



City of Orillia

**2020 Annual Drinking Water System
and Summary Report**

**February 2021
Environmental Services Division
Environment and Infrastructure Services Department**

Table of Contents

1.0	Introduction.....	3
1.1	Drinking Water System Information.....	3
1.2	Report Availability	4
1.3	Drinking Water Quality Management System.....	4
2.0	Description of the Orillia Drinking Water System.....	4
2.1	Overview	4
2.2	Supply	4
2.3	Treatment.....	5
2.4	Disinfection.....	5
2.5	Storage	5
2.6	Distribution System	6
2.7	Emergency Backup	6
3.0	Significant Expenses	6
4.0	Adverse Water Quality Incident (AWQI) Reports.....	6
5.0	Non-Compliance and Corrective Actions.....	7
6.0	Treatment Chemicals	7
7.0	Rated Capacity Assessment	8
8.0	Water Quality Analysis	10
8.1	Testing Required Under Schedules 10 and 7 of O. Reg. 170/03	10
8.2	Chemical Testing Required under Schedules 13 and 15.1 of O. Reg. 170/03 ..	11

List of Tables

Table 1:	Summary of Chemicals Used in 2020	7
Table 2:	System Summary	8
Table 3:	WFP Summary for 2020	8
Table 4:	West Orillia Well Summary for 2020.....	9
Table 5:	Microbiological Sample Results Required under Schedule 10 of O. Reg. 170/03 for 2020	10
Table 6:	Operational Testing Required Under Schedule 7 of O. Reg. 170/03 for 2020 ..	11
Table 7:	Water Filtration Plant – Treated Single Sample for 2020	11
Table 8:	West Orillia Well – Treated Single Sample for 2020.....	13
Table 9:	Multiple Samples through Reporting Period for 2020	13

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
- **Groundwater Permit to Take Water:** P-300-5069408381
West Orillia Well, Well 1 and 2
 - **Issue Date:** April 20, 2020
 - **Expiry Date:** March 31, 2030
- **Surface Water Permit to Take Water:** 2865-BVER7T
Lake Couchiching
 - **Issue Date:** November 16, 2020
 - **Expiry Date:** November 16, 2030
- **Operational Plan Number:** 125-401
- **Reporting Period:** January 1, 2020 to December 31, 2020

- **Population:** 33,367

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 33,367 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.

- Harvie Hill Reservoir (Safety Equipment Installation) \$ 61,160
- Front Street Watermain Replacement (Phase 2) \$903,400
- Horne Business Park Extension Watermain \$327,255
- Radio Antenna Replacements \$ 32,605
- Virtualization of the SCADA System \$120,000
- Various Instrument Replacement \$ 50,089
- Replacement of Valve Actuators \$ 20,966

4.0 Adverse Water Quality Incident (AWQI) Reports

In 2020, there were three (3) AWQI reports made. Below summarizes each notification.

AWQI 149977 – A 150 mm watermain servicing 70 Front St. N broke on May 13, 2020. The watermain was observed to have contained debris from the trench and was unable to be satisfactorily removed. The pipe was repaired, following the Watermain Disinfection Procedure, water was flushed until adequate chlorine residual was obtained, and two (2) sets of samples were taken. The user was asked to boil water and/or use an alternate source of potable water until directed. All resamples were acceptable (0 Total Coliform, 0 E. Coli).

AWQI 150450 – A sample taken on June 29, 2020 had a result of twenty (20) Total Coliform. The accredited laboratory that conducted the test notified the City of the result. The flushing in the localized area where the sample was taken, and a set of three (3) resamples. All resamples were acceptable (0 Total Coliform, 0 E. Coli).

AWQI 150451 – A sample taken on June 29, 2020 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 a set of three (3) resamples. All resamples were acceptable (0 Total Coliform, 0 E. Coli).

5.0 Non-Compliance and Corrective Actions

No Non-Compliance events were identified during the reporting period. 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.

Table 1: Summary of Chemicals Used in 2020

Month	Water Filtration Plant			West Orillia Well
	Polyaluminum Chloride (L)	Magnafloc LT (L)	Liquefied Chlorine (kg)	Sodium Hypochlorite (L)
January	3,896	262	1,273	631
February	3,399	214	1,089	924
March	3,773	247	1,265	983
April	3,143	200	1,029	1,128
May	3,071	185	1,006	1,593
June	4,719	294	1,587	1,061
July	5,180	326	1,938	824
August	5,420	328	2,140	853
September	4,877	305	1,952	932
October	4,482	8	1,609	530

Month	Water Filtration Plant			West Orillia Well
	Polyaluminum Chloride (L)	Magnafloc LT (L)	Liquefied Chlorine (kg)	Sodium Hypochlorite (L)
November	4,678	-	1,465	249
December	4,209	-	1,210	692
Totals	50,847	2,369	17,563	10,400

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.

Table 2: System Summary

Item	2016	2017	2018	2019	2020	5 Yr. Avg.
System Average Day Flow (m ³ /day)*	11,464	10,618	10,944	10,921	10,988	10,987
System Maximum Day Flow (m ³ /day)*	15,748	12,394	16,797	12,708	12,548	14,039
Rated Capacity of System (m ³ /day)*	39,592					
Maximum Day/Rated Capacity (%)	40.0	31.0	42.4	32.1	38.4	N/A
Total Yearly WFP Flow (ML)	3,473	3,122	2,847	3,093	3,372	3,181
Total Yearly West Orillia Well Flow (ML)	712	755	1,214	895	639	843
Total Yearly System Flow (ML)	4,185	3,877	4,061	3,988	4,011	4,024

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

Table 3: WFP Summary for 2020

Month	Total Flow (m ³)	Minimum (m ³ /day)	Maximum (m ³ /day)	Maximum Day/Rated Capacity (%)
January	282,550	5,733	11,543	34.9
February	236,727	6,565	10,094	30.5
March	260,767	6,227	10,782	32.6

Month	Total Flow (m ³)	Minimum (m ³ /day)	Maximum (m ³ /day)	Maximum Day/ Rated Capacity (%)
April	214,494	4,135	10,202	30.9
May	215,757	4,106	10,499	31.8
June	297,949	6,900	11,796	35.7
July	341,917	8,745	13,353	40.4
August	356,450	8,426	13,610	41.2
September	323,450	9,230	11,911	36.0
October	291,895	5,466	11,056	33.5
November	286,134	6,717	11,615	35.2
December	264,179	6,372	10,995	33.3
Total	3,372,269	-	-	-

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

Table 4: West Orillia Well Summary for 2020

Month	Total Flow (m ³)	Minimum (m ³ /day)	Maximum (m ³ /day)	Maximum Day/ Rated Capacity (%)
January	41,865	0	3,565	54.4
February	69,311	1,686	3,548	54.2
March	62,280	0	4,428	67.6
April	64,952	0	5,112	78.0
May	103,814	1,215	4,911	75.0
June	56,259	0	3,735	57.0
July	49,314	913	3,548	54.2
August	49,459	0	3,717	56.7
September	56,033	809	3,629	55.4
October	32,188	0	3,036	46.4
November	13,721	0	2,214	33.8
December	39,516	0	3,463	52.9
Total	638,712	-	-	-

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

The total overall system flow including the WFP and West Orillia Well in 2020 was 4,010,981 m³.

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

Table 5: Microbiological Sample Results Required under Schedule 10 of O. Reg. 170/03 for 2020

Facility	Parameter	Source	Number of Samples	Number of Detections
Water Filtration Plant	E. Coli	Raw (Lake Couchiching)	52	46
		Raw (Well 1)	42	0
		Raw (Well 2)	49	0
		Treated	103	0
	Total Coliforms	Raw (Lake Couchiching)	52	17
		Raw (Well 1)	42	0
		Raw (Well 2)	49	0
		Treated	103	0
HPC	Treated	103	8	
West Orillia Well	E. Coli	Raw	50	0
		Treated	50	0
	Total Coliforms	Raw	50	0
		Treated	50	0
	HPC	Treated	50	3
Distribution System	E. Coli		530	0
	Total Coliforms		530	2
	HPC		167	16

Note: HPC – Heterotrophic Plate Count

Table 6: Operational Testing Required Under Schedule 7 of O. Reg. 170/03 for 2020

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	250	0.27 – 0.94
		Raw (Well 1)	G	41	0.04 – 0.15
		Raw (Well 2)	G	50	0.04 – 0.23
	Free Chlorine (mg/L)	Treated	C	8,760	0.00 – 4.34
			G	499	1.00 – 2.91
West Orillia Well	Turbidity (NTU)	Raw	G	50	0.04 – 0.33
	Free Chlorine (mg/L)	Treated	C	8,760	0.00 – 2.00
			G	242	0.92 – 1.67
Distribution System	Free Chlorine (mg/L)		G	3,760	0.16 – 2.20

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

Table 7: Water Filtration Plant – Treated Single Sample for 2020

Parameter	Units	Result	Date of Sample
Alachlor	µg/L	<0.02	June 8, 2020
Antimony	µg/L	0.11	June 8, 2020
Arsenic	µg/L	0.5	June 8, 2020
Atrazine + N-dealkylated metabolites	µg/L	<0.01	June 8, 2020
Azinphos-methyl	µg/L	<0.05	June 8, 2020
Barium	µg/L	29.3	June 8, 2020
Benzene	µg/L	<0.32	June 8, 2020
Benzo(a)pyrene	µg/L	<0.004	June 8, 2020
Boron	µg/L	20	June 8, 2020
Bromoxynil	µg/L	<0.33	June 8, 2020
Cadmium	µg/L	<0.003	June 8, 2020

Parameter	Units	Result	Date of Sample
Carbaryl	µg/L	<0.05	June 8, 2020
Carbofuran	µg/L	<0.01	June 8, 2020
Carbon Tetrachloride	µg/L	<0.17	June 8, 2020
Chlorpyrifos	µg/L	<0.02	June 8, 2020
Chromium	µg/L	0.22	June 8, 2020
Diazinon	µg/L	<0.02	June 8, 2020
Dicamba	µg/L	<0.20	June 8, 2020
1,2-Dichlorobenzene	µg/L	<0.41	June 8, 2020
1,4-Dichlorobenzene	µg/L	<0.36	June 8, 2020
1,2-Dichloroethane	µg/L	<0.33	June 8, 2020
1,1-Dichloroethylene (vinylidene chloride)	µg/L	<0.35	June 8, 2020
Dichloromethane	µg/L	<0.35	June 8, 2020
2,4-Dichlorophenol	µg/L	<0.15	June 8, 2020
2,4-Dichlorophenoxyacetic acid (2,4-D)	µg/L	<0.19	June 8, 2020
Diclofop-methyl	µg/L	<0.40	June 8, 2020
Dimethoate	µg/L	<0.06	June 8, 2020
Diquat	µg/L	<1	June 8, 2020
Diuron	µg/L	<0.03	June 8, 2020
Glyphosate	µg/L	<1	June 8, 2020
Malathion	µg/L	<0.02	June 8, 2020
Mercury	µg/L	<0.01	June 8, 2020
MCPA (2-methyl-4-chlorophenoxyacetic acid)	mg/L	<0.00012	June 8, 2020
Metolachlor	µg/L	<0.01	June 8, 2020
Metribuzin	µg/L	<0.02	June 8, 2020
Monochlorobenzene	µg/L	<0.3	June 8, 2020
Paraquat	µg/L	<1	June 8, 2020
Pentachlorophenol	µg/L	<0.15	June 8, 2020
Phorate	µg/L	<0.01	June 8, 2020
Picloram	µg/L	<1	June 8, 2020
Polychlorinated Biphenyls (PCB)	µg/L	<0.04	June 8, 2020
Prometryne	µg/L	<0.03	June 8, 2020
Selenium	µg/L	0.06	June 8, 2020
Simazine	µg/L	<0.01	June 8, 2020
Sodium	mg/L	30.5	June 8, 2020
Terbufos	µg/L	<0.01	June 8, 2020

Parameter	Units	Result	Date of Sample
Tetrachloroethylene	µg/L	<0.35	June 8, 2020
2,3,4,6-Tetrachlorophenol	µg/L	<0.20	June 8, 2020
Triallate	µg/L	<0.01	June 8, 2020
Trichloroethylene	µg/L	0.44	June 8, 2020
2,4,6-Trichlorophenol	µg/L	<0.25	June 8, 2020
Trifluralin	µg/L	<0.02	June 8, 2020
Uranium	µg/L	0.236	June 8, 2020
Vinyl Chloride	µg/L	<0.17	June 8, 2020

Table 8: West Orillia Well – Treated Single Sample for 2020

Parameter	Units	Result	Date of Sample
Sodium	mg/L	33.9	June 8, 2020

Table 9: Multiple Samples through Reporting Period for 2020

Parameter	Source	Unit	Average	Minimum	Maximum	Number of Samples
Nitrate	WFP	mg/L	0.037	0.024	0.058	4
	WOW		3.115	3.030	3.270	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	179	88	268	8
pH			7.5	7.4	7.7	8
THM		µg/L	60.3	24.0	84.0	4
HAA		µg/L	30.8	5.3	42.9	4