

2019 Port Hope Drinking Water System Annual and Summary Report



January 1st - December 31st



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February 4, 2020

Municipality of Port Hope
56 Queen Street
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RE: 2019 Annual and Summary Report – Port Hope Drinking Water System No. 260058006

Dear Mr. Gilmer:

We are pleased to provide the 2019 Annual and Summary Report for the Municipality of Port Hope's Drinking Water System, as outlined in Section 11 and Schedule 22 of Ontario Regulation 170/03, made under the *Safe Drinking Water Act 2002*.

This report includes information from January 1, 2019 to December 31, 2019.

Sincerely,

Mike Stewart
Water Operations Manager
Municipality of Port Hope

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2019 Annual Drinking Water System Report

System Information

Drinking-Water System Number: **260058006**

Drinking-Water System Name: **Port Hope Drinking Water System**

Drinking-Water System Owner: **The Corporation of the Municipality of Port Hope**

Drinking-Water System Category: **Large Municipal Residential System**

Period being reported: **January 1, 2019-December 31, 2019**

Does your Drinking-Water System serve more than 10,000 people?

Yes

Is your annual report available to the public at no charge on a web site on the Internet?

Yes – please visit www.porthope.ca

Location where Summary Report required under O. Reg. 170/03 Schedule 22 will be available for inspection.

Port Hope Municipal Town Hall
56 Queen Street
Port Hope, ON L1A 3Z9

*Also available at the Municipal Development Team Office; Municipal Libraries (Mary J Benson Branch and The Hub in Canton); and the Water Treatment Plant.

List all Drinking-Water Systems (if any), which receive all of their drinking water from your system:

N/A

Indicate how you notified system users that your annual report is available, and is free of charge.

[X] Public access/notice via the web

Public access/notice via Government Office

Public access/notice via a newspaper

Public access/notice via Public Request

Public access/notice via a Public Library

Public access/notice via other method:

Description of the Drinking Water System

Port Hope Drinking Water System is classified as Large Municipal Residential System and consists of the Water Treatment Plant (WTP) and the Distribution System. The WTP provides ultrafiltration water treatment for the water system. The WTP is located at 35 Marsh St in the Municipality of Port Hope, County of Northumberland, Ontario. The Municipality is the Owner and Operator of the Port Hope Drinking Water System that serves the community of Port Hope with a population of approximately 12,587.

Drinking Water Quality Management System

Port Hope Drinking Water System is operated by an accredited Operating Authority and in accordance with the Municipal Drinking Water Licence # 146-101, the Drinking Water Works Permit # 146-201 and the Municipality's Drinking Water Quality Management System Operational Plan # 146-401.

The following describes the components of the Port Hope Drinking Water System:

Raw Water Source

The water supply for Port Hope WTP is obtained from Lake Ontario. Lake Ontario water is of good quality and can be described as a large body of clear-coloured water with low turbidity. The Lake water's temperature ranges from 0°C (winter) to approximately 23°C (summer). The raw water source is classified as surface water, which means that it is considered to be an unprotected source. Raw water requires full treatment at Port Hope's WTP to make it drinkable or potable.

Intake Structure

Raw water is taken into a 750-mm diameter intake pipe through the intake structure. The existing intake structure and 750 mm intake piping was retrofitted to include a 900 mm on shore addition. The intake is utilized to draw water from Lake Ontario to the low

lift pumping station. The low lift pumping station is where water undergoes coarse screening.

Raw Water Pumping

The raw water pumping station consists of several raw water chambers, one (1) raw water travelling screen, two (2) manually cleaned screens (i.e., for standby purposes), and three (3) low lift pumps (with provision for a fourth). Raw water is dosed with chlorine for Zebra Mussel control prior to ultrafiltration process to control organic and micro solids from creating irreversible damage to the membranes. The raw water quality is monitored by Operations staff at the WTP.

Water Treatment

Facility Type	Facility Name	Class	Certificate No.	Issue Date
Water Treatment Plant	Port Hope Water Treatment Plant	II	WT No. 3552	July 25, 2005

Raw water is treated by passing through the ultrafiltration system. The ultrafiltration process removes organics and solids as well as safeguards against giardia and cryptosporidium contamination. The water treatment facilities consist of a Zenon ZeeWeed 1000 membrane ultrafiltration system which includes four (4) membrane tanks (each tank contains two (2) filtration cassettes with a total capacity for four cassettes) and associated cleaning and backwashing equipment. Following ultrafiltration, filtered water is disinfected by using a chlorine gas system (primary disinfection). The post-chlorination is used, as required, to maintain a fixed chlorine residual level in the water leaving the WTP. Following the disinfection process, the water is pumped to the distribution system and ready for consumption by consumers. Five (5) high lift pumps (with provision for a sixth) lift treated water to the distribution system. The WTP has a rated capacity of 20,000 m³/d. It is expected that this capacity will provide potable water to the Municipality of Port Hope for a period greater than the 20 year planning period.

Process Wastewater System

The WTP provides process residue management consisting of equalization storage and solids separation. Two (2) equalization tanks precede two (2) parallel tube settling units. Settled solids at the base of each wastewater clarifier are pumped via a sewage pumping station (located outside the WTP) to the sanitary sewer. The wastewater

supernatant is continuously analyzed for total chlorine residual, and dechlorinated prior to a discharge to Lake Ontario.

Water Distribution System

Facility Type	Facility Name	Class	Certificate No.	Issue Date
Distribution System	Port Hope Water Distribution	III	WD No. 719	April 22, 2007

Due to Port Hope's hilly terrain, the community has been divided into two pressure zones. Zone 1 is located in the lower elevation areas (east end) of the community, whereas Zone 2 is located in the higher elevation areas (west end). Zone 2 pressure and flows are maintained via a booster pumping station, elevated water tower and an in-ground reservoir/ pumping station. Zone 1 pressure and flows are maintained via the WTP pumping station and standpipe.

Water Storage Facilities

At the WTP, potable water storage consists of twined reservoirs that have a total rated capacity of 5,000 m³. Off-site storage facility in Zone 1 includes a standpipe with a rated capacity of 1,205 m³. Storage facilities in Zone 2 include an in-ground reservoir with a rated capacity of 2,273 m³ and an elevated tank that can hold up to 3,000 m³ of water.

Supervisory Control and Data Acquisition (SCADA)

SCADA system consists of numerous computer systems that control and monitor the drinking water system and the water quality at all times. Operational staff monitor and control these systems to ensure their proper operation and water quality. All Operational Staff for Port Hope Drinking Water System are fully certified by the Ministry of the Environment, Conservation and Parks.

List all water treatment chemicals used over this reporting period:

Chemical Systems

All chemicals and materials, used in the alteration or operation of the Port Hope Drinking Water System, which came into contact with drinking water, met the AWWA and the ANSI safety criteria standards NSF/60 and NSF/61.

Table 1 - Descriptions of Chemical Feed Systems Used at the Port Hope WTP

Treatment System	Chemical	Purpose	Chemical Concentration (%)	Target Dosage (mg/L)
Membrane Filtration	Sodium Hypochlorite	Membrane cleaning (CEB & high pH CIP)	12	Note 1
	Citric Acid	Membrane cleaning (low pH CIP)	50	Note 1
	Hydrochloric Acid	Membrane cleaning (low pH CIP)	30 - 40	Note 1
	Sodium Bisulphite	Dechlorination of membrane cleaning wastewater	38	Note 2
	Sodium Hydroxide	Membrane wastewater pH control	50	Note 3
Waste Residual Management System	Sodium Bisulphite	Dechlorination of wastewater supernatant from clarifier/thickeners	38	Note 2
	Polymer	Clarification aid	n/a	Note 4
Disinfection Systems	Chlorine gas	<ul style="list-style-type: none"> Zebra mussel control at Intake No. 1 Primary disinfection at inlet of chlorine contact chambers Secondary disinfection at high lift chambers 	100	<ul style="list-style-type: none"> 0.5 1.50 1.50

Notes:

- 1 - Chemicals are dosed based on a time basis to achieve a desired concentration inside the membrane tanks.
- 2 - Chemicals are dosed to achieve 0 mg/L chlorine residual.
- 3 - Chemicals are dosed to achieve a target pH range.
- 4 - There has been no need to dose polymer to date.

Table 2 - Summary of Annual Chemical Usage at Port Hope WTP

Treatment System	Chemical	Volume (Litre) or Weight (kg)	Range of Monthly Quantities Used
Membrane Filtration	Sodium Hypochlorite	21,214 L	1,295 – 2,067 L
	Citric Acid	7,899 L	563 – 870 L
	Hydrochloric Acid	820 L	20 – 100 L
	Sodium Bisulphite	14,140 L	944 – 1,525 L
	Sodium Hydroxide	3,841 :	235 – 392 L
Waste Residual Management System	Sodium Bisulphite	-	Combined with membrane volumes
	Polymer	0	0
Disinfection Systems	Chlorine gas for Zebra mussel control at Intake No. 1	-	Volume included in Primary disinfection
	Chlorine gas for primary disinfection at inlet of chlorine contact chambers	4,749 kg	336 – 458 kg
	Chlorine gas for secondary disinfection at high lift chambers	195 kg	2 – 34 kg

Were any significant expenses incurred to?

- Install required equipment
- Repair required equipment
- Replace required equipment

Please provide a brief description and a breakdown of monetary expenses incurred:

Preventative maintenance activities for equipment are scheduled and completed routinely along with other lifecycle replacement needs. In addition to the PM activities, the following capital expenditures were incurred throughout this Reporting Period.

Description	Monetary Expenses
Membrane Replacement – Train 3	≈ \$380,000
Replace Truck #1 – Meter Van	≈\$45,000
High Lift Pump (HLP) #4 Refurbishment	≈ \$50,000
Installation of Variable Frequency Drives on HLPs #2, 3, 4 & 5	≈ \$240,000 ¹
Brown Street Reconstruction	≈ \$460,000

Note 1 – Partial monetary expenses funded through the Save on Energy Retrofit Program.

Notices submitted in accordance with subsection 18(1) of the Safe Drinking Water Act or section 16-4 of Schedule 16 of O.Reg.170/03 and reported to Spills Action Centre during this Reporting Period:

Table 3 - Summary of Reportable Incidents

Incident Date (DD-MM-YY)	Parameter	Result	Unit of Measure	Corrective Action	Corrective Action Date (DD-MM-YY)
N/A					

Microbiological Testing completed under Schedule 10, 11, or 12 of Regulation 170/03 during this Reporting Period:

Table 4 - Microbiological Testing Summary

	Number of Samples	Range of E.Coli Or Fecal Results (min #) – (max #)	Range of Total Coliform Results (min #) – (max #)	Number of HPC Samples	Range of HPC Results (min #) – (max #)
Raw	53	0	0-2	N/A	N/A
Treated	53	0	0	53	0-1
Distribution	372	0	0	372	0-800

Operational Testing completed under Schedule 7, 8, or 9 of Regulation 170/03 during the Reporting Period covered by this Annual Report:

Table 5 - Operational Testing Summary

Parameters	Number of Grab Samples	Range of Results (min #)-(max #)	Unit of Measure
Raw Turbidity	8760	0.00 – 99.98	NTU
Treated Turbidity	8760	0.00 – 1.46	NTU
Primary Chlorine	8760	0.51 – 2.48	mg/L
Post-Chlorination Chlorine	8760	1.02 – 2.50	mg/L
Distribution Chlorine (Grab Samples)	1308	0.35 – 2.18	mg/L
Distribution Chlorine (Reservoir)	8760	0.55 – 3.76	mg/L
Distribution Chlorine (Elevated Tank)	8760	0.00 – 5.00	mg/L
Fluoride (If the DWS provides Fluoridation)	N/A	N/A	N/A

Note – For continuous monitors, 8760 is used as the number of samples.

Table 6 - Summary of additional testing and sampling carried out in accordance with the requirement of an Approval, Order, or other Legal Instrument

Date of legal instrument issued	Parameter	Date Sampled	Result	Unit of Measure
Nov.24, 2015 Municipal Drinking Water License 146-101	Process waste water, Total Chlorine Residual	Continuously	0.00 – 1.43	mg/L
Nov.24, 2015, Municipal Drinking Water License 146-101	Process waste water, Total suspended solids	Monthly	18.83 Annual Average	mg/L

Table 7 - Summary of Inorganic parameters tested during this Reporting Period or the most recent Sample Results

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Antimony	Aug. 07, 2019	0.20	ug/L	No
Arsenic	Aug. 07, 2019	0.9	ug/L	No
Barium	Aug. 07, 2019	21.4	ug/L	No
Boron	Aug. 07, 2019	24	ug/L	No
Cadmium	Aug. 07, 2019	0.003 <MDL	ug/L	No
Chromium	Aug. 07, 2019	0.28	ug/L	No
*Lead	N/A			
Mercury	Aug. 07, 2019	00.01 <MDL	ug/L	No
Selenium	Aug. 07, 2019	0.15	ug/L	No
Sodium	Aug. 07, 2019	13.8	mg/L	No
Uranium	Aug. 07, 2019	0.416	ug/L	No
Fluoride	Aug. 07, 2019	0.12	mg/L	No
Nitrite	Feb. 05, 2019	0.003 <MDL	mg/L	No
Nitrate	Feb. 05, 2019	0.447 (MAX for yr	mg/L	No

*Only for drinking water systems testing under Schedule 15.2; this includes large municipal non-residential systems, small municipal non-residential systems, non-municipal seasonal residential systems, large non-municipal non-residential systems, and small non-municipal non-residential systems.

Table 8 - Summary of Lead Testing under Schedule 15.1 during this Reporting Period

Location Type	Number of Samples	Range of Lead Results (min#) – (max #)	Unit of Measure	Number of Exceedances
Plumbing	N/A			
Distribution	8	Not Required in 2019– pH and Alkalinity Only.		

Table 9 - Summary of Organic parameters sampled during this Reporting Period:

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Alachlor	Aug. 07, 2019	0.02 <MDL	ug/L	No
Atrazine + N-dealkylated metabolites	Aug. 07, 2019	0.07	ug/L	No
Azinphos-methyl	Aug. 07, 2019	0.05 <MDL	ug/L	No
Benzene	Aug. 07, 2019	0.32 <MDL	ug/L	No
Benzo(a)pyrene	Aug. 07, 2019	0.004 <MDL	ug/L	No
Bromoxynil	Aug. 07, 2019	0.33 <MDL	ug/L	No
Carbaryl	Aug. 07, 2019	0.05 <MDL	ug/L	No
Carbofuran	Aug. 07, 2019	0.01 <MDL	ug/L	No
Carbon Tetrachloride	Aug. 07, 2019	0.17 <MDL	ug/L	No
Chlorpyrifos	Aug. 07, 2019	0.02 <MDL	ug/L	No
Diazinon	Aug. 07, 2019	0.02 <MDL	ug/L	No
Dicamba	Aug. 07, 2019	0.20 <MDL	ug/L	No
1,2-Dichlorobenzene	Aug. 07, 2019	0.41 <MDL	ug/L	No
1,4-Dichlorobenzene	Aug. 07, 2019	0.36 <MDL	ug/L	No
1,2-Dichloroethane	Aug. 07, 2019	0.35 <MDL	ug/L	No
1,1-Dichloroethylene	Aug. 07, 2019	0.33 <MDL	ug/L	No
Dichloromethane	Aug. 07, 2019	0.35 <MDL	ug/L	No
2,4 Dichlorophenol	Aug. 07, 2019	0.15 <MDL	ug/L	No
2,4-Dichlorophenoxy acetic acid (2,4-D)	Aug. 07, 2019	0.19 <MDL	ug/L	No
Diclofop-methyl	Aug. 07, 2019	0.40 <MDL	ug/L	No
Dimethoate	Aug. 07, 2019	0.06 <MDL	ug/L	No
Diquat	Aug. 07, 2019	1 <MDL	ug/L	No

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Diuron	Aug. 07, 2019	0.03 <MDL	ug/L	No
Glyphosate	Aug. 07, 2019	1 <MDL	ug/L	No
Malathion	Aug. 07, 2019	0.02 <MDL	ug/L	No
MCPA	Aug. 07, 2019	0.00012 <MDL	ug/L	No
Metolachlor	Aug. 07, 2019	0.01	ug/L	No
Metribuzin	Aug. 07, 2019	0.02 <MDL	ug/L	No
Monochlorobenzene	Aug. 07, 2019	0.3 <MDL	ug/L	No
Paraquat	Aug. 07, 2019	1 <MDL	ug/L	No
Pentachlorophenol	Aug. 07, 2019	0.15 <MDL	ug/L	No
Phorate	Aug. 07, 2019	0.01 <MDL	ug/L	No
Picloram	Aug. 07, 2019	1 <MDL	ug/L	No
Polychlorinated Biphenyls(PCB)	Aug. 07, 2019	0.04 <MDL	ug/L	No
Prometryne	Aug. 07, 2019	0.03 <MDL	ug/L	No
Simazine	Aug. 07, 2019	0.01 <MDL	ug/L	No
THM (Running Annual Average of Quarterly Results)	2019	41	ug/L	No
HAA (Running Annual Average of Quarterly Results)	2019	24	ug/L	No
Terbufos	Aug. 07, 2019	0.01 <MDL	ug/L	No
Tetrachloroethylene	Aug. 07, 2019	0.35 <MDL	ug/L	No
2,3,4,6-Tetrachlorophenol	Aug. 07, 2019	0.20 <MDL	ug/L	No
Triallate	Aug. 07, 2019	0.01 <MDL	ug/L	No
Trichloroethylene	Aug. 07, 2019	0.44 <MDL	ug/L	No
2,4,6-Trichlorophenol	Aug. 07, 2019	0.25 <MDL	ug/L	No
Trifluralin	Aug. 07, 2019	0.02 <MDL	ug/L	No
Vinyl Chloride	Aug. 07, 2019	0.17 <MDL	ug/L	No

Table 10 - Inorganic or Organic parameter(s) that have exceeded half the standard prescribed in Schedule 2 of Ontario Drinking Water Quality Standards

Parameters	Result Value	Unit of Measure	Date of Sample
N/A			

2019 Summary Report to Council

In accordance with Schedule 22 of Ontario Regulation 170/03, a Summary Report shall be prepared no later than March 31st for the preceding year and supplied to members of Municipal Council.

The Report shall list the requirements of the Act, Regulations, Drinking Water Works Permit (DWWP), Municipal Drinking Water Licence (MDWL), and any Orders applicable to the system that were not met at any time during the period covered by the Report.

The Report must also include a summary of the quantities and flow rates of potable (drinkable) water supplied during the reporting period, including monthly average and maximum daily flows. A comparison of these flows, to the rated capacity and flow rates approved in the system Drinking Water Works Permit and Municipal Drinking Water Licence, must also be provided.

Acts, Regulations, and Prescribed Instruments applicable to the Port Hope Drinking Water System (DWS)

The Port Hope DWS is governed by, and must operate their DWS's in accordance with the following Acts and Regulations at minimum:

- Safe Drinking Water Act, 2002;
 - O. Reg. 170/03 – Drinking Water Systems;
 - O. Reg. 128/04 – Certification of Drinking Water System Operators and WQA;
 - O. Reg. 169/03 – Ontario Drinking Water Quality Standards;
- Environmental Protection Act, where applicable;
- Clean Water Act, where applicable;
- Municipal Drinking Water Licence 146-101;
- Municipal Drinking Water Works Permit 146-201; and
- Permit to Take Water 2205-7DQHGN.

Compliance with Prescribed Instruments, Acts and Regulations

Safe Drinking Water Act

The Municipality, acting as the Operating Authority for the operation of the Port Hope Drinking Water System, is fully compliant with Ontario Acts, Regulations and Orders and as such has maintained a Ministry of the Environment Conservation and Parks (MOE) inspection rating of 100% for several years. The 2018-2019 MOE inspection

completed in March of 2019, yielded that same result. There were no occurrences in 2019 that resulted in non-compliance.

SAI Global conducted an offsite surveillance system audit of the Municipality of Port Hope's Drinking Water Quality Management System (QMS), on September 12, 2019. The audit determined that the QMS is effectively implemented, maintained and meets the requirements of the Drinking Water Quality Management Standard Version 2.0 – 2017. The Auditor suggested two (2) opportunities for improvement which will be further evaluated prior to the next audit. Another onsite re-accreditation audit will take place, prior to the Municipalities full scope certificate of accreditation expiration on December 21st, 2021.

Clean Water Act

The Ganaraska Source Protection Plan was approved by the MOE and came into effect on January 1, 2015. The Municipality has put necessary internal processes in place with the Planning, Fire and Emergency Services and Works and Engineering Departments to ensure compliance with the Source Protection Plan. The vulnerable scores for the Port Hope Intake Protection Zone are too low to create prescribed significant drinking water threats within the Intake Protection Zone (IPZ) 1 and IPZ 2. The current local significant drinking water threats have been identified through an event based modelling approach, and are mitigated through emergency preparedness and sound operational practices.

Permit to Take Water

In accordance with Permit to Take Water number 3130-AW2KR4, the Port Hope Water Treatment Plant is permitted to take 52,700 m³/day from Lake Ontario, at a maximum flow rate of 609.95 Litres/second. Throughout the Reporting Period, the Port Hope WTP remained within compliance limits identified in the Permit to Take Water for the facility. A maximum daily taking of 8,880 m³ was recorded on July 10, 2019. The maximum flow rate recorded was 280 L/s on June 20, 2019. For further details on Raw Water taking throughout the reporting period, see Table 11 – Monthly Summary of Net Daily Raw Water Volumes on Page 17.

Raw Water Flow Rates

A summary of the daily quantities of water being taken from Lake Ontario (i.e., net daily raw water volumes) are shown in Table 11. As shown, the highest daily raw water volume of 8,880 m³/day has not exceeded 52,700 m³/day as stipulated in the Permit to Take Water.

Table 11 - Monthly Summary of Net Daily Raw Water Volumes

Month	Daily Average Raw Water Volume per Month (m ³ /d)	Maximum Daily Raw Water Volume in Month (m ³ /d)
January	5,774	6,746
February	5,856	6,443
March	5,746	6,500
April	6,315	7,575
May	6,517	7,295
June	6,998	8,460
July	7,154	8,880
August	5,684	6,440
September	6,625	7,373
October	6,572	7,274
November	6,150	6,653
December	5,724	6,821
Average	6,260	
Maximum		8,880

Drinking Water Works Permit/Municipal Drinking Water Licence

Summary of Water Quantities and Flow Rates

This section provides a summary of records related to flow rates of treated water, wastewater and also membrane instantaneous flow rates.

This section also provides a summary and discussion on the quantity of treated water supplied in 2019 in comparison to the rated capacity specified in the Municipal Drinking Water Licence, including monthly average and maximum daily flows.

Currently, there are sufficient membrane modules installed to produce Phase 1 flows of 14,000 m³/day. Note that this flow rate is a total net daily production of treated water.

Given that there's downtime for cleaning, backwashing and membrane integrity tests, the instantaneous flow rate into the membranes is higher than the plant rated capacity

as defined above. The current recovery rate is 90%, which provides an instantaneous factor of approximately 1.11 l/s. Thus, requiring an instantaneous raw water flow rate into the membranes of 15,540 m³/day.

A summary of the above is provided below:

- Current plant rated capacity (net treated water production)= 14,000 m³/day.
- Current instantaneous raw water flow rate at plant rated capacity = 15,540 m³/day.
- Current maximum daily flow rate from membranes = 8,390 m³/day.

Membrane Instantaneous Flow Rates

A summary of the combined instantaneous flow rate from the membranes is shown in Table 12 below. As shown, the maximum instantaneous flow rate from the membranes has not exceeded the anticipated instantaneous raw water flow rate of 15,540 m³/d.

Table 12 - Monthly Summary of Combined Instantaneous Flowrate from Membranes

Month	Daily Average Per Month	Maximum Instantaneous Flowrate	
	m ³ /d	L/s	m ³ /d
January	5,308	71	6,170
February	4,819	66	5,724
March	5,320	71	6,137
April	5,541	83	7,163
May	6,067	79	6,792
June	6,325	92	7,971
July	6,704	97	8,390
August	5,324	70	6,021
September	5,924	80	6,932
October	6,175	80	6,885
November	5,701	71	6,166
December	5,353	74	6,379

Month	Daily Average Per Month	Maximum Instantaneous Flowrate	
	m ³ /d	L/s	m ³ /d
Average	5,713	77.9	
Maximum		97.1	8,390

Treated Water Flow Rates

A summary of the treated water flows is shown in Table 13. As shown, the plant rated capacity of 20,300 m³/d was not exceeded. The maximum daily water demand reached 36.12% of the plant rated capacity; averaging 28.74 % over the year.

Table 13 - Monthly Summary of Treated Water Flows

Month	Daily Average per Month (m ³ /d)	Maximum Daily (m ³ /d)	% Max/ Rated Capacity	Max. Peak Hour (m ³ /h)
January	4,754	5,330	26.26	238.59
February	4,776	5,049	24.87	233.27
March	4,771	5,216	25.69	240.61
April	5,112	6,152	30.31	226.07
May	5,429	6,115	30.12	233.44
June	5,630	6,868	33.83	257.42
July	5,975	7,333	36.12	291.65
August	4,732	5,355	26.38	271.74
September	5,226	6,245	30.76	232.86
October	5,411	5,843	28.78	238.25
November	4,898	5,472	26.96	234.75
December	4,695	5,037	24.81	220.75
Avg.	5,117		28.74	243
Max.		7,333	36.12	292

Wastewater Flow Rates

Wastewater is generated on-site from cleaning the membranes utilizing the following processes: backwashing, maintenance cleans and recovery cleans. It has been anticipated that approximately 10% of the raw water volume is used for these processes, resulting in the plant recovery rate of 90%.

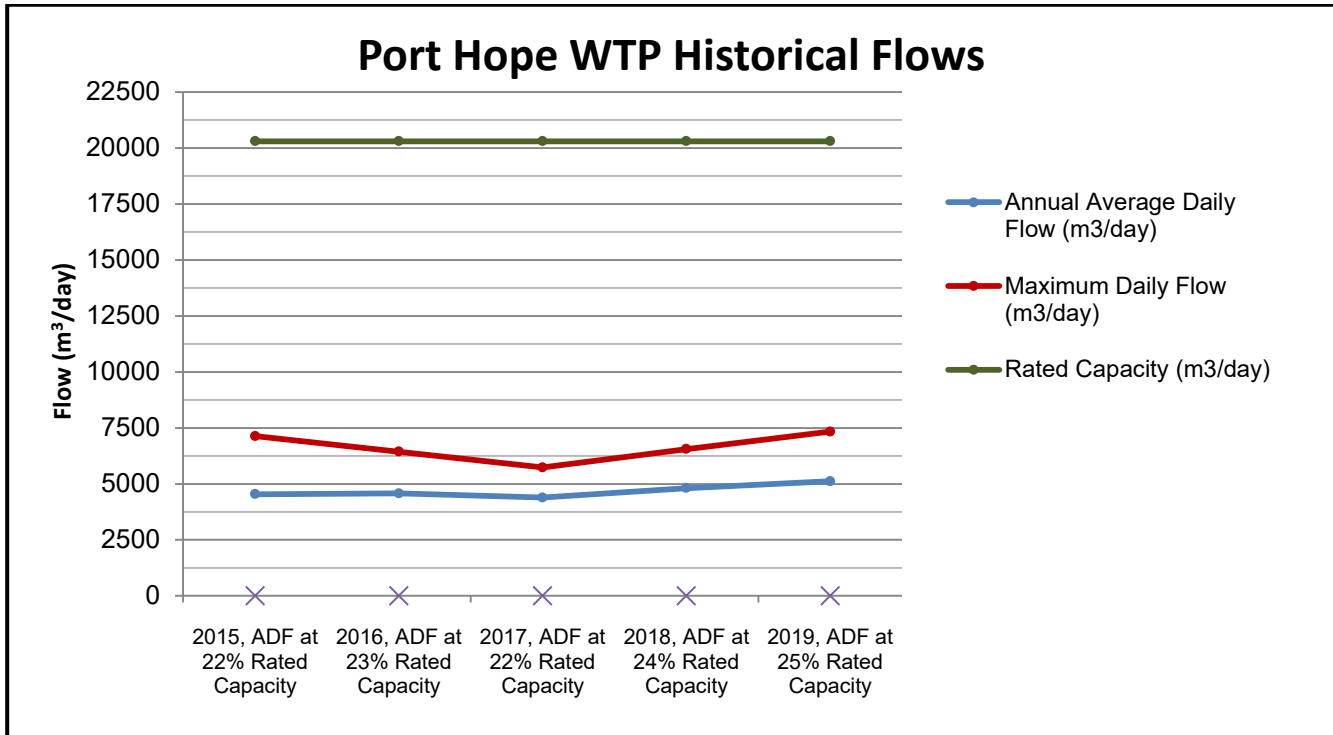
Table 14 shows that wastewater production, in any given month, has averaged 18.4 % of the raw water flows, which is 8.4 % more than the anticipated 10% wastewater production.

Table 14 - Monthly Summary of Wastewater Flows

Month	Total Monthly Raw Water Volume (m ³)	Total Monthly Wastewater Volume (m ³)	% Wastewater/ Raw
January	178,979	34,492	19.27%
February	163,972	34,017	20.75%
March	178,134	33,175	18.62%
April	189,436	33,349	17.60%
May	202,022	36,540	18.09%
June	209,950	36,812	17.53%
July	221,774	37,667	16.98%
August	176,209	31,845	18.07%
September	195,761	36,053	18.42%
October	203,726	38,433	18.87%
November	184,501	34,633	18.77%
December	177,433	32,515	18.33%
Average	190,158	34,961	18.44%
Maximum	221,774	38,433	20.75%

Historical Flow Comparison

Accounting for 23% of the facility's rated capacity, the 5-year Average Daily Flow (ADF) is 4,688 m³/day.



Sampling Analytical Results

This section provides a summary of analytical results of sampling required by Ontario Drinking Water Quality Standards (ODWQS) and conditions in the Municipal Drinking Water Licence, Section 1.5 of Schedule C.

Microbiological

The bacteriological data in the raw, treated and distribution water supply are shown in Table 4 - Microbiology Testing Summary. If either the treated or distribution water contain any total coliform (TC) or fecal coliform (FC), then the water quality is considered adverse. The corrective action in all cases is to report, resample, analyze and follow the instructions as directed by the Medical Officer of Health. The Municipality observed no adverse samples in 2019.

Turbidity

Permeate water turbidity readings from all of the four membrane trains averaged between 0.02 – 0.03 NTU in 2019.

Table 15 - Analysis of Permeate Water Turbidity Data

Month	Sampling Location	Train 1	Train 2	Train 3	Train 4	Total Turbidity Samples	Total Turbidity Samples	Percentage of Samples
		AVG	AVG	AVG	AVG		<0.1NTU	<0.1 NTU
January	On-line	0.02	0.03	0.02	0.01	6412217	6412217	100.000%
February	On-line	0.02	0.03	0.02	0.01	6071267	6071267	100.000%
March	On-line	0.02	0.03	0.02	0.02	6457893	6457771	99.998%
April	On-line	0.02	0.03	0.02	0.03	6501942	6500538	99.978%
May	On-line	0.02	0.03	0.02	0.03	7088344	7087912	99.994%
June	On-line	0.03	0.03	0.02	0.03	7299654	7299099	99.992%
July	On-line	0.03	0.03	0.02	0.03	7464996	7462401	99.965%
August	On-line	0.02	0.02	0.02	0.03	5689194	5688827	99.994%
September	On-line	0.02	0.02	0.02	0.03	6799603	6798095	99.978%
October	On-line	0.02	0.02	0.02	0.03	7104464	7103979	99.993%
November	On-line	0.02	0.02	0.02	0.03	6515648	6512057	99.945%
December	On-line	0.02	0.02	0.02	0.03	6811598	6809231	99.965%

Disinfection

Primary and Post Chlorination Disinfection Chlorine Residuals

Primary disinfection: chlorine is added just prior to the dual cell contact chambers to target a free chlorine residual of 1.50 mg/l.

Post chlorination disinfection: chlorine is injected into the high lift equalization chambers, to maintain free chlorine residual of 1.50 mg/L, entering Zone 1 of the distribution system.

Table 16 - Summary of Primary and Post Chlorination Disinfection Free Chlorine Residuals

Location	Sample Count	Free Chlorine Residual (mg/L)			% of time > 0.05 mg/L	% of time > 0.2 mg/L
		Minimum	Average	Maximum		
WTP – Primary Disinfection	continuous	0.51	1.56	2.48	100	100
WTP – Post Chlorination Disinfection	continuous	1.02	1.53	2.50	100	100

Secondary Disinfection Chlorine Residuals – Distribution System

The Procedure for Disinfection of Drinking Water in Ontario states that “the distribution system must be operated such that at all times and at all locations within the distribution system there is at least a detectable free chlorine residual of 0.05 mg/L at a pH 8.5 or lower.”

O. Reg. 170/03, Schedule 16-3.4 states that the distribution water quality is considered to be adverse if the free chlorine residual is measured to be less than 0.05 mg/L. The corrective action is to restore chlorination immediately and follow the instructions as directed by the Medical Officer of Health. All samples analyzed, in 2019, met regulatory requirement for free chlorine residual of greater than 0.05 mg/L.

The Municipality has implemented the following procedures to comply with the Regulation:

- Scheduled flushing of dead end water mains;
- Chlorine addition at the Zone 2 at the Elevated Tank and Reservoir; and
- Initiation of a “Capital Works” program to replace all 100 mm cast iron water mains and loop dead ends within the next ten (10) years.

Table 17 - Summary of Distribution Free Chlorine Residuals

Location	Sample Count	Distribution Free Chlorine Residual (mg/L)			% of time > 0.05 mg/L	% of time > 0.2 mg/L
		Minimum	Average	Maximum		
Distribution – Jocelyn St Reservoir	continuous	0.55 ¹	1.52	3.76	100	100
Distribution – Fox Rd. Elevated Water Tank	continuous	0.00 ²	1.57	5.00 ²	100	100
Distribution System, Grab Samples	1308	0.35	2.18	1.40	100	100

Note 1 – SCADA reporting program recorded analyzer values while in calibration mode.

Note 2 –SCADA reporting program recorded analyzer values during start-up of analyzer, after preventative maintenance/calibration was performed.

Supernatant Total Suspended Solids

Schedule C, Section 1.5 of the Municipal Drinking Water Licence states that the annual average concentration of the suspended solids (TSS) in the effluent discharged from the Port Hope WTP into the natural environment shall not exceed 25 mg/L. Furthermore, as stated in Schedule C, Section 4.4, the total suspended solids composite sampling is required to be completed quarterly at the effluent discharge pipe. As shown below, the annual average concentration of suspended solids has not exceeded the discharge limit of 25 mg/L and continuing efforts are made to optimize the process to ensure TSS content in the effluent remains below 25 mg/L.

Table 18 - Supernatant Discharge Total Suspended Solids

Location	Sample Count	Total Suspended Solids (mg/L)		
		Minimum	Annual Average	Maximum
Supernatant Discharge at Outfall	12	3.0	18.83	97.0

Other Parameters

Table 19 lists deviations from Ontario Drinking Water Quality Standards (ODWQS) and Ontario Drinking Water Standards, Objectives and Guidelines (ODWSOG).

Table 19 - Deviations from ODWQS and ODWSOG

Parameter	Location	Operational Guideline (OG) /Aesthetic Objective (AO)	Exceedance	Comments
Raw Water				
Temperature	Plant	15 °C (OG)	0.0 – 22.6°C	Uncontrolled parameter
Hardness (as CaCO ₃)	Plant	80-100 mg/L (AO)	111 mg/L	Uncontrolled parameter
Treated Water				
Temperature	Plant	15 °C (OG)	1.0 – 22°C	Uncontrolled parameter
Hardness (as CaCO ₃)	Plant	80-100 mg/L (AO)	133 mg/L	Uncontrolled parameter
Distribution System				
-	-	-	-	-

Abnormal or Emergency Drinking Water System Operating Conditions

There were no abnormal or emergency drinking water system operating conditions as a result of an emergency situation in 2019.

APPENDIX A

Ontario Ministry of the Environment, Conservation and Parks Compliance Inspection Results