2022 Annual Drinking Water System Summary Report

Dereham Centre Drinking 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 water@oxfordcounty.ca.

Drinking Water System:	Dereham Centre Drinking Water System
Drinking Water System Number:	220001510
Reporting Period:	January 1, 2022 – December 31, 2022

Drinking Water System Owner & Contact Information:

Oxford County Public Works Department - Water Services
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1.1 System Description

The Dereham Centre Drinking Water System is a Small Municipal Water system as defined by Ontario Regulation (O.Reg.) 170/03 and serves a population of approximately 84. The system consists of one secure groundwater well and a treatment facility. The water is treated with sodium hypochlorite for disinfection and in 2022 approximately 48L of sodium hypochlorite was used. This chemical is certified to meet standards set by the Standards Council of Canada or American National Standards Institute.

The treatment facility houses pumps, MD-80 filters to improve water quality, treatment and monitoring equipment, and a 37 m^3 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 Drinking 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 2022 had an operating and maintenance expenditures of approximately $3,300,000.

In addition to regular operational and maintenance expenditures, Capital Improvement Projects for the Townships systems totaled $1,800,000 for improvements to water treatment systems and replacement of distribution mains in the Township System.

Township Capital Improvement Projects included:

- $940,000 distribution replacements
- $228,000 repair and maintenance on wells, water pump stations, and water treatment facilities
- $225,000 for facilities improvements

Capital Improvement projects for all systems included:

- $625,000 to develop Countywide SCADA Master Plan for all water systems
- $150,000 to develop Countywide Water Servicing Master Plan for all water systems

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, 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 2022 sampling program are shown in the table below. There were no adverse test results from 104 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	**52**	**0**	**0**
Treated	**52**	**0**	**0**
Distribution	**52**	**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. 2022 results are shown in the table below.

	Number of Samples	*Range of HPC Min - Max*
Distribution	**52**	**0 - 6**

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. 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. Samples for hardness are collected at a minimum every 3 years from raw water. The hardness for the Dereham Centre Drinking Water System was 255 mg/L (14.9 grains/gallon) based on the sample collected from 2022.

Levels of iron less than 0.30 mg/L (ppm) are not considered to cause problems such as discoloured water. The updated filtration process added in 2021 has effectively reduced iron concentrations in the treated water to below 0.3 mg/L.

Samples for iron were collected quarterly from treated water in 2022. Iron for the Dereham Centre Drinking Water System was less then the detection limit for all samples collected in 2022.

3.2 Additional Testing Required by MECP

The Maximum Allowable Concentration (MAC) for arsenic is 10 µg/L. In Dereham Centre, the average arsenic concentrations in the raw well water are naturally above 10 µg/L. In 2021, filters were installed in Dereham Centre to remove arsenic from the water. After the filters were installed, the MECP reviewed treated water results and approved quarterly sampling for arsenic. In 2022, the arsenic in treated drinking water ranged from 3.3 – 3.6 µg/L, with an average concentration of 3.45 µg/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 actions taken. There were no reportable incidents in 2022. A summary of the chlorine residual readings is provided in the table in section 4.2.

4.2 Turbidity

Turbidity of treated water is continuously monitored at the treatment facility as a change in turbidity can indicate an operational problem. As a minimum, turbidity for each well is required to be tested monthly. Turbidity is measured in nephelometric turbidity units (NTU). Under O. Reg. 170/03 turbidity in groundwater from a secure well or a well with effective in-situ filtration 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 2022 is provided in the table below.

Parameter	*Number of Tests or Monitoring Frequency*	*Range of Results (Min – Max) and Average*
Chlorine residual after treatment (mg/L)	Continuous	(0.31 - 1.84) 1.09
Chlorine residual in distribution (mg/L)	105	(0.82 - 1.43) 1.05
Well 2 turbidity before treatment (NTU)	52	(0.10 - 0.96) 0.27
Turbidity after treatment (NTU)	Continuous	(0.02 - 0.96) 0.08

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 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 2022 flows are provided in the table below and presented graphically in Appendix B.

Flow Summary	*Quantity*
Water Taking Limit	50 m^3/d
Municipal Drinking Water License Limit	78 m^3/d
2022 Average Daily Flow	7 m^3/d
2022 Maximum Daily Flow	22 m^3/d
2022 Average Monthly Flow	297 m^3
2022 Total Amount of Water Supplied	3,567 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.

Firm Capacity of this system is rated at 50 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 water if necessary to maintain system integrity. This system comprises of one supply well that is limited to 50 m^3/day. When this well is not in service 50 m^3/day can be supplied via trucked water.

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 that this report was drafted the Annual MECP Inspection for the Dereham Centre Drinking Water System had not yet taken place.

6.2 Adverse Results

Any adverse results from bacteriological samples, chemical samples, or observations of operational conditions that indicate adverse water quality are reported as required and corrective actions are taken. There were no adverse or reportable occurrences in 2022.

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 PSIB 4449e01 titled "Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines" available at https://cvc.ca/wp-content/uploads/2011/03/std01_079707.pdf.

Results are shown as concentrations with units of either milligrams per litre (mg/L) or micrograms per litre (µg/L). 1 mg/L is equal to 1000 µg/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	*Number of Tests*	*Result Range Min – Max (mg/L)*	*Average Result (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Nitrite	4	ND	ND	1.0	0.003
Nitrate	4	0.008 – 0.010	0.009	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 (µg/L)*	*MAC (µg/L)*	*MDL (µg/L)*
Trihalomethane (THM)	2022	8.2	100	0.37
Haloacetic Acids (HAA)	2022	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	*Sample Date*	*Result Value (mg/L)*	*MAC (mg/L)*	*MDL (mg/L)*
Sodium	August 16, 2021	11.6	20*	0.01
Fluoride	August 16, 2021	0.59	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 2022	224 – 233	2	30 – 500mg/L
Distribution pH 2022	7.83 – 7.84	2	6.5 – 8.5
Distribution Lead 2021	0.22 – 0.41	2	10 µg/L MAC

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

Parameter	*Sample Date*	*Result Value (µg/L)*	*MAC (µg/L)*	*MDL (µg/L)*
Antimony	December 2, 2019	ND	6	0.09
Arsenic	Annual average	3.45	10	0.2
Barium	December 2, 2019	239	1000	0.02
Boron	December 2, 2019	29	5000	2
Cadmium	December 2, 2019	ND	5	0.003
Chromium	December 2, 2019	0.10	50	0.08
Mercury	December 2, 2019	0.01	1	0.01
Selenium	December 2, 2019	ND	50	0.04
Uranium	December 2, 2019	0.112	20	0.002

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

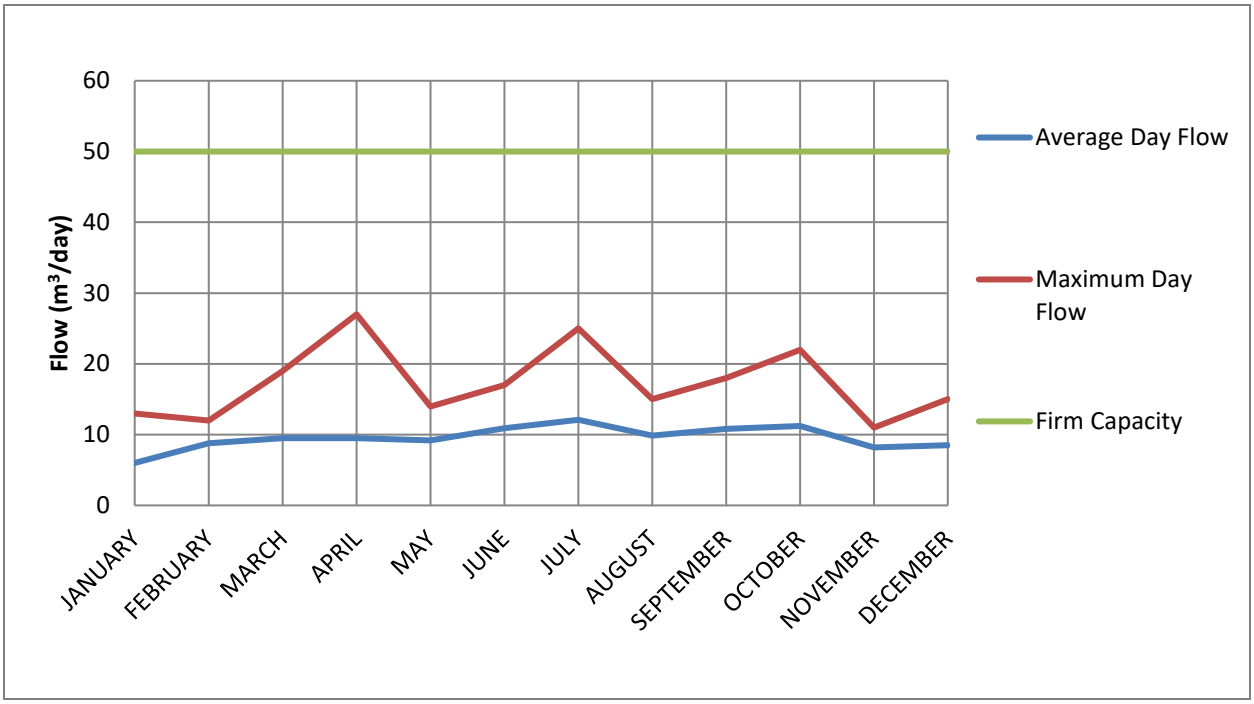
Parameter	*Sample Date*	*Result (µg/L)*	*MAC (µg/L)*	*MDL (µg/L)*
Alachlor	December 2, 2019	ND	5	0.02
Atrazine + N-dealkylatedmetobolites	December 2, 2019	ND	5	0.01
Azinphos-methyl	December 2, 2019	ND	20	0.05
Benzene	December 2, 2019	ND	1	0.32
Benzo(a)pyrene	December 2, 2019	ND	0.01	0.004
Bromoxynil	December 2, 2019	ND	5	0.33
Carbaryl	December 2, 2019	ND	90	0.05
Carbofuran	December 2, 2019	ND	90	0.01
Carbon Tetrachloride	December 2, 2019	ND	2	0.17
Chlorpyrifos	December 2, 2019	ND	90	0.02
Chlorpyrifos	December 2, 2019	ND	90	0.02
Diazinon	December 2, 2019	ND	20	0.02
Dicamba	December 2, 2019	ND	120	0.20
1,2-Dichlorobenzene	December 2, 2019	ND	200	0.41
1,4-Dichlorobenzene	December 2, 2019	ND	5	0.36
1,2-Dichloroethane	December 2, 2019	ND	5	0.35
1,1-Dichloroethylene (vinylidene chloride)	December 2, 2019	ND	14	0.33
Dichloromethane	December 2, 2019	ND	50	0.35
2-4 Dichlorophenol	December 2, 2019	ND	900	0.15
2,4-Dichlorophenoxy acetic acid (2,4-D)	December 2, 2019	ND	100	0.19
Diclofop-methyl	December 2, 2019	ND	9	0.40

Parameter	*Sample Date*	*Result (µg/L)*	*MAC (µg/L)*	*MDL (µg/L)*
Dimethoate	December 2, 2019	ND	20	0.06
Diquat	December 2, 2019	ND	70	1
Diuron	December 2, 2019	ND	150	0.03
Glyphosate	December 2, 2019	ND	280	1
Malathion	December 2, 2019	ND	190	0.02
2-methyl-4chlorophenoxyacetic acid (MCPA)	December 2, 2019	ND	100	0.12
Metolachlor	December 2, 2019	ND	50	0.01
Metribuzin	December 2, 2019	ND	80	0.02
Monochlorobenzene	December 2, 2019	ND	80	0.30
Paraquat	December 2, 2019	ND	10	1
Pentachlorophenol	December 2, 2019	ND	60	0.15
Phorate	December 2, 2019	ND	2	0.01
Picloram	December 2, 2019	ND	190	1
Polychlorinated Biphenyls(PCB)	December 2, 2019	ND	3	0.04
Prometryne	December 2, 2019	ND	1	0.03
Simazine	December 2, 2019	ND	10	0.01
Terbufos	December 2, 2019	ND	1	0.01
Tetrachloroethylene	December 2, 2019	ND	10	0.35
2,3,4,6-Tetrachlorophenol	December 2, 2019	ND	100	0.20
Triallate	December 2, 2019	ND	230	0.01
Trichloroethylene	December 2, 2019	ND	5	0.44
2,4,6-Trichlorophenol	December 2, 2019	ND	5	0.25
Trifluralin	December 2, 2019	ND	45	0.02
Vinyl Chloride	December 2, 2019	ND	1	0.17

APPENDIX B: WATER QUANTITY SUMMARY

Dereham Centre Drinking Water System Firm Capacity 50 m^3/ day
Dereham Centre Drinking Water System Supply Capacity 50 m^3/ day

2022 Average vs Maximum Daily Flow Rates



2022 Daily Flow