



Corporation of the Town of Perth
Drinking Water System
2022 Summary Report

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2022 DWS Summary Report

DWS Summary Report Overview

A Summary Report, as per Ontario Regulation 170/03, Schedule 22 must be prepared for each drinking water system in the province of Ontario. The report must be provided no later than March 31 to members of Municipal Council.

Free copies are available on our website, and paper copies available upon request. Notices of availability on our website and/or through media releases.

The DWS Summary report will cover a period for the preceding calendar year, January 01 to December 31, 2022.

The completion and presentation of this report will also fulfill the requirement for a compliance report to be produced in accordance applicable regulations.

Section 1 contains,

- any failures during the reporting periods to achieve the requirements of the Safe Drinking Water Act, associated drinking water regulations and guidelines, any approvals, any operating licences or permits, or any orders applicable to the Perth DWS system;
- duration of the failure, and measures taken to correct the failure;
- any priority concerns that might lead to failures to meet the operating requirements.

Section 2 contains,

- summary of quantities and flow rates of water taken from the Tay River, in addition to water production and process wastewater generation.

Supplemental Perth DWS information sources would include, but not limited to,

- The Town of Perth Water Treatment Plant year end documentation,
- The Town of Perth Water Distribution year end documentation,
- The Town of Perth DWS Annual Report, Infrastructure Report, Water Taking report.

Supplemental government legislation sources would include, but limited to,

- Safe Drinking Water Act, 2002
- Ontario Regulation 170/03, Drinking Water Systems
- Ontario Regulation 169/03, Ontario Drinking Water Quality Standards
- Ontario Regulation 128/04, Certification of Drinking Water System Operators and Water Quality Analysts

It is noted to ensure currency, up to date documents can be reviewed at <http://www.e-laws.gov.on.ca>.

Supplemental government support documentation is available at the Ministry of the Environment and Climate Change's Drinking Water Ontario website, <https://www.ontario.ca/page/drinking-water>.

Ontario Regulation 170/03, Schedule 22 – Summary Reports for Municipalities

Section 22-1

- as a large municipal residential system, the Town of Perth is required to complete and submit a Summary Report.

Section 22-2 (1)

- requires the Summary Report is prepared in accordance with the regulation by no later than March 31, covering a period for the preceding calendar year.
- as the drinking water system is owned by the municipality, the Summary Report is required to be given to the members of the municipal council by March 31 of each year

Section 22-2 (2)

- *The report must,*
 - a) *list the requirements of the Act, the regulations, the system's approval, drinking water works permit, municipal drinking water licence, and any orders applicable to the system that were not met at any time during the period covered by the report; and*
 - b) *for each requirement referred to in clause (a) that was not met, specify the duration of the failure and the measures that were taken to correct the failure.*
- Please refer to Section 1 of the Summary Report for this information

Section 22-2 (3)

- *The report must also include the following information for the purpose of enabling the owner of the system to assess the capability of the system to meet existing and planned uses of the system:*
 - a) *A summary of the quantities and flow rates of the water supplied during the period covered by the report, including monthly average and maximum daily flows.*
 - b) *A comparison of the summary referred to in paragraph 1 to the rated capacity and flow rates approved in the system's approval, drinking water works permit or municipal drinking water licence, or if the system is receiving all of its water from another system under an agreement pursuant to subsection 5 (4), to the flow rates specified in the written agreement.*
- Please refer to Section 2 of the Summary Report for this information

Section 22-2 (4)

- *If a report is prepared for a system that supplies water to a municipality under the terms of a contract, the owner of the system shall give a copy of the report to the municipality by March 31*
- Some services of the Perth DWS are located in Tay Valley Township, and as such, the Perth DWS Summary Report is forwarded to the Municipality by March 31.

DWS Information

Drinking-Water System Number	220001272
Drinking-Water System Name:	Perth Drinking Water System
Drinking-Water System Owner:	Perth, The Corporation of the Town of

Period being reported:	Jan 01, 2022 to Dec 31, 2022
Latest MOECC Inspection	January 18, 2023
Previous MECP Inspection	Jan 2021 (document review); Jan 2022 (on-site)

Drinking-Water System Category:	Large Municipal Residential System (LMRS)
Drinking Water System Facilities	<ul style="list-style-type: none">• Class III Water Treatment Subsystem,• Class I Water Distribution Subsystem

Municipal Drinking Water Licence (MDWL)	160-101
Licence Issue Date	July 26, 2021
Licence Revision Date (most recent)	July 26, 2021 (issue #7)
Licence Expiry Date	July 25, 2026

Drinking Water Works Permit	160-201
DWWP Issue Date	July 26, 2021 (Issue #3)
DWWP Expiry Date	July 25, 2026

Permits to Take Water	7770-A8HKRH
PTTW Issue Date	March 29, 2016
PTTW Expiry Date	March 31, 2026
Water Taking Location	Tay River
Financial Plan Number (under O. Reg. 453/07)	160-301
Financial Plan Issue Date	June 01, 2021
Accredited Operating Authority	The Corporation of the Town of Perth
Operating Authority No.	160-OA1
Operational Plan No.	160-401

SECTION 1 – FAILURE TO MEET REQUIREMENTS

1.1. Adverse Water Quality Incident reports (Drinking Water System)

1.1.1 AWQI #157703 (WTP operational issue)

Discovered Filter #2 alarms disarmed during filter operations. There were no adverse tests and adverse effects to WTP operations. (see 1.3.1)

1.1.2 AWQI #161012 (WTP operational issue)

Loss of coagulant feed due to raw water reading loss resulting in no feed during SCADA shutdown process (~6 min). There was no adverse effect or impact on facility operations or drinking water. (see 1.3.2)

1.2. Ministry Orders

1.2.1 Drinking Water System

- No MOE orders issued.

1.2.2 Water Treatment Subsystem

- No MOE orders issued.

1.2.3 Water Distribution Subsystem

- No MOE orders issued.

1.3. Notifications to MECP (MOECC) regarding operational issues

1.3.1. Filter 2 operational turbidity alarm found disabled

On January 11, 2022, Filter 2 had been taken out of service for maintenance work, and not all operational alarms were enabled when recommissioned. An incident occurred with high filter NTU being registered on the turbidimeter, believed cause was an outside door left propped open for ventilation and frazzle ice formed in the unit's sample cell resulting in false readings. The HIHI alarm did not activate, however the operator noted the readings spiking and took corrective action immediately. No adverse effect or impact to drinking water, and filtrate NTU grabs samples indicated proper operations. The incident was called in as an AWQI event, as the filter had been operated without the HIHI alarm and not deemed normal operations.

1.3.2. WTP treatment operation continuing without proper coagulant addition.

On December 19, 2022, the SCADA lost raw water flow signal communications between the chemical PLC and the coagulant pumps. The coagulant pumps operate on a pace to flow mode, so although the coagulant pumps were operating

properly they were not getting a flow signal. No raw water flow signal, or 0 L/s, resulted in 0 ml/min chemical flow from the chemical pump. The coagulant line flow meter then sensed a prolonged period with no flow, sent a fault signal to the coagulant pump to shut down. After the duty coagulant pump shutdown, it automatically started the backup coagulant. However, with no raw water flow signal, that chemical pump repeated the same process and properly shut itself down. When SCADA sensed no coagulant pumps available, it automatically shut down the raw water pumps (LLP ops), stopping water production altogether.

The incident occurred during unmanned facility operations, with the SCADA alarm protocol and shutdown of LLP operations working properly. The time (6 minutes) which SCADA needed to properly complete check lists and the shutdown process was the issue, and the need to call SAC as no coagulant feed occurred during raw water operations. There was still sufficient amount of floc suspended in the treatment tanks during the subsequent on-site visit. The cause of the event was a faulty PLC (communication controller) event, not allowing to raw water flow signal to the chemical feed pumps.

There was no adverse effect or impact to the drinking water production.

1.3.3 WTP treatment operation continuing without fluoride addition

Issues with the fluoride feeder being unreliable and significantly inoperable have gone back to July 2021. Several attempts to try and restore operations occurred in 2021 unsuccessfully. As of December 31, 2021, finding a suitable dry volumetric feeder replacement unit proved very difficult, with the best economically feasible solution looks to be exploring possible refabricating of the current unit.

Efforts were made in May 2022 to restore some type of fluoridation operations, but only during facility unmanned operations. This effort last into late June 2022, when operating the fluoride feeder during unmanned operations were attempted. In early July 2022, operations become too unreliable again, the machine disassembled and shipped off for a complete rebuild. As of December 31 2022, the machine was still under reconstruction, delayed with material and parts shortages.

Government authorities have been kept aware of the situation and status of repair work.

1.4. MECP Identified Known Failures to Meet Requirements

1.4.1 January 27, 2022 MECP DWS Inspection

A MECP DWS inspection was conducted on January 27, 2022 which covered a period from January 01, 2021 to January 15, 2022. This was a full detailed

inspection, with the Inspector's report released March 07, 2022. There were no known failures to meet legislative requirements, however several recommendations and areas for improvement were noted.

1.4.2 January 18, 2023 MECP DWS Inspection

Also, a MECP DWS was conducted on January 18, 2023, which covered a period from January 09, 2022 to January 11, 2023. This was a focused inspection, with the Inspector's report not received as of January 31, 2023.

1.5. MECP identified areas for possible improvement

In the MECP Inspection Report, dated March 07, 2022, some areas for improvement and other recommendations were as follows,

- to develop and implement,
 - a water conservation plan;
 - a backflow prevention program, policy, and/or bylaw;
 - a hydrant access/use bylaw and/or written policy.
- to establish programs so that,
 - the Drinking Water Works Permit (DWWP) reflects current operations and equipment;
 - any time the DWWP requires to be changed or updated, proper submission of Director's Notification forms occurs
- to have operations ensure that,
 - any water distribution alterations are properly reported and recorded;
 - disinfectant residuals are checked at extremities and "dead ends" of the distribution system;
 - water storage facilities are regularly inspected and cleaned

The Drinking Water System Infrastructure Review Report outlines operational and infrastructure areas for possible improvement, with some identified by MECP. Any corrective actions taken, being done, or to be considered, is included in the report.

1.6. Additional concerns meeting potential compliance or operational requirements

The Drinking Water System Infrastructure Review Report, to be presented to Town of Perth Municipal Council, highlights abilities to maintain operational abilities, along with immediate, short term, and long term DWS operational needs.

In the report, significant issues or areas of concern that might be viewed as potential impact items to operations were listed. These lists contained issues identified by operational staff and management which might,

- pose potential risk with inability to meet compliance and/or operational requirements,
- help prevent equipment failure or down time,
- assist with more efficient operations.

Section 2 of the Infrastructure Report provided detailed assessment of the drinking water system abilities, including

- water treatment ability
- water pumping capacity
- process wastewater residue management ability
- process automation computer system capability
- water storage ability, and
- drinking water system staffing requirements

Section 3 of the Infrastructure Report outlined,

- work completed in 2022,
- immediate and short-term needs, and
- long term (2 to 5 year) operational needs forecasting.

SECTION 2 – SUMMARY OF PLANT FLOWS

2.1. Raw Water (Source water)

Individual daily RW flow expressed in Liters/day (1000 L = 1 m³) can be found in the Town’s 2022 Annual Record of Water Taking (Permit to Take Water) report.

The table below (RW-1) gives the monthly average RW flow, monthly single day max and min flows, and the monthly total RW intake flow volume. A comparison of the single day maximum of the month to the PTTW allowable volume of 9092 m³ is shown.

Table RW-1

2022 Raw Water Volumes					
	Average Daily Flow (m ³)	Minimum Daily Flow (m ³)	Maximum Daily Flow (m ³)	TOTAL FLOW (m ³)	Daily Maximum % of PTTW Allowable Volume (9092 m ³)
January	2704.9	2059	3616	83,852	39.8%
February	2885.5	2544	3391	80,793	37.3%
March	3093.4	2544	3977	95,895	43.7%
April	2917.2	2112	3656	87,516	40.2%
May	3354.8	2369	5104	103,999	56.1%
June	3278.3	2403	4001	98,350	44.0%
July	3297.1	2693	4344	102,210	47.8%
August	3336.6	2684	4299	103,434	47.3%
September	2870.7	2250	3520	86,120	38.7%
October	2808.2	1979	4691	87,055	51.6%
November	2568.7	2003	3173	77,060	34.9%
December	2614.6	2015	3183	81,052	35.0%
ANNUAL TOTALS	avg 2977.49	Min 1979	Max 5104	Total 1,087,336	

2.1.1. Average Daily Raw Water Flow:

The monthly average of daily average raw water flow was 2977.49 m³ in 2022, or approximately 32.7% of the PTTW. It was relatively the same in 2021 at 32.3%.

The daily average in 2019 was 3063 m³, followed by 2982 m³ in 2020, and 2978 m³ in 2021. Overall, there appears a slight drop in daily water intake over recent years can be shown.

2.1.2 Maximum Raw Water Flow:

The maximum day flow however was on May 03 (5104 m³), during hydrant flushing.

The next highest raw water flow days in 2022 also occurred during Town hydrant flushing times, with the second highest being 4891 m³ (May 05), followed by flow days of 4691 m³ (Oct 04) and 4656 m³ (May 02).

- Spring flushing (May 2-5) had an average day flow of 4671.5 m³
- Fall flushing (October 3-6) had an average day flow of 4356.5 m³

This is relevant as the PTTW maximum of 9092 m³ can be exceeded during water distribution maintenance work times.

July 11 (4344 m³) and August 15 (4299 m³) were also abnormally high RW production days. This was simply due to high water demand, numerous bulk water sales, and/or operational requirements.

2.2. Service Water (Treated Discharged Water)

Below are the Treated Water monthly volumes, noting the high daily flow volume in May and October can be attributed to Hydrant Flushing week(s). Water main breaks can also be associated with high treated water flows, such with January 11 break on Sherbrooke St.

2022 Treated Water Volumes Discharged to Town					
	Average Daily Flow (m ³)	Minimum Daily Flow (m ³)	Maximum Daily Flow (m ³)	TOTAL FLOW (m ³)	Daily Maximum % of Design flow (9090 m ³)
January	2570.4	2072	3449	79,683	37.9%
February	2773.1	2476	3072	77,648	33.8%
March	3007.8	2405	3548	93,242	39.0%
April	2835.0	2354	3337	85,049	36.7%
May	3292.6	2313	4963	102,071	54.6%
June	3188.3	2421	3876	95,648	42.6%
July	3190.5	2696	4190	98,904	46.1%
August	3208.2	2641	3726	99,484	41.0%
September	2728.4	2303	3472	81,852	38.2%
October	2728.1	2160	4661	84,571	51.3%
November	2454.9	2262	2718	73,648	29.9%
December	2491.3	2121	2909	77,230	32.0%
ANNUAL TOTALS	avg 2872.38	Min 2072	Max 4963	Total 1,049,000	

Table TW-1

2.2.1. Average Daily Service Water Flow:

Annual service water daily average flow

Year	2017	2018	2019	2020	2021	2022
Annual avg flow m ³	2653	3072	3011	2896	2787	2872

The service water daily average water flow was 2872.38 m³ in 2022. Over 5 years (2017-2021), the average daily service water flow was 2884 m³, making 2022 service water volumes comparable to recent years.

2.2.2. Service Water Discharge:

Annual service water total flow

Year	2017	2018	2019	2020	2021	2022
Annual avg flow m ³	967,217	1,122,056	1,099,316	1,060,407	1,017,774	1,049,000

In 2022, the total discharge amount was 1,049,000 m³ to the Town. Over 5 years (2017-2021), the average annual water discharged was 1,053,348 m³, making it comparable to recent years.

This volume is relevant to doing future financial projections of water service revenues.

2.3. Plant process water

The WTP Process Wastewater Residue Management involves two individual treatment processes, direct Geo Bag system deployment, and a separate pre-treatment Backwash Equalization Tank (BET) system.

Sludge from the settling tanks is typically dense enough for direct processing and sending to the Geotubes (solids collection geo membrane bags). The geo membrane captures the solids, and allows “cleaned” water to pass through. The water is discharged back to the Tay River.

Filter backwash wastewater is directed to a “geo membrane pre-treatment” system, or Backwash Equalization Tanks (BET). The backwash wastewater contains a higher percentage of water, opposed to solids. The BET system allows time for sludge separation through sedimentation, and supernatant removal. The BET supernatant is discharged to the Tay River, with sludge directed to the Geotubes for treatment. Backwash wastewater is dechlorinated prior to entering the BETs.

The accumulation of “clean wastewater” from non-process water sources (such as roof drains, work sinks, analyzer bypass flows, engine and pump coolant water) continues to fill BET(s) and use up residue processing time and resources. As mentioned in previous DWS Summary Reports, a feasibility study should be considered to explore

options to divert this water away from the process residue management system and possibly to sanitary sewer discharges.

2.3.1. Waste Volumes

Annual total Geo-tube influent flow

Year	2017	2018	2019	2020	2021		2022
Annual total flow m ³	13,572	14,250	13,528	12,867	15,244		15,124

In 2022, a total volume of 15,124 m³ was directed to the Geo-tubes (solids collection membrane bags). It is noted the volume being generated annually can be influenced by many uncontrollable operational factors, such as raw water conditions and rainfall accumulation (overabundance or lack of).

Annual total filter backwash wastewater generation

Year	2016 (no air scour)		2017	2018	2019	2020	2021	2022
Annual total flow m ³ (est)	14,131		9,155	11,391	10,934	10,377	15,936	9,906

Backwash wastewater generation for 2022 was estimated at 9,906 m³. This volume appears back into normal range expectations. The higher volume in 2021 was attributed to GAC removal and replacement media “cleaning” through repeated backwashes.

Appendix

4.1 Appendix Table 1 – Summary of Flows January 1, 2022 to December 31, 2022

Perth Water Treatment Plant

PTTW maximum allowable flow rate: **9,092 m³/ day**

	Raw water (m ³)		Discharge (Service) Water (m ³)	
Month	Monthly Daily Average Flow	Monthly Total Flow	Monthly Daily Average Flow	Monthly Total Flow
January	2704.9	83,852	2570.4	79,683
February	2885.5	80,793	2773.1	77,648
March	3093.4	95,895	3007.8	93,242
April	2917.2	87,516	2835.0	85,049
May	3354.8	103,999	3292.6	102,071
June	3278.3	98,350	3188.3	95,648
July	3297.1	102,210	3190.5	98,904
August	3336.6	103,434	3208.2	99,484
September	2870.7	86,120	2728.4	81,852
October	2808.2	87,055	2728.1	84,571
November	2568.7	77,060	2454.9	73,648
December	2614.6	81,052	2491.3	77,230
Year Average	2977.49	90,611.3	2872.38	87,416.7
Year Total		1,087,336		1,049,000

4.2 Appendix Table 2 – Historical Average Daily Treated Water Flow (m³)

	2022	2021	2020	2019	2018	2017	2016
JANUARY	2570	2491	2762	2972	2982	2,381	2,502
FEBRUARY	2773	2670	2750	3036	2890	2,454	2,571
MARCH	3008	2630	2704	3047	2961	2,491	2,455
APRIL	2835	2409	2555	3038	2983	2,586	2,471
MAY	3293	3030	2938	3049	3363	2,495	2,931
JUNE	3188	3154	3347	3062	3268	2,836	2,996
JULY	3191	2993	3635	3469	3602	2,796	2,954
AUGUST	3208	3498	3223	3228	3269	2,837	3,024
SEPTEMBER	2728	2890	2981	2902	2947	2,886	2,694
OCTOBER	2728	2774	2805	2912	2982	2,830	2,603
NOVEMBER	2455	2486	2513	2707	2840	2,568	2,372
DECEMBER	2491	2417	2534	2711	2776	2,681	2,300
MAXIMUM	3,293	3,498	3,635	3,469	3,602	2,886	3,024
MINIMUM	2,455	2,409	2,513	2,707	2,776	2,381	2,300
AVERAGE	2,872	2,787	2,896	3,011	3,072	2,654	2,656