



City of Orillia

**2019 Annual Drinking Water System
and Summary Report**

**February 2020
Operations Division
Environmental Services and Operations Department**

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1.0 Introduction

This report has been prepared by the City of Orillia pursuant to Section 11 and Schedule 22 of Ontario Regulation (O. Reg.) 170/03. Section 11 of O.Reg 170/03 requires the preparation of an Annual Report on the drinking water system no later than February 28 of the following year. Schedule 22 of O.Reg 170/03 requires the preparation of a Summary Report no later than March 31 of the following year. The Annual Report is to discuss the overall drinking water system, water treatment chemicals used, testing results and sampling points, corrective actions taken and major expenses incurred. The Summary Report is to discuss the drinking water system's approval (permit and licence), any orders applicable to the system that were not met, and a discussion of the quantities and flow rates of the water supplied to understand the capability of the system to meet existing and planned uses of the system. This consolidated report discusses the requirements of both the Annual Report and the Summary Report.

1.1 Drinking Water System Information

- **Drinking Water System Name:** Orillia Drinking Water System
- **Drinking Water System Number:** 220001183
- **Drinking Water System Owner:** The Corporation of the City of Orillia
- **Drinking Water System Category:** Large Municipal Residential
- **Municipal Drinking Water Licence Number:** 125-101
 - **Issue Date:** August 22, 2016
 - **Expiry Date:** June 6, 2021
- **Drinking Water Works Permit Number:** 125-201
 - **Issue Date:** June 29, 2016
- **Wells (West Orillia Well, Well 1, 2 and 3) Permit to Take Water:** 7638-84FMT2
 - **Issue Date:** April 21, 2010
 - **Expiry Date:** March 31, 2020
- **Lake Couchiching Permit to Take Water:** 91-P-3036
 - **Issue Date:** May 23, 2011
 - **Expiry Date:** February 28, 2021
- **Operational Plan Number:** 125-401
- **Reporting Period:** January 1, 2019 to December 31, 2019
- **Population:** 32,456

1.2 Report Availability

This annual report is available to the public at no charge on the City of Orillia's website, <https://www.orillia.ca/en/living-here/waterqualityreports.aspx> and upon request for printed copies. Accessible formats or communication supports are also available upon request. To access the report in person, or for assistance, please visit:

**City of Orillia
City Centre, 1st Floor Reception
50 Andrew St. S., Suite 300
Orillia, ON L3V 7T5**

1.3 Drinking Water Quality Management System

The City of Orillia has a Drinking Water Quality Management System (DWQMS) in place and is committed to maintaining the highest quality of service and water supply through this quality management system. Information relating to the Quality Management System can be found on the City of Orillia website at <https://www.orillia.ca/en/living-here/drinkingwaterqualitymanagementstandard.aspx>.

The City of Orillia is an accredited Operating Authority, as designated by the Ministry of Environment, Conservation and Parks.

2.0 Description of the Orillia Drinking Water System

2.1 Overview

The Orillia Water Filtration Plant (WFP) is designed to obtain raw water from a surface source (Lake Couchiching) and from two groundwater sources (Wells 1 and 2). An additional high quality groundwater source (West Orillia Well) is also used for supply to the system. All source water is disinfected and delivered through the distribution system to three pressure zones (Zone 1, Zone 2 and Zone 3). Zone 1 supply is managed from the WFP and the Rosemary Road Reservoir. Zone 2 supply is managed from the WFP, the West Orillia Well, and the Harvie Hill Reservoir. Zone 3 is supplied directly from Zone 2.

2.2 Supply

Lake Couchiching is a relatively shallow lake with a maximum depth of 12 m and an average depth of 6 m. The intake for the plant is located approximately 374 m from shore and 3.3 m below the surface. The raw water intake pipe extends into Lake Couchiching and begins at a concrete filled wooden cribbed structure. There is also a standby raw water intake, located approximately 85 m from shore. The supply from Lake Couchiching has a rated capacity of 27,280 m³/day.

Well 1 and Well 2, with a combined capacity of 5,762 m³/day, are located within 160 m of Lake Couchiching shore and are approximately 170 m apart. The combined rated capacity of the WFP (lake based and wells) is 33,042 m³/day. West Orillia Well is rated at a maximum daily flow of 6,550 m³/day.

2.3 Treatment

Using gravity, raw lake water travels through the intake to the WFP. As it enters the WFP, the water passes through a fixed screen and a travelling screen to remove any heavy debris. There are four vertical turbine low lift pumps used to move the water from

the wet well to the remainder of the process in the WFP. The raw water is then mixed with a coagulant (polyaluminum chloride) and coagulant aid (polymer) prior to the three parallel concrete flocculation tanks. From the flocculation tanks, the water travels through the filtration system.

The filtration system is comprised of four dual media (sand with granular activated carbon) filters including a backwash system. The filter effluent then combines with the discharge effluent of the Well 1 and/or 2, if online, to be disinfected. The water passes through the contact chambers and clearwell where it is delivered to the distribution system, using high lift pumps. Three vertical turbine pumps are dedicated to delivering water to Zone 1, and three vertical turbine pumps are dedicated to delivering water to Zone 2.

Prior to the introduction at the WFP, the raw water from the Well 1 and Well 2 is treated using an air stripping process for the removal of trichloroethylene (TCE) and tetrachloroethylene (PCE).

2.4 Disinfection

The gas chlorination system consists of five chlorinators dedicated for pre-chlorination, post-chlorination and post-post chlorination. Redundancy of the chlorinators is built in to the design (duty/standby). Two 0.909 tonne cylinders of liquefied chlorine are kept online at all times with two vacuum regulators and an automatic cylinder switchover system.

The raw water from Lake Couchiching is pre-chlorinated at the intake in the summer months for zebra mussel control, and in-plant at all other times. The effluent from the filters, and additionally from the wells, is combined for chlorine disinfection (secondary) at the WFP. Further disinfection can be added prior to entering the distribution system if required.

The primary disinfection method of the drinking water is through three flow-through ultraviolet (UV) reactors (one duty for each zone, and one standby). The UVs are located after the high lift pumps and prior to discharge to the distribution system.

The West Orillia Well is disinfected using sodium hypochlorite.

2.5 Storage

The WFP has storage of approximately 4,110 m³ between the chlorine contact chambers and clearwell. This storage supplies both Zone 1 and Zone 2. Rosemary Road Reservoir (two tanks) has a total storage capacity of 10,500 m³ and supplies Zone 1. Harvie Hill Reservoir has a storage capacity of 7,800 m³ and supplies Zone 2 and Zone 3.

2.6 Distribution System

The distribution system is a network of approximately 198 kilometres of various sized piping servicing the approximately 32,456 people, businesses and facilities within Orillia throughout the three pressure zones.

The system also contains 1,193 hydrants (933 municipal and 260 private), 2,687 control valves, 61 air relief valves, 7 pressure reducing valves used to control flow between the pressure zones (6 municipal and 1 private), 10 blow offs, 4 permanent auto-flushers and 18 sampling stations (17 municipal and 1 private).

The Zone 3 Booster Pumping Station boosts the pressure from Zone 2 to deliver to the Zone 3 using two booster pumps and two high flow pumps.

2.7 Emergency Backup

The WFP, West Orillia Well and the Zone 3 Booster Pumping Station are all protected with standby generators in the event of a power outage. The WFP and the Zone 3 Booster Pumping Station have an onsite generator dedicated for their use. The West Orillia Well is fed from the backup generator located at the nearby Champlain Sewage Pumping Station.

3.0 Significant Expenses

The following is a list of significant expenses incurred for the maintenance and operation of treatment and supply equipment.

4.0 Adverse Water Quality Incident (AWQI) Reports

In 2019 there were five (5) AWQI reports made. Below summarizes each notification.

AWQI 146261 – A sample taken on July 8, 2019 had a result of four (4) Total Coliform. The accredited laboratory that conducted the test notified the City of the result. The corrective actions included increasing the chlorine dosage at the Water Filtration Plant, flushing in the localized area where the sample was taken, and taking two (2) sets of resamples on consecutive days. All resamples were acceptable (0 Total Coliform, 0 E. Coli).

AWQI 146262 – A sample taken on July 8, 2019 had a result of seven (7) Total Coliform and one (1) E. Coli. The accredited laboratory that conducted the test notified the City of the result. The corrective actions included increasing the chlorine dosage at the Water Filtration Plant, flushing in the localized area where the sample was taken, and taking two (2) sets of resamples on consecutive days. All resamples were acceptable (0 Total Coliform, 0 E. Coli).

AWQI 146949 – A sample taken on July 29, 2019 had a result of one (1) Total Coliform. The accredited laboratory that conducted the test notified the City of the result. The corrective actions included flushing in the localized area where the sample was taken and taking one (1) set of resamples. All resamples were acceptable (0 Total Coliform, 0 E. Coli).

AWQI 148124 – A sample taken on September 18, 2019 at a private fire hydrant was tested for free chlorine. The result of the test was 0.00 mg/L. The requirement under O. Reg. 170/03 is that the free chlorine residual be maintained above 0.05 mg/L at all times. The private fire hydrant was at the end of a watermain that had no customer services to it and only supplied the hydrant. Upstream of this watermain had a free chlorine residual of 0.99 mg/L. The hydrant was flushed until 1.11 mg/L free chlorine residual was achieved.

AWQI 148998 – A sample taken on November 12, 2019 had a result of ten (10) Total Coliform. The accredited laboratory that conducted the test notified the City of the result. The corrective actions included flushing in the localized area where the sample was taken and taking one (1) set of resamples. All resamples were acceptable (0 Total Coliform, 0 E. Coli).

5.0 Non-Compliance and Corrective Actions

As noted above, the instance of having less than 0.05 mg/L of a free chlorine residual in the distribution system is considered a non-compliant event. The event was reported to the Ministry of Environment, Conservation and Parks (MECP) and all required corrective actions were taken.

The MECP, during the annual inspection, was satisfied with the response and noted this in their Inspection Report:

“The Operator flushed the line and achieved a residual of 1.11mg/L free chlorine. All verbal and written notifications were made as per Regulatory requirements. No further action is required.”

No Provincial Orders were issued during the reporting period.

6.0 Treatment Chemicals

Various chemicals are used throughout the treatment process from source to tap. Please refer the system description for further information on the use of the chemicals throughout the treatment process.

Figure 1: Summary of Chemicals Used in 2019

Month	Water Filtration Plant			West Orillia Well
	Polyaluminum Chloride (L)	Magnafloc LT (L)	Liquefied Chlorine (kg)	Sodium Hypochlorite (L)
January	4,345	252	1,265	1,104
February	3,904	226	1,209	937
March	3,956	229	1,338	993
April	4,446	256	1,411	985
May	4,206	242	1,270	1,239
June	4,108	237	1,291	1,060
July	5,281	301	1,804	1,162
August	4,574	256	1,640	978
September	4,545	260	1,489	885
October	3,840	215	812	1,532
November	3,506	202	1,028	1,254
December	3,795	243	1,132	1,001
Totals	50,506	2,919	15,689	13,130

In the distribution system, sodium hypochlorite and sodium thiosulphate are used as needed and quantities are not tracked.

7.0 Rated Capacity Assessment

Figures 2 to 4 on the following pages illustrate the water supplied and the capacity of the system and its components.

Figure 2: System Summary

Item	2015	2016	2017	2018	2019	5 Yr. Avg.
System Average Day Flow (m ³ /day)*	11,809	11,464	10,618	10,944	10,921	11,151
System Maximum Day Flow (m ³ /day)*	14,492	15,748	12,394	16,797	12,708	14,428
Rated Capacity of System (m ³ /day)*	39,592					
Maximum Day/Rated Capacity (%)	37.0	40.0	31.0	42.4	32.1	N/A
Total Yearly WFP Flow (ML)	3,060	3,473	3,122	2,847	3,093	3,119
Total Yearly West Orillia Well Flow (ML)	1,250	712	755	1,214	895	965
Total Yearly System Flow (ML)	4,310	4,185	3,877	4,061	3,988	4,084

*The System values include data from all sources – WFP, Wells 1 and 2 and WOW.

Figure 3: WFP Summary for 2019

Month	Total Flow (m ³)	Minimum (m ³ /day)	Maximum (m ³ /day)	Maximum Day/Rated Capacity (%)
January	259,630	5,740	11,471	34.7
February	231,015	5,823	11,569	35.0
March	254,738	5,764	11,490	34.8
April	245,501	5,519	11,526	34.9
May	250,422	6,111	12,315	37.3
June	269,818	6,351	12,796	38.7
July	310,802	7,431	13,311	40.3
August	292,965	6,896	12,954	39.2
September	271,811	5,406	11,533	34.9
October	235,643	5,416	10,950	33.1
November	220,617	4,980	9,065	27.4
December	249,742	5,397	10,816	32.7
Total	3,092,704	-	-	-

Note: Rated capacity for WFP is 33,042 m³/day

Figure 4: West Orillia Well Summary for 2019

Month	Total Flow (m³)	Minimum (m³/day)	Maximum (m³/day)	Maximum Day/ Rated Capacity (%)
January	75,743	0	4,244	64.8
February	64,259	0	4,404	67.2
March	68,549	0	4,173	63.7
April	68,701	0	4,280	65.3
May	86,611	0	4,268	65.2
June	75,945	0	4,233	64.6
July	78,190	0	3,948	60.3
August	70,251	0	4,179	63.8
September	53,386	0	4,391	67.0
October	97,225	0	4,842	73.9
November	89,175	1,352	4,495	68.6
December	67,167	0	3,393	51.8
Total	895,202	-	-	-

Note: Rated capacity for the West Orillia Well is 6,550 m³/day

8.0 Water Quality Analysis

Figures 5 to 9 illustrate the water quality analysis conducted on the drinking water system for various parameters.

No inorganic or organic parameters exceeded half the standard as prescribed in Schedule 2 of O. Reg. 169/03 for this reporting period.

8.1 Testing Required Under Schedules 10 and 7 of O. Reg. 170/03

Figure 5: Microbiological Sample Results Required under Schedule 10 of O. Reg. 170/03 for 2019

Facility	Parameter	Source	Number of Samples	Number of Detections
Water Filtration Plant	E. Coli	Raw (Lake Couchiching)	52	13
		Raw (Well 1)	51	0
		Raw (Well 2)	49	0
		Treated	106	0
	Total Coliforms	Raw (Lake Couchiching)	52	45
		Raw (Well 1)	51	0
		Raw (Well 2)	49	0
		Treated	106	0
HPC	Treated	106	10	
West Orillia Well	E. Coli	Raw	53	0
		Treated	53	0
	Total Coliforms	Raw	53	0
		Treated	53	0
	HPC	Treated	53	2
Distribution System	E. Coli		555	1
	Total Coliforms		555	4
	HPC		167	29

Note: HPC – Heterotrophic Plate Count

Figure 6: Operational Testing Required Under Schedule 7 of O. Reg. 170/03 for 2019

Facility	Parameter	Source	Type	Number of Samples	Range of Results (Minimum to Maximum)
Water Filtration Plant	Turbidity (NTU)	Raw (Lake Couchiching)	C	8,760	0.00 – 10.00
			G	249	0.24 – 0.93
		Raw (Well 1)	G	55	0.05 – 0.15
		Raw (Well 2)	G	51	0.05 – 0.14
	Free Chlorine (mg/L)	Treated	C	8,760	0.86 – 2.99
G			498	1.44 – 2.41	
West Orillia Well	Turbidity (NTU)	Raw	G	53	0.04 – 0.16
	Free Chlorine (mg/L)	Treated	C	8,760	0.07 – 5.00
			G	249	1.00 – 1.76
Distribution System	Free Chlorine (mg/L)		G	920	0.00 – 2.12

Notes: C = Continuous Monitoring

G = Grab Sample

Continuous monitoring equipment is recorded as 8,760 samples.

8.2 Chemical Testing Required under Schedules 13 and 15.1 of O. Reg. 170/03

Figure 7: Water Filtration Plant – Treated Single Sample for 2019

Parameter	Units	Result	Date of Sample
Alachlor	µg/L	<0.02	June 10, 2019
Antimony	µg/L	<0.09	June 10, 2019
Arsenic	µg/L	1.4	June 10, 2019
Atrazine + N-dealkylated metabolites	µg/L	<0.01	June 10, 2019
Azinphos-methyl	µg/L	<0.05	June 10, 2019
Barium	µg/L	38.4	June 10, 2019
Benzene	µg/L	<0.32	June 10, 2019
Benzo(a)pyrene	µg/L	<0.004	June 10, 2019
Boron	µg/L	20	June 10, 2019
Bromoxynil	µg/L	<0.33	June 10, 2019

Parameter	Units	Result	Date of Sample
Cadmium	µg/L	<0.003	June 10, 2019
Carbaryl	µg/L	<0.05	June 10, 2019
Carbofuran	µg/L	<0.01	June 10, 2019
Carbon Tetrachloride	µg/L	<0.17	June 10, 2019
Chlorpyrifos	µg/L	<0.02	June 10, 2019
Chromium	µg/L	0.17	June 10, 2019
Diazinon	µg/L	<0.02	June 10, 2019
Dicamba	µg/L	<0.20	June 10, 2019
1,2-Dichlorobenzene	µg/L	<0.41	June 10, 2019
1,4-Dichlorobenzene	µg/L	<0.36	June 10, 2019
1,2-Dichloroethane	µg/L	<0.33	June 10, 2019
1,1-Dichloroethylene (vinylidene chloride)	µg/L	<0.35	June 10, 2019
Dichloromethane	µg/L	<0.35	June 10, 2019
2,4-Dichlorophenol	µg/L	<0.15	June 10, 2019
2,4-Dichlorophenoxyacetic acid (2,4-D)	µg/L	<0.19	June 10, 2019
Diclofop-methyl	µg/L	<0.40	June 10, 2019
Dimethoate	µg/L	<0.06	June 10, 2019
Diquat	µg/L	<1	June 10, 2019
Diuron	µg/L	<0.03	June 10, 2019
Fluoride	mg/L	0.07	June 10, 2019
Glyphosate	µg/L	<1	June 10, 2019
Malathion	µg/L	<0.02	June 10, 2019
Mercury	µg/L	<0.01	June 10, 2019
MCPA (2-methyl-4-chlorophenoxyacetic acid)	mg/L	<0.00012	June 10, 2019
Metolachlor	µg/L	<0.01	June 10, 2019
Metribuzin	µg/L	<0.02	June 10, 2019
Monochlorobenzene	µg/L	<0.3	June 10, 2019
Paraquat	µg/L	<1	June 10, 2019
Pentachlorophenol	µg/L	<0.15	June 10, 2019
Phorate	µg/L	<0.01	June 10, 2019
Picloram	µg/L	<1	June 10, 2019
Polychlorinated Biphenyls (PCB)	µg/L	<0.04	June 10, 2019
Prometryne	µg/L	<0.03	June 10, 2019
Selenium	µg/L	0.11	June 10, 2019
Simazine	µg/L	<0.01	June 10, 2019

Parameter	Units	Result	Date of Sample
Sodium	mg/L	33.7	June 10, 2019
Terbufos	µg/L	<0.01	June 10, 2019
Tetrachloroethylene	µg/L	<0.35	June 10, 2019
2,3,4,6-Tetrachlorophenol	µg/L	<0.20	June 10, 2019
Triallate	µg/L	<0.01	June 10, 2019
Trichlorethylene	µg/L	<0.44	June 10, 2019
2,4,6-Trichlorophenol	µg/L	<0.25	June 10, 2019
Trifluralin	µg/L	<0.02	June 10, 2019
Uranium	µg/L	0.257	June 10, 2019
Vinyl Chloride	µg/L	<0.17	June 10, 2019

Figure 8: West Orillia Well – Treated Single Sample for 2019

Parameter	Units	Result	Date of Sample
Fluoride	mg/L	0.13	June 10, 2019
Sodium	mg/L	26.6	June 10, 2019

Figure 9: Multiple Samples through Reporting Period for 2019

Parameter	Source	Unit	Average	Minimum	Maximum	Number of Samples
Nitrate	WFP	mg/L	0.119	0.043	0.3226	4
	WOW		3.080	3.020	3.120	4
Nitrite	WFP	mg/L	0.003	<0.003	<0.003	4
	WOW		0.003	<0.003	<0.003	4
Lead	Distribution	µg/L	0.10	0.05	0.22	4
Alkalinity		mg/L	149	88	269	8
pH			7.6	7.4	7.8	8
THM		µg/L	39.5	6.9	72.0	4
HAA		µg/L	35.9	5.3	65.3	4