



City of Orillia

**2022 Annual Drinking Water System
and Summary Report**

**February 2023
Environmental Services Division
Environment and Infrastructure Services 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 6
 - **Issue Date:** May 23, 2021
 - **Expiry Date:** May 23, 2026
- **Drinking Water Works Permit Number:** 125-201, Issue 3
 - **Issue Date:** May 23, 2021
- **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, 2022 to December 31, 2022

- **Population:** 35,906

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**

If you have any questions regarding the content of the report, please reach out to Laura Pye, Superintendent of Water Treatment and Supply, at 705-325-4521 or lpye@orillia.ca.

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). The Zone 1 supply is managed from the WFP and the Rosemary Road Reservoir. The Zone 2 supply is managed from the WFP, the West Orillia Well, and the Harvie Hill Reservoir. The 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 into 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 203 kilometres of various sized piping servicing the approximately 35,906 people, businesses and facilities within Orillia throughout the three pressure zones.

The system also contains 1228 hydrants (961 municipal and 267 private), 2,689 control valves, 60 air relief valves, 8 pressure reducing valves used to control flow between the pressure zones (6 municipal and 2 private), 10 blow offs, 4 permanent auto-flushers and 20 sampling stations (19 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.

- Ladder Replacement and Cleaning of the Flocculation Cells - \$21,064
- Replacement Sampling Stations - \$3,715
- UV Reference Sensor - \$3,101
- Various PLC and SCADA Upgrades - \$205,395
- Hydrant Painting - \$31,393

4.0 Adverse Water Quality Incident (AWQI) Reports

In 2022, there were four (4) AWQI reports made. Below summarizes each notification.

AWQI 158675 and 158676 – Samples taken on June 6, 2022, as part of the annual testing for the WFP and West Orillia Well had elevated results of sodium above the reportable limit of 20 mg/L. Sodium is tested annually in the City of Orillia, however the adverse is only reportable every five years. The City was required to notify as an adverse for 2022. Working with the Simcoe Muskoka District Health Unit, a communications plan was developed to notify users of the sodium results, which was implemented and completed

by July 15, 2022. The Simcoe Muskoka District Health Unit also advises local medical professionals of the results.

AWQI 159380 – On August 2, 2022, it was discovered that the filter effluent turbidity analyzer for Filter 3 stopped recording on July 31, 2022. Repairs were made to the turbidity analyzer to begin recording, as well as adjusting alarm setpoints to prevent this from occurring in the future. All other filters during that time did not indicate any concerns with water quality. All sampling (turbidity, chlorine, and microbiological) taken on August 2, 2022, indicated that there did not appear to be any water quality issues.

AWQI 159527 – On August 12, 2022, it was found that during routine monitoring that a hydrant located on Olive Crescent had 0.00 mg/L of free chlorine. The chlorine dosage was increased at the WFP and flushing began in the area. A microbiological sample was collected at the site and analyzed for Total Coliforms and E. Coli, which were negative. The area was monitored closely after to ensure that the residual was above the minimum (0.05 mg/L).

5.0 Non-Compliance and Corrective Actions

During the reporting period, there was one non-compliance event. Per the Municipal Drinking Water Licence, condition 6.1.2 requires the City to have a Harmful Algal Bloom response and sampling plan. While the City does have a plan, it was determined that a missed sample for microcystin on September 6, 2022, meant that the plan had not been fully implemented. The City has updated procedures and training of staff to prevent this from happening in the future. No further action was required by the MECP.

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 provides a summary of the treatment chemicals used in 2022.

Table 1: Summary of Chemicals Used in 2022

Month	Water Filtration Plant		West Orillia Well
	Polyaluminum Chloride (L)	Liquefied Chlorine (kg)	Sodium Hypochlorite (L)
January	4,149	1,149	781
February	3,634	1,134	803
March	3,948	1,305	671

Month	Water Filtration Plant		West Orillia Well
	Polyaluminum Chloride (L)	Liquefied Chlorine (kg)	Sodium Hypochlorite (L)
April	3,903	1,140	639
May	5,547	1,422	773
June	5,668	1,676	930
July	5,266	1,674	835
August	5,972	1,909	1,036
September	5,644	1,649	748
October	5,450	1,567	324
November	4,037	1,245	512
December	4,102	1,132	664
Totals	57,320	17,002	8,716

In the distribution system, sodium hypochlorite and sodium thiosulphate are used as needed for spot repairs or de-chlorination and quantities are not tracked.

7.0 Rated Capacity Assessment

Tables 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	2018	2019	2020	2021	2022	5 Yr. Avg.
System Average Day Flow (m ³ /day)*	11,126	10,926	10,959	11,401	11,071	11,097
System Maximum Day Flow (m ³ /day)*	16,797	12,708	12,548	15,860	15,395	14,662
Rated Capacity of System (m ³ /day)*	39,592					
Maximum Day/Rated Capacity (%)	42.4	32.1	38.4	40.1	38.9	N/A
Total Yearly WFP Flow (ML)	2,847	3,093	3,372	3,500	3,513	3,265
Total Yearly West Orillia Well Flow (ML)	1,214	895	639	661	528	787

Item	2018	2019	2020	2021	2022	5 Yr. Avg.
Total Yearly System Flow (ML)	4,061	3,988	4,011	4,161	4,041	4,052

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

Table 3: WFP Summary for 2022

Month	Total Flow (m ³)	Minimum (m ³ /day)	Maximum (m ³ /day)	Maximum Day/ Rated Capacity (%)
January	276,026	5,649	11,256	34.1
February	253,543	5,813	11,357	34.4
March	284,378	7,588	11,574	35.0
April	266,869	7,715	11,013	33.3
May	317,152	8,076	12,977	39.3
June	327,975	8,357	13,332	40.3
July	331,292	7,402	12,245	37.1
August	331,236	8,426	12,922	39.1
September	305,168	7,790	12,724	38.5
October	306,936	8,029	12,166	36.8
November	269,192	6,781	10,985	33.2
December	242,927	6,993	10,679	32.3
Total	3,512,6993	-	-	-

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

Table 4: West Orillia Well Summary for 2022

Month	Total Flow (m ³)	Minimum (m ³ /day)	Maximum (m ³ /day)	Maximum Day/ Rated Capacity (%)
January	42,301	106	2,730	41.7
February	46,433	636	3,992	60.9
March	37,711	455	2,223	34.1
April	37,890	537	1,882	28.7
May	44,041	471	2,418	36.9
June	48,835	5	3,189	48.7

Month	Total Flow (m ³)	Minimum (m ³ /day)	Maximum (m ³ /day)	Maximum Day/ Rated Capacity (%)
July	54,991	404	3,791	57.9
August	53,660	422	3,497	53.4
September	46,176	460	2,632	40.2
October	27,781	0	2,119	32.3
November	32,243	0	3,739	57.1
December	56,337	0	5,548	84.7
Total	528,399	-	-	-

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 2022 was 4,041,092 m³.

8.0 Water Quality Analysis

Tables 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 2022

Facility	Parameter	Source	Number of Samples	Number of Detections
Water Filtration Plant	E. Coli	Raw (Lake Couchiching)	54	15
		Raw (Well 1)	52	0
		Raw (Well 2)	52	0
		Treated	104	0
	Total Coliforms	Raw (Lake Couchiching)	54	33
		Raw (Well 1)	52	1
		Raw (Well 2)	52	0
		Treated	104	0
	HPC	Treated	104	16

Facility	Parameter	Source	Number of Samples	Number of Detections
West Orillia Well	E. Coli	Raw	51	0
		Treated	51	0
	Total Coliforms	Raw	51	0
		Treated	51	0
	HPC	Treated	51	1
Distribution System	E. Coli		561	0
	Total Coliforms		561	0
	HPC		159	27

Note: HPC – Heterotrophic Plate Count

Table 6: Operational Testing Required Under Schedule 7 of O. Reg. 170/03 for 2022

Facility	Parameter	Source	Type	Number of Samples	Range of Results (Minimum to Maximum)
Water Filtration Plant	Turbidity (NTU)	Raw (Lake Couchiching)	C	8,760	0.20 – 10.00
			G	247	0.26 – 1.42
		Raw (Well 1)	G	52	0.05 – 0.39
		Raw (Well 2)	G	51	0.04 – 0.44
	Free Chlorine (mg/L)	Treated	C	8,760	0.00 – 5.00
			G	493	1.41 – 2.65
West Orillia Well	Turbidity (NTU)	Raw	G	50	0.04 – 0.17
	Free Chlorine (mg/L)	Treated	C	8,760	0.00 – 4.29
			G	146	1.00 – 1.74
Distribution System	Free Chlorine (mg/L)		G	930	0.34 – 1.92

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 2022

Parameter	Units	Result	Date of Sample
Sodium	mg/L	35.2	June 6, 2022
Alachlor	µg/L	<0.02	June 6, 2022
Antimony	µg/L	<0.6	June 6, 2022
Arsenic	µg/L	0.4	June 6, 2022
Atrazine + N-dealkylated metabolites	µg/L	0.01	June 6, 2022
Azinphos-methyl	µg/L	<0.05	June 6, 2022
Barium	µg/L	31.2	June 6, 2022
Benzene	µg/L	<0.32	June 6, 2022
Benzo(a)pyrene	µg/L	<0.004	June 6, 2022
Boron	µg/L	21.0	June 6, 2022
Bromoxynil	µg/L	<0.33	June 6, 2022
Cadmium	µg/L	<0.003	June 6, 2022
Carbaryl	µg/L	<0.05	June 6, 2022
Carbofuran	µg/L	<0.01	June 6, 2022
Carbon Tetrachloride	µg/L	<0.17	June 6, 2022
Chlorpyrifos	µg/L	<0.02	June 6, 2022
Chromium	µg/L	0.35	June 6, 2022
Diazinon	µg/L	<0.02	June 6, 2022
Dicamba	µg/L	<0.20	June 6, 2022
1,2-Dichlorobenzene	µg/L	<0.41	June 6, 2022
1,4-Dichlorobenzene	µg/L	<0.36	June 6, 2022
1,2-Dichloroethane	µg/L	<0.35	June 6, 2022
1,1-Dichloroethylene (vinylidene chloride)	µg/L	<0.33	June 6, 2022
Dichloromethane	µg/L	<0.35	June 6, 2022
2,4-Dichlorophenol	µg/L	<0.15	June 6, 2022
2,4-Dichlorophenoxyacetic acid (2,4-D)	µg/L	<0.19	June 6, 2022
Diclofop-methyl	µg/L	<0.40	June 6, 2022
Dimethoate	µg/L	<0.06	June 6, 2022
Diquat	µg/L	<1	June 6, 2022
Diuron	µg/L	<0.03	June 6, 2022
Glyphosate	µg/L	<1	June 6, 2022
Malathion	µg/L	<0.02	June 6, 2022
Mercury	µg/L	<0.01	June 6, 2022

Parameter	Units	Result	Date of Sample
MCPA (2-methyl-4-chlorphenoxyacetic acid)	mg/L	<0.00012	June 6, 2022
Metolachlor	µg/L	<0.01	June 6, 2022
Metribuzin	µg/L	<0.02	June 6, 2022
Monochlorobenzene	µg/L	<0.3	June 6, 2022
Paraquat	µg/L	<1	June 6, 2022
Pentachlorophenol	µg/L	<0.15	June 6, 2022
Phorate	µg/L	<0.01	June 6, 2022
Picloram	µg/L	<1	June 6, 2022
Polychlorinated Biphenyls (PCB)	µg/L	<0.04	June 6, 2022
Prometryne	µg/L	<0.03	June 6, 2022
Selenium	µg/L	0.1	June 6, 2022
Simazine	µg/L	<0.01	June 6, 2022
Terbufos	µg/L	<0.01	June 6, 2022
Tetrachloroethylene	µg/L	<0.35	June 6, 2022
2,3,4,6-Tetrachlorophenol	µg/L	<0.20	June 6, 2022
Triallate	µg/L	<0.01	June 6, 2022
Trichlorethylene	µg/L	<0.44	June 6, 2022
2,4,6-Trichlorophenol	µg/L	<0.25	June 6, 2022
Trifluralin	µg/L	<0.02	June 6, 2022
Uranium	µg/L	0.242	June 6, 2022
Vinyl Chloride	µg/L	<0.17	June 6, 2022

Table 8: West Orillia Well – Treated Single Sample for 2022

Parameter	Units	Result	Date of Sample
Sodium	mg/L	40.1	June 6, 2022

Table 9: Multiple Samples through Reporting Period for 2022

Parameter	Source	Unit	Average	Minimum	Maximum	Number of Samples
Nitrate	WFP	mg/L	0.336	0.073	0.577	4
	WOW		3.095	2.870	3.300	4

Parameter	Source	Unit	Average	Minimum	Maximum	Number of Samples
Nitrite	WFP	mg/L	0.005	<0.003	0.009	4
	WOW		0.003	<0.003	<0.003	4
Alkalinity	Distribution	mg/L	174	125	268	8
pH	Distribution		7.4	7.3	7.6	8
THM	Distribution	µg/L	41.9	3.4	82.0	4
HAA	Distribution	µg/L	24.7	5.3	41.9	4