



City of Orillia

**2023 Annual Drinking Water System
and Summary Report**

**February 2024
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 4
 - **Issue Date:** October 18, 2023
- **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, 2023 to December 31, 2023

- **Population:** 36,502

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 Chris Hoos, Superintendent of Water Treatment and Supply, at 705-325-5818 or choos@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 if required, a 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 36,502 people, businesses and facilities within Orillia throughout the three pressure zones.

The system also contains 1,224 hydrants (966 municipal and 258 private), 2,734 control valves, 59 air relief valves, 7 pressure reducing valves used to control flow between the pressure zones, 10 blow offs, 4 permanent auto-flushers, and 19 sampling stations (18 municipal and 1 private).

The Zone 3 Booster Pumping Station boosts the pressure from Zone 2 to deliver to the Zone 3 using three 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.

- Motor Control Centre Replacements - \$625,000
- Various Instrumentation Replacements - \$50,000
- Various Valve Replacements - \$230,000
- Consulting (Harmful Algal Blooms and Air Scrubber Study) - \$50,000
- Water Filtration Plant Security - \$70,000
- Fire Hydrant Painting - \$30,000
- Laclie St. and Centennial Dr. Watermain Improvements - \$2,000,000

4.0 Adverse Water Quality Incident (AWQI) Reports

In 2023, there was one (1) AWQI report made. Below summarizes the notification.

AWQI 163820 – On October 16, 2023 Filter 3 Turbidity was >1 NTU for a total of one hour and 21 minutes during backwash drain down. On October 16, 2023 at 8:56 pm, the On Call Operator (OCO) was alerted to a general filter alarm caused by a drain down timer exceedance. The OCO attended the Water Filtration Plant to complete the backwash and verify upstream and downstream processes were normal. Further investigations and non-compliance trending review on the morning of October 17, 2023, indicated filter effluent was being directed to the clearwell during the period of high turbidity. During backwash drain down, effluent turbidity is not trended or alarmed. The high turbidity is suspected to be an analytical error caused by air due to the low flow condition on drain down but can not be verified. Typical turbidity and chlorine levels were observed throughout the process. All operational filters and monitoring equipment had been functioning normally since the event. Filter turbidity alarming and trending was reviewed with the system integrator. SCADA programming was updated to ensure filter turbidity alarming and trending was active at all times when the filters are delivering water to the clearwell. Programming was tested and appropriate functionality was confirmed including alarming, trending and interlocks.

5.0 Non-Compliance and Corrective Actions

During the reporting period, there no non-compliance events.

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 2023.

Table 1: Summary of Chemicals Used in 2023

Month	Water Filtration Plant		West Orillia Well
	Polyaluminum Chloride (L)	Liquefied Chlorine (kg)	Sodium Hypochlorite (L)
January	4,853	1,736	491
February	4,437	1,532	608
March	4,826	1,618	658
April	4,776	1,386	421
May	6,118	1,684	492
June	6,251	1,589	814

Month	Water Filtration Plant		West Orillia Well
	Polyaluminum Chloride (L)	Liquefied Chlorine (kg)	Sodium Hypochlorite (L)
July	7,118	1,600	742
August	6,177	1,657	892
September	4,270	1,487	799
October	5,404	1,478	810
November	4,580	1,241	547
December	4,585	1,108	608
Totals	63,395	18,116	7,882

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	2019	2020	2021	2022	2023	5 Yr. Avg.
System Average Day Flow (m ³ /day)*	10,926	10,959	11,401	11,071	10,714	11,014
System Maximum Day Flow (m ³ /day)*	12,708	12,548	15,860	15,395	15,677	14,438
Rated Capacity of System (m ³ /day)*	39,592					
Maximum Day/Rated Capacity (%)	32.1	38.4	40.1	38.9	39.6	37.8
Total Yearly WFP Flow (ML)	3,093	3,372	3,500	3,513	3,338	3,363
Total Yearly West Orillia Well Flow (ML)	895	639	661	528	568	658
Total Yearly System Flow (ML)	3,988	4,011	4,161	4,041	3,906	4,021

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

Table 3: WFP Summary for 2023

Month	Total Flow (m ³)	Minimum (m ³ /day)	Maximum (m ³ /day)	Maximum Day/ Rated Capacity (%)
January	269,720	6,267	10,350	31.3
February	241,890	6,847	10,132	30.7
March	261,883	7,264	9,729	29.4
April	290,033	7,599	11,053	33.5
May	323,155	8,123	12,631	38.2
June	324,221	6,749	13,289	40.2
July	314,892	8,367	13,179	39.9
August	291,497	7,453	11,332	34.3
September	276,229	6,027	12,036	36.4
October	260,818	6,344	11,261	34.1
November	240,500	4,696	10,938	33.1
December	242,817	4,757	10,608	32.1
Total	3,337,655	-	-	-

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

Table 4: West Orillia Well Summary for 2023

Month	Total Flow (m ³)	Minimum (m ³ /day)	Maximum (m ³ /day)	Maximum Day/ Rated Capacity (%)
January	44,993	446	2,262	34.5
February	47,087	381	3,172	48.4
March	50,540	252	2,770	42.3
April	16,133	0	1,944	29.7
May	37,203	0	2,892	44.2
June	58,581	840	3,446	52.6
July	54,996	879	2,948	45.0
August	64,040	885	2,997	45.8

Month	Total Flow (m ³)	Minimum (m ³ /day)	Maximum (m ³ /day)	Maximum Day/ Rated Capacity (%)
September	56,319	964	3,015	46.0
October	49,615	802	2,725	41.6
November	41,504	0	3,694	56.4
December	47,105	0	3,241	49.5
Total	568,116	-	-	-

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 2023 was 3,905,771 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 2023

Facility	Parameter	Source	Number of Samples	Number of Detections
Water Filtration Plant	E. Coli	Raw (Lake Couchiching)	52	17
		Raw (Well 1)	51	0
		Raw (Well 2)	52	0
		Treated	104	0
	Total Coliforms	Raw (Lake Couchiching)	52	25
		Raw (Well 1)	51	0
		Raw (Well 2)	52	0
		Treated	104	0
HPC	Treated	104	12	
West Orillia Well	E. Coli	Raw	52	0
		Treated	52	0
		Raw	52	0

Facility	Parameter	Source	Number of Samples	Number of Detections
	Total Coliforms	Treated	52	0
	HPC	Treated	52	4
Distribution System	E. Coli		573	0
	Total Coliforms		573	0
	HPC		156	20

Note: HPC – Heterotrophic Plate Count

Table 6: Operational Testing Required Under Schedule 7 of O. Reg. 170/03 for 2023

Facility	Parameter	Source	Type	Number of Samples	Range of Results (Minimum to Maximum)
Water Filtration Plant	Turbidity (NTU)	Raw (Lake Couchiching)	C	8,760	0.27 – 2.46
			G	245	0.33 – 1.13
		Raw (Well 1)	G	50	0.05 – 0.29
			Raw (Well 2)	G	48
	Free Chlorine (mg/L)	Treated	C	8,760	1.15 – 3.22
			G	492	1.40 – 2.98
West Orillia Well	Turbidity (NTU)	Raw	G	48	0.06 – 0.13
	Free Chlorine (mg/L)	Treated	C	8,760	0.76 – 2.54
			G	151	0.91 – 2.10
Distribution System	Free Chlorine (mg/L)		G	837	0.24 – 2.07

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 2023

Parameter	Units	Result	Date of Sample
2,3,4,6-Tetrachlorophenol	µg/L	<0.3	June 6, 2023
2,4,6-Trichlorophenol	µg/L	<0.2	June 6, 2023
2,4-D	µg/L	<0.368	June 6, 2023
2,4-Dichlorophenol	µg/L	<0.2	June 6, 2023
Alachlor	µg/L	<0.308	June 6, 2023
Antimony	µg/L	<0.5	June 6, 2023
Apparent Colour	TCU	6	June 6, 2023
Arsenic	µg/L	2	June 6, 2023
Atrazine	µg/L	<0.308	June 6, 2023
Atrazine + N-dealkylated metabolites	µg/L	<0.5	June 6, 2023
Azinphos-methyl (Guthion)	µg/L	<0.231	June 6, 2023
Barium	µg/L	50	June 6, 2023
Benzo(a)pyrene	µg/L	<0.01	June 6, 2023
Boron	µg/L	<2	June 6, 2023
Bromoxynil	µg/L	<0.098	June 6, 2023
Cadmium	µg/L	<0.1	June 6, 2023
Carbaryl	µg/L	<2	June 6, 2023
Carbofuran	µg/L	<4	June 6, 2023
Chloride	mg/L	79.6	June 6, 2023
Chlorpyrifos (Dursban)	µg/L	<0.231	June 6, 2023
Chromium	µg/L	2	June 6, 2023
Decachlorobiphenyl (Surr.)	% Rec	19.1	June 6, 2023
Desethyl atrazine	µg/L	<0.385	June 6, 2023
Diazinon	µg/L	<0.231	June 6, 2023
Dicamba	µg/L	<0.0858	June 6, 2023
Dichlorophenyl acetic acid (Surr.)	% Rec	113	June 6, 2023
Diclofop-methyl	µg/L	<0.123	June 6, 2023
Dimethoate	µg/L	<0.231	June 6, 2023
Diquat	µg/L	<0.2	June 6, 2023
Diuron	µg/L	<10	June 6, 2023
Free Residual Chlorine	mg/L	1.99	June 6, 2023
Glyphosate	µg/L	<20	June 6, 2023
Iron	µg/L	110	June 6, 2023
Malathion	µg/L	<0.231	June 6, 2023
Manganese	µg/L	2	June 6, 2023

Parameter	Units	Result	Date of Sample
MCPA	µg/L	<6.13	June 6, 2023
Mercury	µg/L	<0.1	June 6, 2023
Metolachlor	µg/L	<0.154	June 6, 2023
Metribuzin (Sencor)	µg/L	<0.154	June 6, 2023
Nitrate (as N)	mg/L	0.37	June 6, 2023
Nitrite (as N)	mg/L	<0.05	June 6, 2023
Paraquat	µg/L	<0.2	June 6, 2023
Pentachlorophenol	µg/L	<0.3	June 6, 2023
Phorate	µg/L	<0.154	June 6, 2023
Picloram	µg/L	<0.0858	June 6, 2023
Prometryne	µg/L	<0.077	June 6, 2023
Selenium	µg/L	2.1	June 6, 2023
Simazine	µg/L	<0.231	June 6, 2023
Sodium	µg/L	38,000	June 6, 2023
Terbufos	µg/L	<0.154	June 6, 2023
Total Hardness (as CaCO3)	mg/L	164	June 6, 2023
Total PCBs	µg/L	<0.08	June 6, 2023
Triallate	µg/L	<0.154	June 6, 2023
Trifluralin	µg/L	<0.154	June 6, 2023
Uranium	µg/L	<1	June 6, 2023

Table 8: West Orillia Well – Treated Single Sample for 2023

Parameter	Units	Result	Date of Sample
Sodium	µg/L	36,200	June 6, 2023

Table 9: Multiple Samples through Reporting Period for 2023

Parameter	Source	Unit	Average	Minimum	Maximum	Number of Samples
Nitrate	WFP	mg/L	0.340	0.060	0.860	4
	WOW		3.205	3.130	3.330	4
Nitrite	WFP	mg/L	0.050	0.050	0.050	4
	WOW		0.050	0.050	0.050	4
Alkalinity	Distribution	mg/L	167	92	271	8
pH	Distribution		7.55	7.30	7.80	8

Parameter	Source	Unit	Average	Minimum	Maximum	Number of Samples
THM	Distribution	µg/L	42.2	31.0	56	4
HAA	Distribution	µg/L	24.3	8.0	35	4