted.	Transported water was supplied on February 1, 2019. The filter media was replaced with another type before resuming operation
Arsenic of 18.8 ug/L from a sample taken Apr 29, 2019	Reported, resample taken. DWA issued	Sample results acceptable May 10, 2019, DWA removed
Arsenic of 10.6 ug/L from a sample taken Nov 4, 2019	Reported, resample taken	Sample results acceptable Nov 18, 2019

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 required every 3 months in normal operation.

<i>Parameter</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	ND	ND	1.0	0.003
Nitrate	ND – 0.046	0.018	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.

<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)	2019	7.9	100	0.37
Haloacetic Acids (HAA)	2019	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</i>	<i>Sample Date</i>	<i>Result Value (mg/L)</i>	<i>MAC (mg/L)</i>	<i>MDL (mg/L)</i>
Sodium	Aug 22/16	13.0	20.0*	0.01
Fluoride	"	0.62	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.

<i>Parameter</i>	<i>Result Range (Min - Max)</i>	<i>Number of Samples</i>	<i>Acceptable Level</i>
Distribution Alkalinity	223 - 224	2	30 – 500mg/L
Distribution pH	7.3	2	7.7 – 8.0
Distribution Lead 2018 -19	0.10 - 0.16	2	10 ug/L MAC

The following Table summarizes the most recent test results for Schedule 23. Testing is required every 5 years for secure groundwater wells.

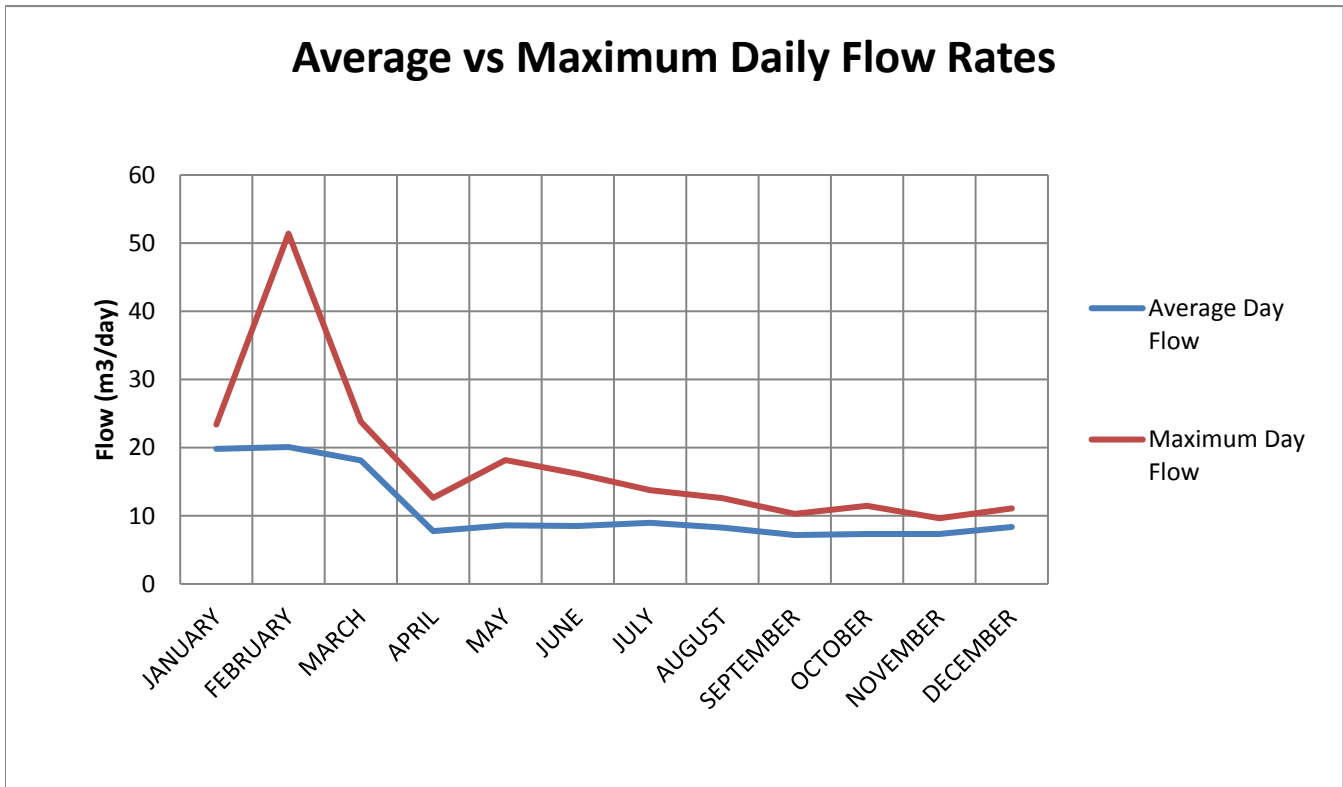
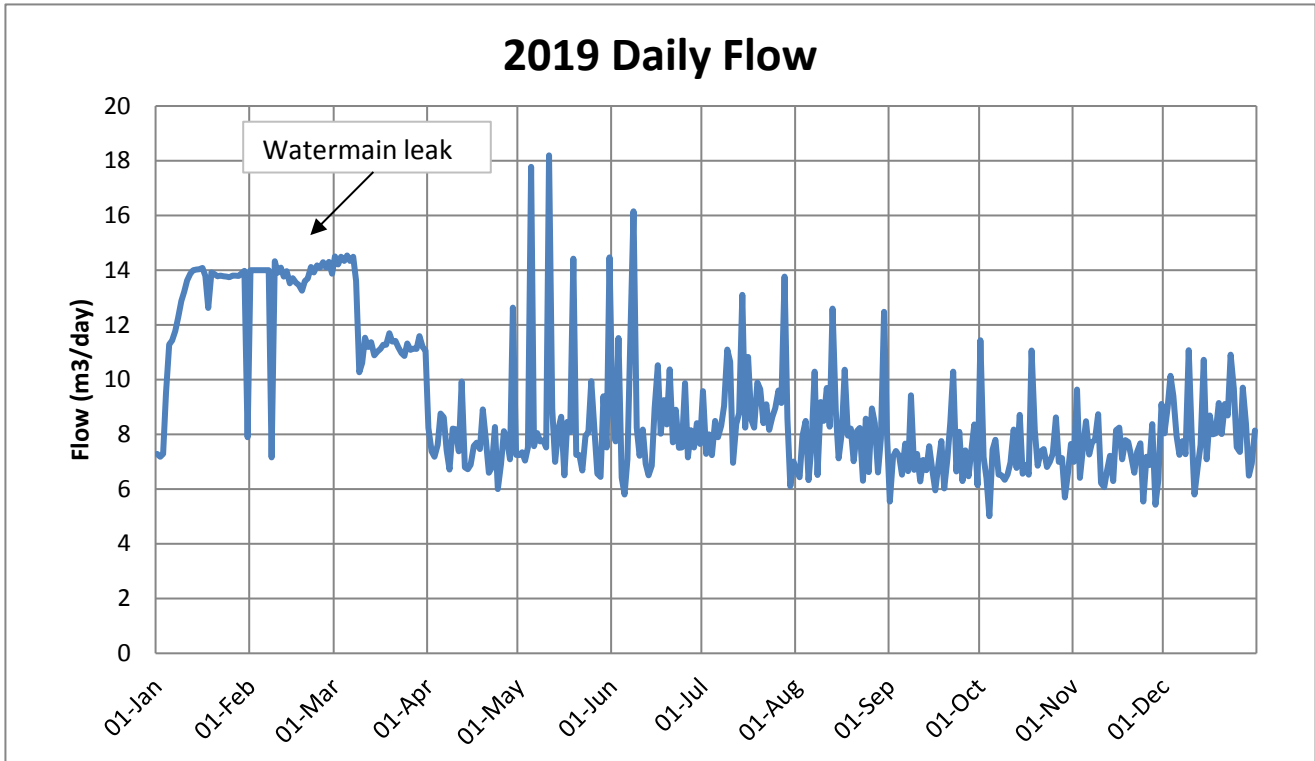
<i>Parameter</i>	<i>Sample Date</i>	<i>Result Value (ug/L)</i>	<i>MAC (ug/L)</i>	<i>MDL (ug/L)</i>
Antimony	Dec 2/19	ND	6	0.09
Arsenic	Annual Average	7.7	10	0.2
Barium	Dec 2/19	239	1000	0.01
Boron	"	29	5000	0.2
Cadmium	"	ND	5	0.003
Chromium	"	0.10	50	0.5
Mercury	"	0.01	1	0.02
Selenium	"	ND	5	1
Uranium	"	0.112	20	0.001

The following Table summarizes the most recent test results for Schedule 24. Testing is required every 5 years for secure groundwater wells.

<i>Parameter</i>	<i>Sample Date</i>	<i>Result (ug/L)</i>	<i>MAC (ug/L)</i>	<i>MDL (ug/L)</i>
Alachlor	Dec 2/19	ND	5	0.02
Aldicarb	"	ND	9	0.01
Aldrin + Dieldrin	"	ND	0.7	0.01
Atrazine + N-dealkylatedmetabolites	"	ND	5	0.01
Azinphos-methyl	"	ND	20	0.02
Bendiocarb	"	ND	40	0.01
Benzene	"	ND	1	0.32
Benzo(a)pyrene	"	ND	0.01	0.004
Bromoxynil	"	ND	5	0.33
Carbaryl	"	ND	90	0.01
Carbofuran	"	ND	90	0.01
Carbon Tetrachloride	"	ND	2	0.16
Chlordane (Total)	"	ND	7	0.01
Chlorpyrifos	"	ND	90	0.02
Cyanazine	"	ND	10	0.03
Diazinon	"	ND	20	0.02
Dicamba	"	ND	120	0.20
1,2-Dichlorobenzene	"	ND	200	0.41
1,4-Dichlorobenzene	"	ND	5	0.36
Dichlorodiphenyltrichloroethane (DDT) + metabolites	"	ND	30	0.01
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
Dinoseb	"	ND	10	0.36
Diquat	"	ND	70	1
Diuron	"	ND	150	0.03
Glyphosate	"	ND	280	6
Heptachlor + Heptachlor Epoxide	"	ND	3	0.01
Lindane (Total)	"	ND	4	0.01
Malathion	"	ND	190	0.02
Methoxychlor	"	ND	900	0.01
Metolachlor	"	ND	50	0.01
Metribuzin	"	ND	80	0.02
Monochlorobenzene	"	ND	80	0.3
Paraquat	"	ND	10	1
Parathion	"	ND	50	0.02
Pentachlorophenol	"	ND	60	0.15
Phorate	"	ND	2	0.01
Picloram	"	ND	190	0.25
Polychlorinated Biphenyls(PCB)	"	ND	3	0.04
Prometryne	"	ND	1	0.03
Simazine	"	ND	10	0.01
Temephos	"	ND	280	0.01
Terbufos	"	ND	1	0.01
Tetrachloroethylene	"	ND	30	0.35
2,3,4,6-Tetrachlorophenol	"	ND	100	0.14
Triallate	"	ND	230	0.01
Trichloroethylene	"	ND	5	0.43

<i>Parameter</i>	<i>Sample Date</i>	<i>Result (ug/L)</i>	<i>MAC (ug/L)</i>	<i>MDL (ug/L)</i>
2,4,6-Trichlorophenol	Dec 2/19	ND	5	0.25
2,4,5-Trichlorophenpoxy acetic acid (2,4,5-T)	"	ND	280	0.22
Trifluralin	"	ND	45	0.02
Vinyl Chloride	"	ND	1	0.17

APPENDIX B: 2019 WATER QUANTITY SUMMARY



Dereham Centre Water System Capacity 72 m³/d