Ontario Clean Water Agency
Agence Ontarienne Des Eaux

Stephan Burt
District Manager
Hamilton District Office
Ministry of the Environment, Conservation and Parks

March 31, 2024

Re: 2023 Annual Performance Report for the Port Dover Wastewater Treatment Plant and the Port Dover Linear Infrastructure

Attached is the 2022 Annual Performance Report for the Port Dover Wastewater Treatment Plant located at 137 Hamilton Plank Road, Port Dover in Norfolk County and all associated sewage pumping stations and linear infrastructure. This report has been completed in accordance with:

- Section 11(4)(a) through (n) cited in Environmental Compliance Approval #7884-C94HQT issued on January 14, 2022 to the Corporation of Norfolk County
- Schedule E, Section 4.6 cited in the Consolidated Linear Infrastructure – Environmental Compliance Approval #070-W601 issue number 1 issued on July 27, 2022 to the Corporation of Norfolk County

This report, as it pertains to the WWTP, the SPS's and forcemains, was prepared by the Ontario Clean Water Agency on behalf of Norfolk County, based on the information contained in our records. The information included in the reports on the Port Dover gravity separate sewers was provided by Norfolk County.

The report covers the period from January 1, 2023 to December 31, 2023.

Sincerely,

Allison Billingsley
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Cc:
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Introduction:

The Port Dover WWTP is located at 137 Hamilton Plank Road, Ontario (Norfolk County). The plant is a conventional activated sludge plant with a rated capacity of 5,400 m^3/d, and is comprised of the following key components:

Headworks and preliminary treatment facility comprising screening, raw sewage pumping and grit removal; Liquid train comprising three primary clarifiers, two aeration tanks and two secondary clarifiers; Hauled waste receiving facility; Chlorination/dechlorination based disinfection system; Anaerobic digester; and Biosolids storage facility.

Raw Wastewater Collection
There are eight (8) sewage pumping stations (SPS) with seven (7) in the Port Dover collections system and one, SPS #6, Woodhouse, being at the WWTP. The Bridge St pumping station is the largest station in the collection system and receives flow from Nelson St SPS, Lynn St. SPS and Harbour St, SPS as well as the surrounding gravity sewer system. This typically makes up more than 50% of the flow received at the Port Dover WWTP. The WWTP and the pumping stations serve the Town of Port Dover, which has a population of approximately 5,527 people.

Sewage Pumping Stations
The Norfolk County Municipal Wastewater Collection System is made up of five separate wastewater collection systems. The Port Dover wastewater collection system conveys sewage to the Port Dover Wastewater Treatment Facility through a total of 57 kilometres of gravity separate sewers, 3.7 kilometres of forcemains and seven (7) sewage pumping stations in the authorized system and one (1) sewage pumping station located at the Wastewater Treatment Facility that is connected to the authorized system but not a part of the authorized system. For additional information on the individual SPS's listed below, please refer to CLI-ECA #070-W601 Issue #1.

- WW489 – Bridge Street SPS located at 4 Bridge Street in Port Dover, Ontario. Bridge Street SPS is a triplex pumping station equipped with 3 pumps (1 duty, 2 standby), with 19.6 m of total head and a wet well of 166 m^3 capacity. The station is connected to 350 mm diameter forcemain, discharging to a manhole at the intersection of Pansy Street & Erie Street. The station is also equipped with an equalization tank with an emergency storage volume of 2000m^3. There is an Overflow that is located in the man-hole immediately upstream of the wet well and discharges to the Lynn River. Lake Erie is the final receiver.
- WW485 – Donjon Boulevard SPS located at 80 Donjon Boulevard in Port Dover, Ontario. Donjon Boulevard SPS is a duplex pumping station equipped with 2 pumps (1 duty, 1 standby), and a wet well of 22 m^3 capacity. The station is connected to a 200 mm diameter forcemain, discharging to a manhole at the intersection of Hamilton Plank Road & Sommerset Drive. The Overflow is located in the pump station wet well and discharges to the Lynn River. Lake Erie is the final receiver.
- WW490 – Harbour Street SPS located at 40 Harbour Street in Port Dover, Ontario. Harbour Street SPS is a duplex pumping station equipped with 2 pumps (1 duty, 1 standby), and a wet well of 17 m^3 capacity. The station is connected to a 150 mm diameter forcemain, discharging to the Bridge Street Pumping Station at 4 Bridge Street, Port Dover. The Overflow is located in the pump station wet well and discharges to the Lynn River. Lake Erie is the final receiver.

- WW486 – Lynn Street SPS located at 13 Lynn Street in Port Dover, Ontario. Lynn Street SPS is a duplex pumping station equipped with 2 dry well pumps (1 duty, 1 standby), and a wet well of 4 m^3 capacity. The station is connected to a 200 mm diameter forcemain, discharging to a manhole at the intersection of Lynn Street & Bridge Street.
- WW491 – Nelson Street SPS located at 328 Nelson Street in Port Dover, Ontario. Nelson Street SPS is a triplex pumping station equipped with 3 pumps (1 duty, 2 standby), and a wet well of 80 m^3 capacity. The station is connected to a 300 mm diameter forcemain, discharging to a manhole at the intersection of Main Street and Market Street West. The Overflow is located in the pump station wet well and discharges to the adjacent drainage ditch. Lake Erie is the final receiver.
- WW487 – River Drive SPS located at 8 River Drive in Port Dover, Ontario. River Drive SPS is a duplex pumping station equipped with 2 pumps (1 duty, 1 standby), and a wet well of 23 m^3 capacity. The station is connected to a 200 mm diameter forcemain, discharging to a manhole at the intersection of Pansy Street and Erie Street. The Overflow is located in the pump station wet well and discharges to Lynn River. Lake Erie is the final receiver.
- WW488 – Ryerse Crescent SPS located at 38 Ryerse Crescent in Port Dover, Ontario. Ryerse Crescent SPS is a triplex pumping station equipped with 3 dry well submersible pumps (1 duty, 2 standby), and a wet well of 94 m^3 capacity. The station is connected to a 250 mm diameter forcemain, discharging to a manhole at the end of Scott Drive. The Overflow is located in the pump station wet well and discharges to Lynn River. Lake Erie is the final receiver.

Inlet Works

Traveling Screens

There are two (2) screens controlled by a Milltronics unit in the inlet channels and work on lead and lag set points. The screens are rated for a total of 18,000 m^3/d with screening going to a compactor then to the grit box.

Raw Sewage Pumping

The raw sewage is then pumped from the wet wells via three (3) raw sewage pumps, 2 variable speeds and one fixed speed. The pumps are SCADA controlled with one variable speed pump operating as the duty pump. If the influent flows exceed the capabilities of the variable speed pumps, the fixed speed pump will turn on and take the place of one of the variable speed pumps. The variable speed pumps are rotated weekly however all pumps are exercised routinely to ensure operation. The above sequence can be changed by the SCADA system.

Grit Cyclone

The raw sewage is pumped into the Grit Cyclone, which removes grit from the raw sewage. Grit, which is normally sand, gravel etc., has no “nutritional” value for the activated sludge and harms pumps and other moving mechanisms within a wastewater treatment plant due to its abrasiveness. The cyclone uses a paddle in the tank to keep the velocity in the cyclone constant. Air and water scour are used to separate the grit and the water. Ferrous chloride is added immediately after the grit cyclone for Phosphorous control. The water flows by gravity to the primary clarifier splitter-box and the grit is dumped into a grit box and hauled off to a landfill site.

Primary Clarification

Flows enter the primaries via a splitter box, which has three (3) sluice gate valves to direct flow to the individual primary clarification tanks. Waste activated sludge is also received at the

primary splitter box to maintain balanced loadings on all primary clarifiers.

The flow velocity through this tank is very slow allowing heavier solids to settle to the bottom of the tank and lighter material (scum) to float to the surface. The scum is removed by the use of chain drive surface skimmers. The skimmers work two fold, on the up movement the skimmers "push" the scum to the front end of the clarifier and on the down movement they "scrape" the sludge on the bottom of the tank into the sludge collector system. Once the skimmers reach the end of the tank the debris is deposited into a "scum trough" which periodically is manually discharged to the scum pit. The sludge from the primary clarifiers, which can also include waste activated sludge from the secondary (final) clarifiers, is gathered at the bottom of the tank and is pumped to the digester.

Aeration Tanks
The Primary effluent flows into the aeration tanks through a Parshall flume.

The aeration tanks provides air (oxygen) into the wastewater to promote biological activity. Microorganisms live and grow by using the dissolved oxygen and colloidal matter (small solid particles that didn't settle out in the primary clarifier). This in-turn either breaks the waste into simpler compounds or increases the microorganisms' own mass. The microorganisms will clump together to form large particles known as floc, which will settle out later on in the process. This mixture is referred to as "mixed liquor". Oxygen is added to the mixed liquor with the use of mechanical aerators.

There are two (2) mechanical aeration tanks each with two (2) cells for a total of four (4) mechanical mixers. At present the Dissolved Oxygen (DO) is measured manually and the motor speeds are adjusted on SCADA to maintain a dissolved oxygen concentration of 2.0 mg/L.

Secondary Clarification
From the Aeration Tanks the mixed liquor discharges into the secondary/final clarifiers. The clarifiers are circular tanks, 17 m (56') in diameter and 4.3 m (14.11') in depth. The purpose of secondary clarifiers is to settle out any remaining solids from the effluent by gravity. As in primary clarification, the settled sludge is collected at the bottom of the tank and pumped back to the aeration basins as Return Activated Sludge. A portion of the RAS is sent to the primary clarifiers as Waste Activated Sludge, which helps maintain the concentration of microorganisms at the desired level in the secondary treatment process. The clarifiers have a gear drive on the "flights" which act as both skimmers and sludge collectors. The effluent from both of these clarifiers is discharged into the common disinfection contact chamber channel.

Disinfection Phase
<u>Chlorine Contact Chamber</u>
The disinfection contact chamber is a baffled tank with chlorine (sodium hypochlorite) being used as the disinfectant. Chlorine was injected at the head of the contact chamber but was changed in April 2022 as part of the interim works identified in the ECA to the outlet of the secondary clarifier to increase the contact time. One sodium hypochlorite chemical feed pump is located in the chemical building adjacent to the chlorine contact chamber.

Dechlorination
Dechlorination utilizing Sodium Bisulphite was completed and operational on March 1, 2022 as part of the interim works identified in the ECA. A temporary building was constructed near the contact chamber to house the chemical and two (1 duty, 1 standby) sodium bisulphite chemical

feed pumps. Sodium Bisulphite is injected at the outfall of the contact chamber prior to the discharge pipe.

Sludge Management System

Sludge Handling

The digester is an egg shaped tank approximately 18 m (59') high with a diameter of 8.5 m (28') with an approximate volume of 660 m^3 with two (2) recirculation pumps and a central draft tube to provide mixing. It also has a gas collection system, boiler, heat exchanger and gas flare. The raw sludge which is a mix of primary and waste activated sludge is pumped to the digester. The digester is anaerobic meaning that the microorganisms do not require air.

Anaerobic bacteria (those living in the absence of oxygen) break down the solids in the sludge to form simpler compounds and gases. One of these gases is methane, which is a valuable fuel. The methane gas, which is produced, is explosive when mixed with air, so special operating precautions have to be taken. The methane gas is collected and stored in a storage tank and used to heat the boiler. The digested sludge is spread on land during the summer months and stored on site during the winter.

Standby Power

The emergency power for the facility is supplied by 100kW generator powered by a 140HP diesel engine. The fuel storage tank is 900L, allowing for a 30-hour emergency power supply with a full tank of fuel. The generator is sized and connected to provide partial power to the plant. Operational staff determine what equipment needs to run during a power failure to maintain plant operation.

Port Dover WWTP Facts:

Environmental Compliance Approval:	ECA 7884-C94HQT (issued January 14, 2022)
Rated Capacity:	5,400m3/day
Receiving Water:	Lake Erie

For 2023, the Port Dover WWTP was operated in accordance with provincial regulations as required in ECA #7884-C94HQT and ECA #5437-BLYN9F. The following report is presented such that it corresponds with ECA #7884-C94HQT Section 11(4) (a) through (n) and satisfies the requirements for the sewage pumping stations and the Port Dover linear infrastructure in CLI-ECA #070-W601 Issue #1 dated July 27, 2022.

Section A: Influent Monitoring Data

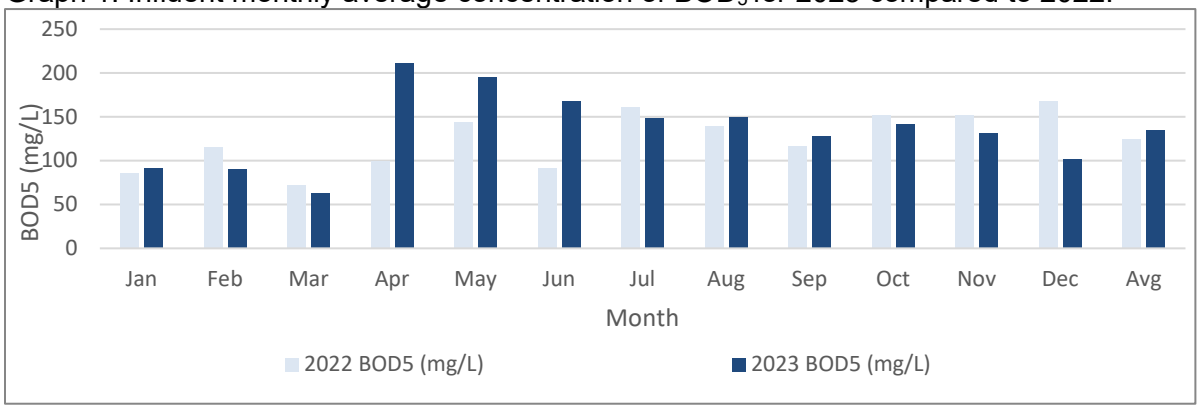
As outlined in ECA 7884-C94HQT issued January 14, 2022 Section 11(4)(a) the following is a summary and interpretation of all influent and imported sewage monitoring data and a review of the historical trend of the sewage characteristics.

(I) Influent Data

The raw wastewater (influent) is monitored for BOD5, total suspended solids, total phosphorus and total kjeldahl nitrogen, pH and alkalinity at a minimum on a weekly basis by composite sample. Refer to Appendix A for more detailed monthly results.

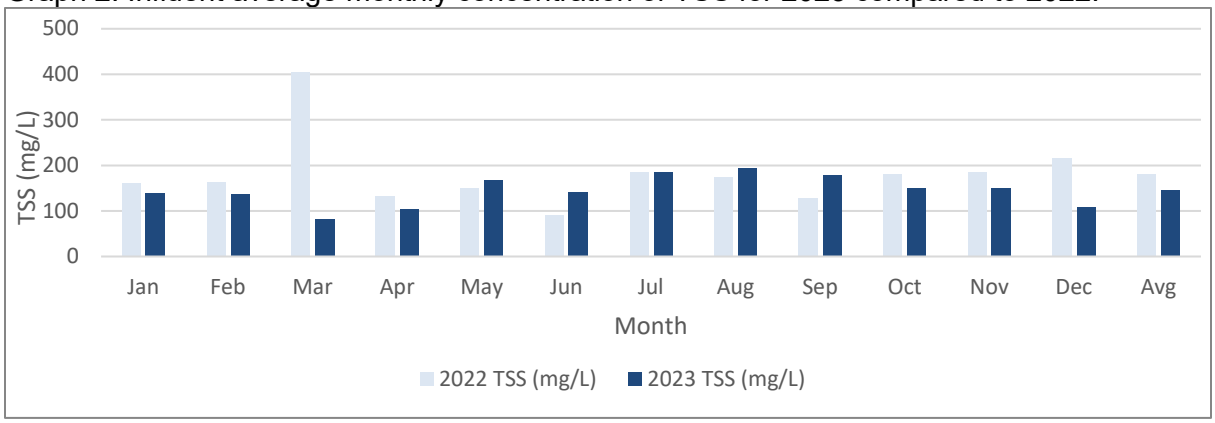
The annual average for raw sewage BOD_5 concentration for 2023 to the plant was 135.1mg/L. This is an increase from 2022 by 7.7%. Refer to Graph 1 for a comparison of the monthly concentrations for 2023 to 2022.

Graph 1. Influent monthly average concentration of BOD_5 for 2023 compared to 2022.



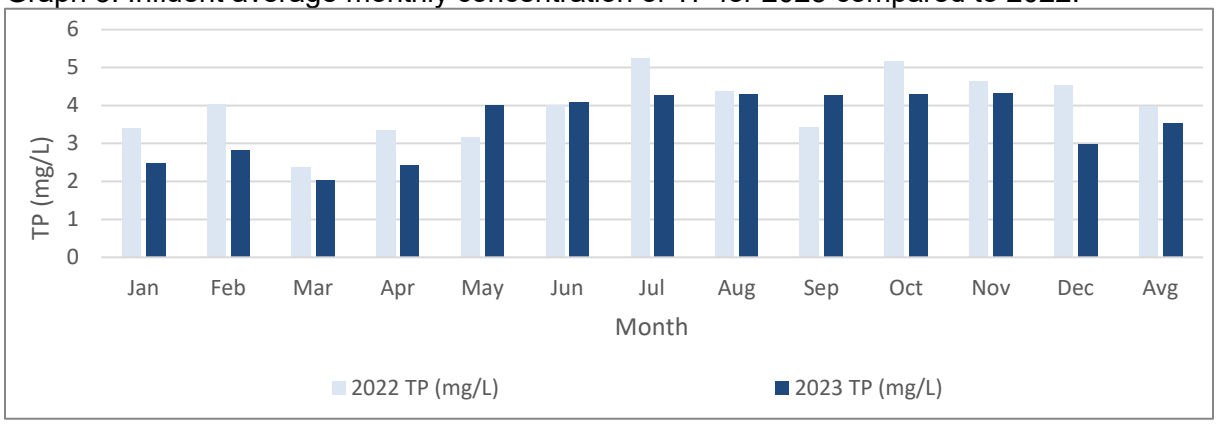
The annual average for influent total suspended solids (TSS) concentration for 2023 to the plant was 145.1mg/L. This is a decrease from 2022 by 24.7%. Refer to Graph 2 for a comparison of the monthly concentrations for 2023 to 2022.

Graph 2. Influent average monthly concentration of TSS for 2023 compared to 2022.



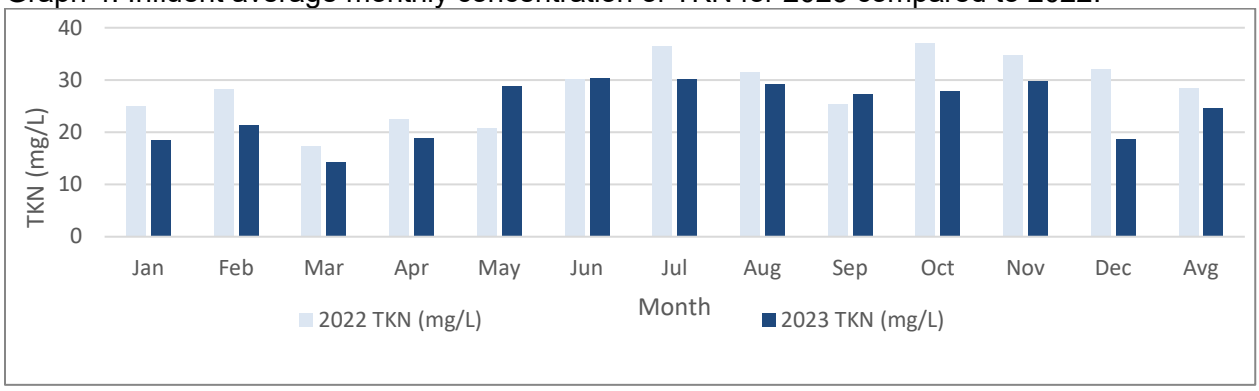
The annual average for the influent total phosphorus (TP) concentration for 2023 to the plant was 3.52mg/L. This is a decrease from 2022 by 12%. Refer to Graph 3 for a comparison of monthly concentrations for 2023 to 2022.

Graph 3. Influent average monthly concentration of TP for 2023 compared to 2022.



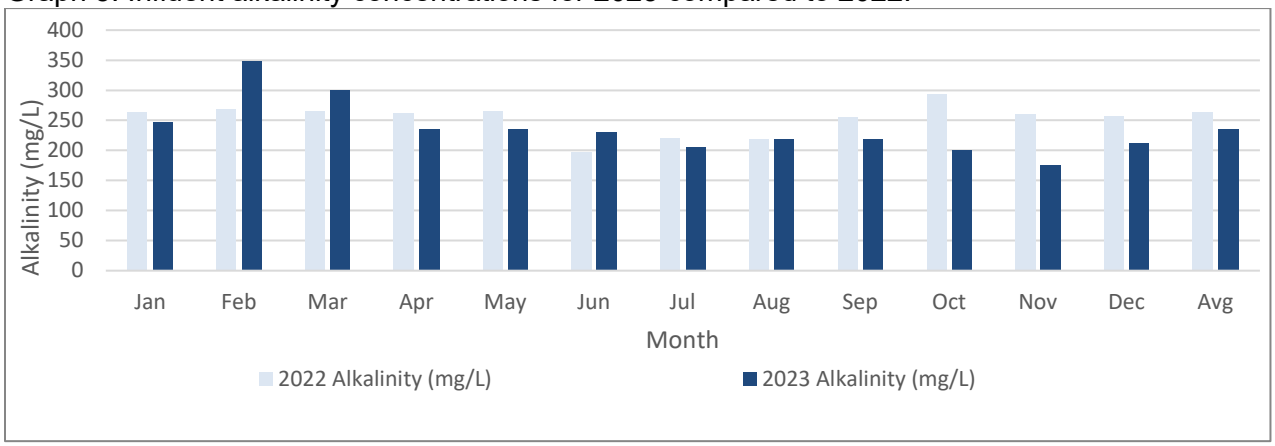
The annual average for the influent total kjeldahl nitrogen (TKN) concentration for 2023 to the plant was 24.6mg/L. This is a decrease from 2022 by 15.8%. Refer to Graph 4 for a comparison of monthly concentrations for 2023 to 2022.

Graph 4. Influent average monthly concentration of TKN for 2023 compared to 2022.



The annual average for the influent alkalinity concentration for 2023 to the plant was 211mg/L. This is a decrease from 2022 by 12%. Refer to Graph 5 for a comparison of monthly concentrations for 2023 to 2022.

Graph 5. Influent alkalinity concentrations for 2023 compared to 2022.



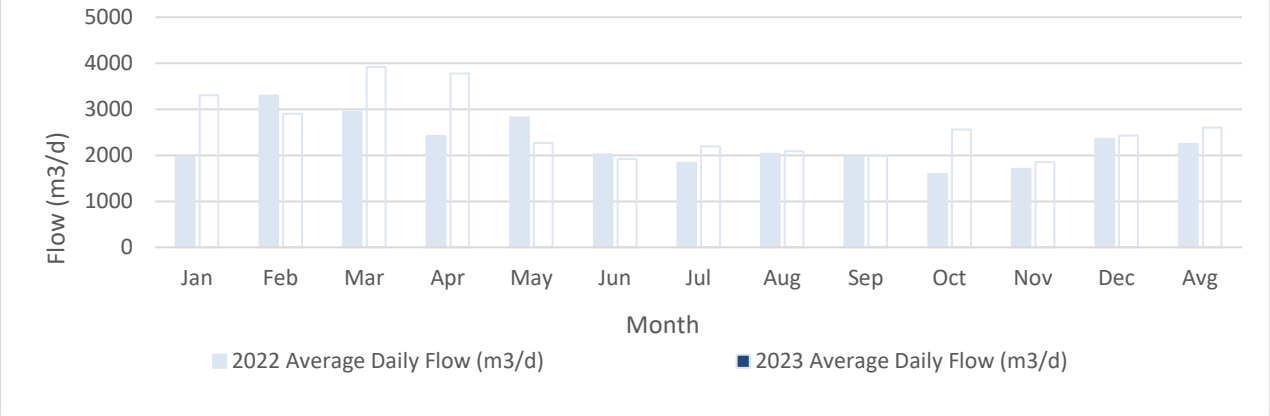
The influent characteristics have fluctuated marginally throughout the year. This is to be expected with the flow variations that are experienced at the Port Dover WWTP.

(II) Sewage Pumping Stations Monitoring Data

As per the CLI-ECA Schedule E Condition 4.6.3, there are flow meters at Bridge Street SPS and Ryerse Cres. SPS. The following graphs show the flow trends from these stations for 2023 compared to 2022. The remaining five (5) SPS's do not have flow meters.

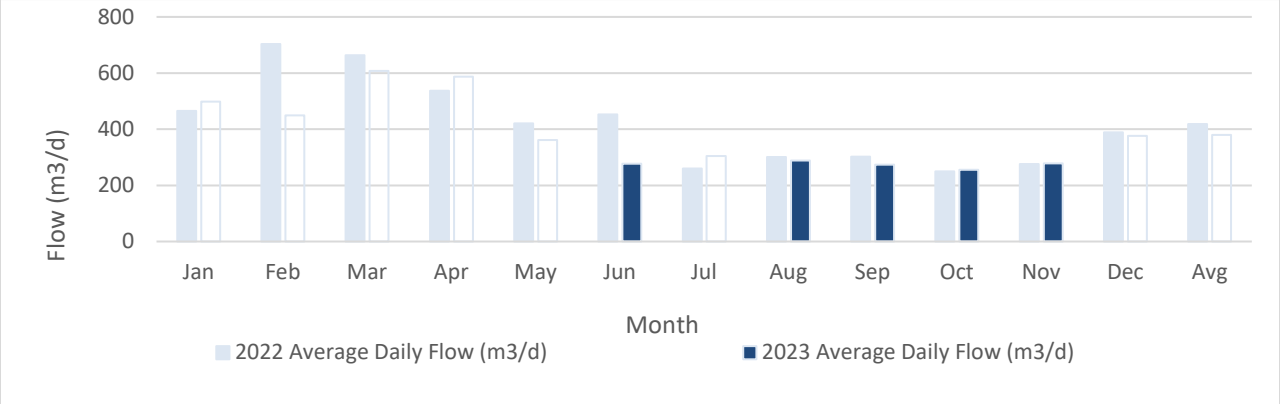
The average daily flow for Bridge Street SPS was 2,601m^3/d in 2023. The total flow for 2023 was 949,264m^3/d which is an increase of 13.8% compared to the total flow of 817,994m^3/d in 2022. The following Graph 6 shows a comparison of the average daily flows per month for 2023 and 2022.

Graph 6. Bridge Street SPS daily flows in 2023 compared to 2022.



The average daily flow for Ryerse Cres SPS was 380m^3/d in 2023. The total flow for 2023 was 138,494m^3/d which is a decrease of 9.7% compared to the total flow of 152,728m^3/d in 2022. The following Graph 7 shows a comparison of the average daily flows per month for 2023 and 2022.

Graph 7. Ryerse Cres SPS daily flows in 2023 compared to 2022.



The following Tables 1 and 2, show the total pump run time hours for each station in 2023 compared to 2022. There is no additional monitoring data that required interpretation or conclusions for the Port Dover sewage pumping stations in 2023. There is no need for future

modifications to the sewage pumping stations at this time.

Table 1. Pump Run Hours for the Port Dover SPS's in 2023 and 2022

Sewage Pumping Station (SPS)	Year	Pump #1 (hours)	Pump #2 (hours)	Pump #3 (hours)
Bridge Street	2022	2,125.34	2,397.20	2,724.00
	2023	2,058.85	1,140.10	3,996.10
Donjon Blvd	2022	464.70	812.20	-
	2023	520.30	276.70	-
Harbour Street	2022	257.30	260.81	-
	2023	235.00	258.00	-
Lynn Street	2022	37.50	-	-
	2023	84.40	-	
Nelson Street	2022	16.40	58.30	5,864.80
	2023	62.80	46.70	2,583.10
River Drive	2022	339.20	496.80	-
	2023	338.60	494.30	-
Woodhouse	2022	348.30	314.40	-
	2023	400.20	376.00	-
Ryerse Cresent	2022	154.30	174.50	2,396.10
	2023	80.00	52.90	2,731.30

Table 2. Total Pump Run Hours for the Port Dover SPS's in 2023 compared to 2022

Sewage Pumping Station (SPS)	Total Hours 2022 (hours)	Total Hours 2023 (hours)	Percent Change (%)
Bridge Street	7,246.54	7,195.05	-0.7
Donjon Blvd	1,276.90	797.00	-60.2
Harbour Street	518.11	493.00	-5.1
Lynn Street	37.50	84.40	55.6
Nelson Street	5,939.50	2,692.60	-120.6
River Drive	836.00	832.90	-0.4
Woodhouse	662.70	776.20	14.6
Ryerse Cresent	2,724.90	2,864.20	4.9

(III) Imported Sewage (Septage) Monitoring

As required by the ECA, imported sewage (septage) is sampled on a weekly basis and tested, at a minimum, for BOD_5, total suspended solids, total phosphorus, total kjeldahl nitrogen, pH and alkalinity. The addition of an imported sewage receiving station is part of the proposed upgrades for the Port Dover WWTP in which flow rates would be captured once completed however, the Port Dover WWTP received an estimated total of 6,957.23m^3 in 2022 as broken down in Table 3 below.

Table 3. Total Volume of Imported Sewage to the Port Dover WWTP in 2023

Month	Holding Volume (m^3)	Septic Volume (m^3)	Portable Waste Volume (m^3)
January	668.81	-	1.34
February	415.59	-	0.95
March	665.78	-	0.76
April	587.81	18.93	1.32
May	471.61	-	9.46
June	306.96	-	8.71
July	677.14	-	-
August	618.28	-	-
September	454.12	142.41	-
October	440.57	5.30	1.51
November	600.68	3.03	1.93
December	457.99	1.89	0.45
Total	**6,365.34**	**171.56**	**26.43**

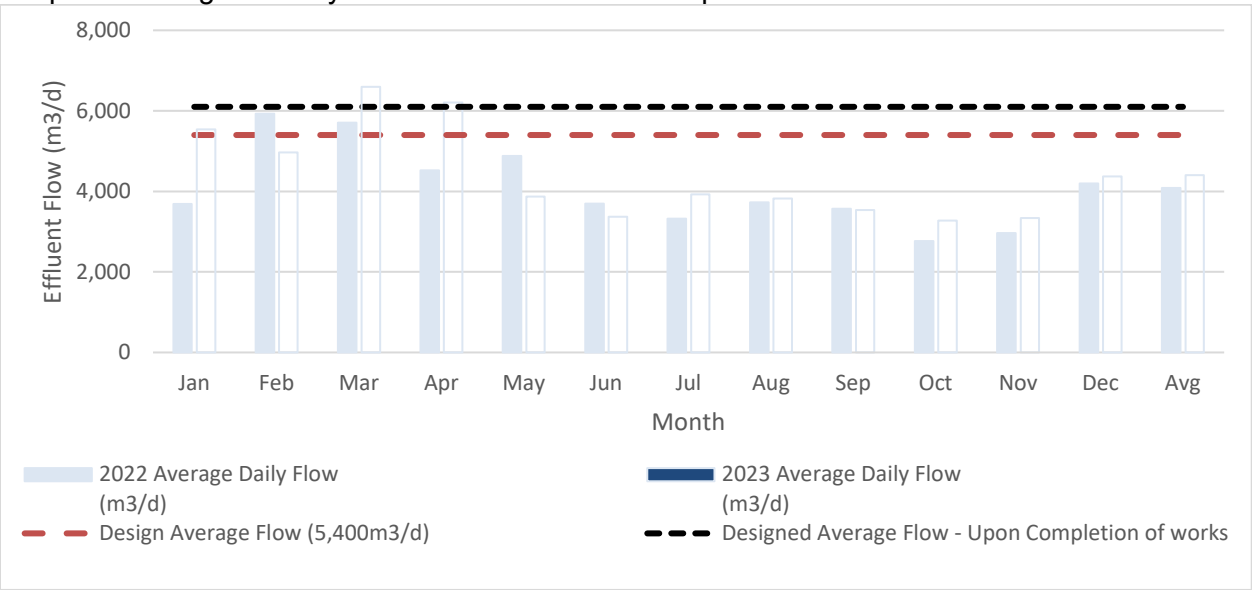
Section B: Effluent Monitoring Data

As outlined in ECA #7884-C94HQT Section 11(4)(b) the following is a summary and interpretation of all effluent monitoring data including concentrations and flow rates. Also included is a comparison of effluent concentrations to the design objectives and compliance limits in the approval and an overview of the success and adequacy of the Works. The completion of construction of the proposed works was not completed in 2023 and therefore all monitoring data is compared against “prior to completion of construction” objectives and limits. Detailed monitoring data is supplied in Appendix A.

(I) Effluent Flow Monitoring

The average daily flow of the effluent wastewater discharging from the Port Dover WWTP was 4,401m^3/d in 2023 which is 81.5% of the rated capacity of 5,400m^3/d. The 2023 average daily flow has increased compared to the 2022 average daily flow of 4,082m^3/d. The following Graph 8 shows a comparison of the average daily flows per month for 2023 and 2022 compared to the rated capacity of the facility.

Graph 8. Average monthly effluent flows for 2023 compared to 2022



There were several instances where the daily flow exceeded the average daily rated capacity. Refer to Table 4 for a summary of the rated capacity exceedances. Compliance is assessed on the annual average, therefore these exceedances are not reportable, but could indicate a possible inflow/infiltration issue within the collection system.

Table 4. Daily flow readings and ranges above the rated capacity of 5,400m^3/d in 2023.

Month	# of Exceedances	Flow Range (m^3/day)
January	14	5,413.93 – 11,180.63
February	6	5,446.67 – 10,881.82
March	20	5,415.51 – 17,164.46
April	12	5,722.83 – 15,603.10
May	3	5,855.75 – 6,300.41
June	1	8,014.23 – 8,014.23
July	2	6,348.83 – 8,537.86
August	1	5,609.73 – 5,609.72
September	1	8,611.44 – 8,611.44
October	0	-
November	0	-
December	3	5,509.11 – 7,771.82
TOTAL	**63**	**5,413.93 – 17,164.46**

(II) Effluent Data Monitoring

The final effluent is sampled on a weekly basis and tested for cBOD$_5$, total suspended solids, total phosphorus and total ammonia (TAN), total kjeldahl nitrogen, nitrate as nitrogen, and nitrite as nitrogen as a composite sample. A grab sample is collected weekly and tested for E. coli. A grab sample is also collected daily (during normal operating hours) and tested for pH, Temperature, Dissolved Oxygen, Total Residual Chlorine (TRC), and TRC post dechlorination. Unionized ammonia is calculated using the weekly laboratory TAN value with the corresponding in house pH and Temperature results. Detailed results are found in *Appendix A*. Table 5, 6 and

7 below show the monthly average effluent results from the composite samples, the monthly average effluent results from the grab samples and a comparison to the loadings limits respectively.

Table 5. Monthly average effluent ranges for 2023 obtained from weekly composite sampling.

Month	cBOD5 (mg/l)	TSS (mg/l)	TP (mg/l)	TAN (mg/l)	NO2 (mg/l)	NO3 (mg/l)	TKN (mg/l)
January	2.0	2.3	0.44	6.73	5.15	1.40	7.75
February	2.2	4.0	0.51	5.70	1.01	6.29	6.75
March	2.1	3.8	0.39	6.06	0.46	6.94	7.06
April	2.7	3.8	0.39	10.01	0.62	2.33	11.15
May	4.7	3.4	0.58	15.30	0.94	1.60	15.70
June	4.3	5.8	0.51	17.50	0.94	0.77	19.80
July	2.2	7.5	0.40	12.11	5.29	1.03	13.75
August	2.0	4.2	0.50	2.99	1.77	9.69	4.18
September	2.0	3.0	0.45	0.97	1.17	12.82	2.30
October	2.0	2.8	0.32	3.10	1.36	12.80	4.58
November	2.5	2.8	0.14	3.19	1.36	13.42	4.44
December	2.6	2.8	0.28	3.32	1.28	10.65	4.25
Average	**2.6**	**3.9**	**0.41**	**7.25**	**1.78**	**6.65**	**8.48**
Objective	15.0	15.0	0.80	n/a	n/a	n/a	n/a
Limit	25.0	25.0	1.0	n/a	n/a	n/a	n/a

Table 6. Monthly average effluent ranges for 2023 obtained from weekly grab samples.

Month	*E.coli (cfu/100mL)	pH (min-max)	Dissolved Oxygen (mg/l)	TRC post dechlor. (min-max) (mg/l)	Temperature (°C)	Unionized Ammonia (mg/l)**
January	76.8	7.21-8.08	2.48	0.00-0.02	10.4	0.0476
February	28.8	7.04-7.85	2.29	0.00-0.02	9.6	0.0257
March	83.3	7.03-7.62	2.57	0.00-0.02	9.2	0.0270
April	65.5	7.09-7.64	2.22	0.00-0.02	11.6	0.0514
May	85.4	6.83-7.53	2.63	0.00-0.02	14.7	0.0630
June	53.2	7.03-7.62	2.50	0.00-0.02	17.6	0.1100
July	27.9	6.84-7.43	2.06	0.00-0.02	20.0	0.0658
August	13.8	7.10-7.61	2.31	0.00-0.02	18.7	0.0218
September	12.3	6.78-7.55	3.09	0.00-0.02	18.5	0.0064
October	10.8	7.11-7.67	2.91	0.00-0.02	16.0	0.0199
November	44.5	7.01-7.56	3.31	0.00-0.02	13.2	0.0132
December	7.4	6.91-7.86	2.80	0.00-0.02	11.9	0.0139
Average	**42.5**	**6.83-8.12**	**2.60**	**0.00-0.02**	**14.3**	**0.0388**
Objective	100	6.5-8.5	n/a	Non-Detect	n/a	n/a
Limit	n/a	6.0-9.5	n/a	0.02	n/a	n/a

*Geometric Mean

**As calculated

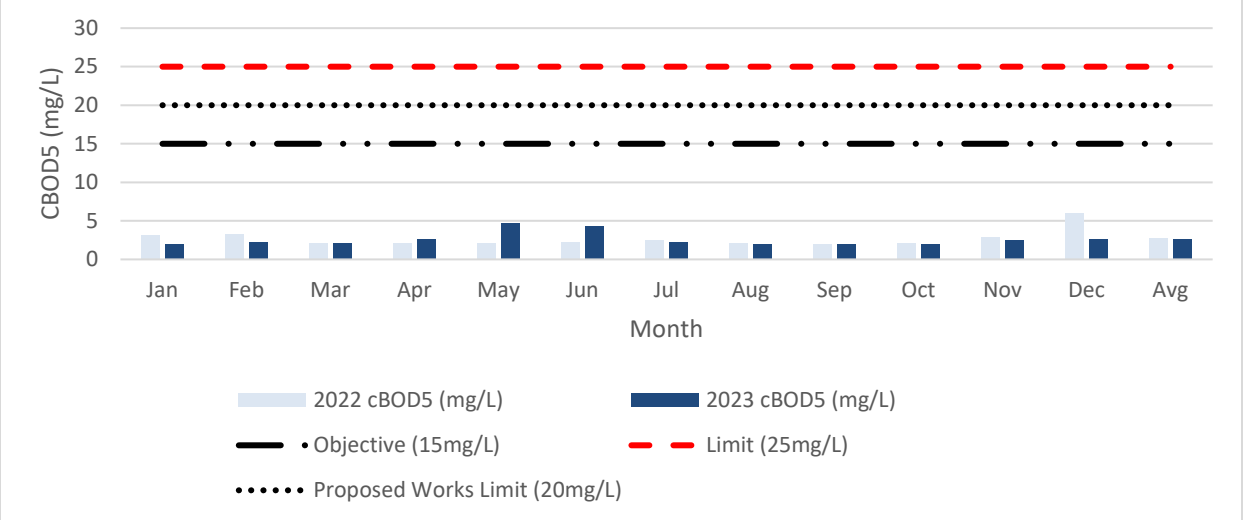
Table 7. Monthly average effluent loading results for 2023

Month	cBOD5 (kg/d)	TSS (kg/d)	TP (kg/d)
January	11.08	12.46	2.44
February	10.93	19.87	2.53
March	13.86	25.08	2.57
April	16.44	23.27	2.42
May	18.19	13.16	2.24
June	14.39	19.36	1.72
July	8.63	29.43	1.57
August	7.64	16.05	1.91
September	7.08	10.61	1.59
October	6.55	9.17	1.05
November	8.34	9.34	0.47
December	11.37	12.03	1.22
Average	**11.21**	**16.65**	**1.81**
Limit	135.0	135.0	5.4

(III) Comparison to Compliance Limits and Objectives

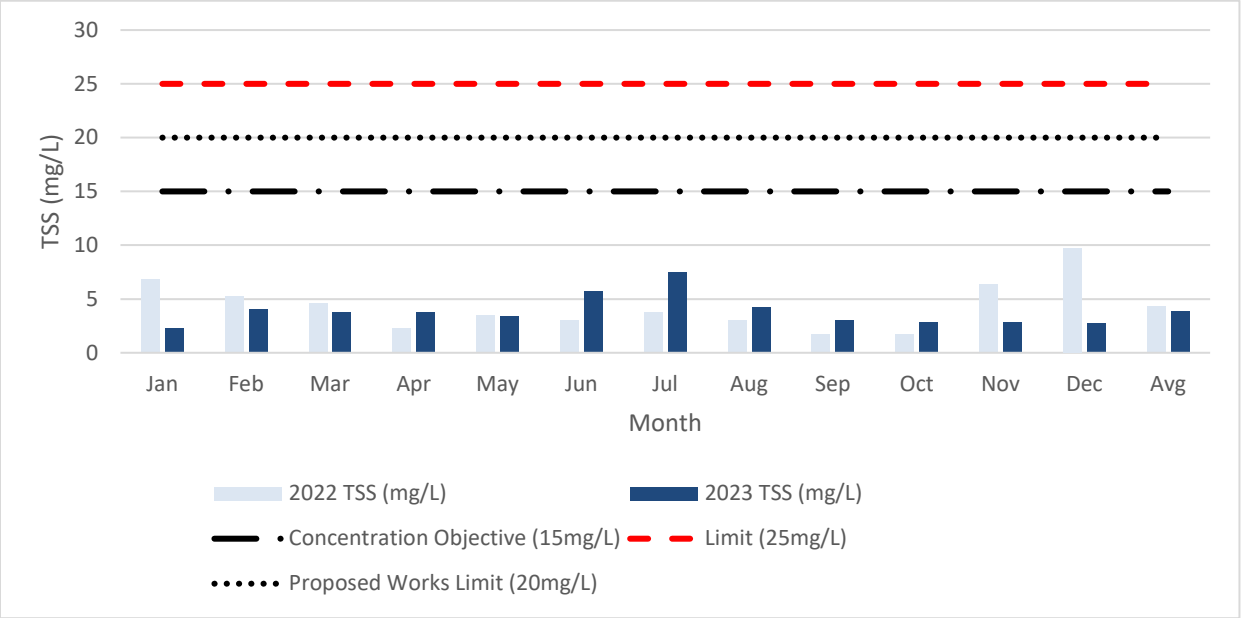
The annual average for effluent $cBOD_5$ in 2023 was 2.6mg/L; this value has decreased by 4.6% compared to 2022. The annual average loading of $cBOD_5$ was 11.21kg/d. The effluent objective and the concentration and loading limits for $cBOD_5$ were not exceeded in 2023. Refer to Graph 9 for a comparison of effluent monthly average concentration of $cBOD_5$.

Graph 9. The effluent monthly average concentration of $cBOD_5$ in 2023 compared to 2022



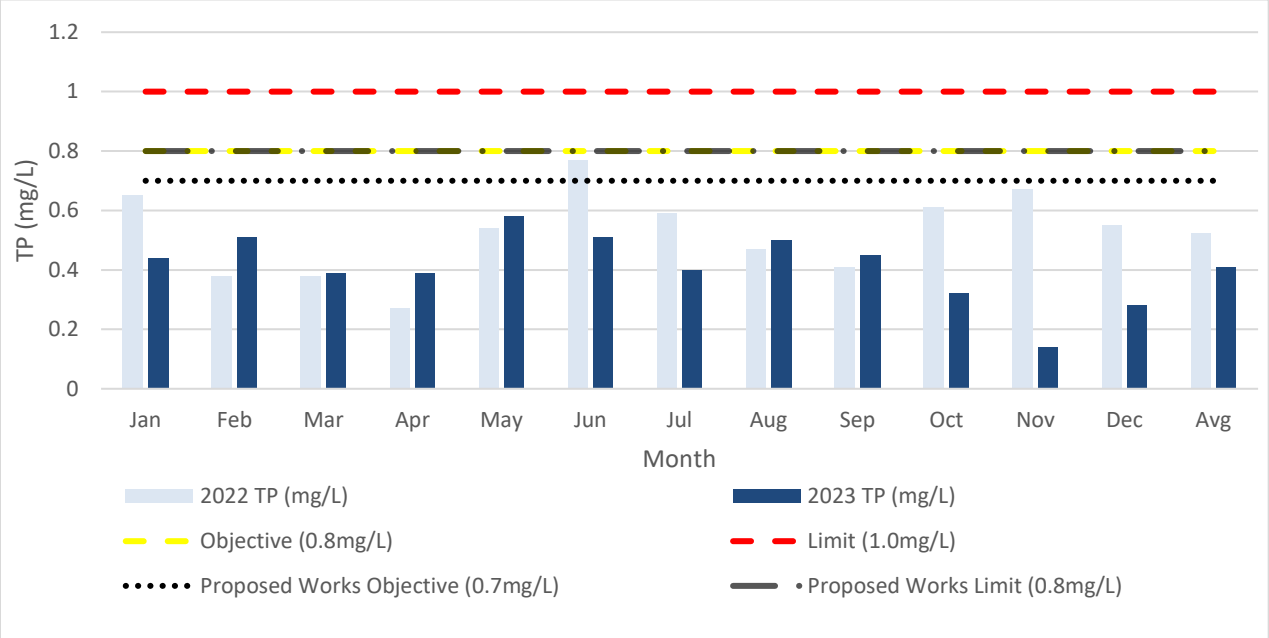
The annual average for effluent TSS in 2023 was 3.9mg/L; this value has decreased by 12.6% from the annual average in 2022.The annual loading of TSS was 16.65kg/d. The effluent objective and the concentration and loading limits for TSS were not exceeded in 2023. Refer to Graph 10 for the effluent monthly average concentration of TSS.

Graph 10. The effluent monthly average concentration of TSS in 2023 compared to 2022.



The annual average for effluent TP in 2023 was 0.41mg/L; this value has decreased by 28.1% from the annual average in 2022. The annual loading of TP was 1.81kg/d. The effluent objective and the concentration and loading limit for TP were not exceeded in 2023. Refer to Graph 11 for a comparison of the effluent monthly average concentration of TP.

Graph 11. The effluent monthly average concentration of TP in 2023 compared to 2022.



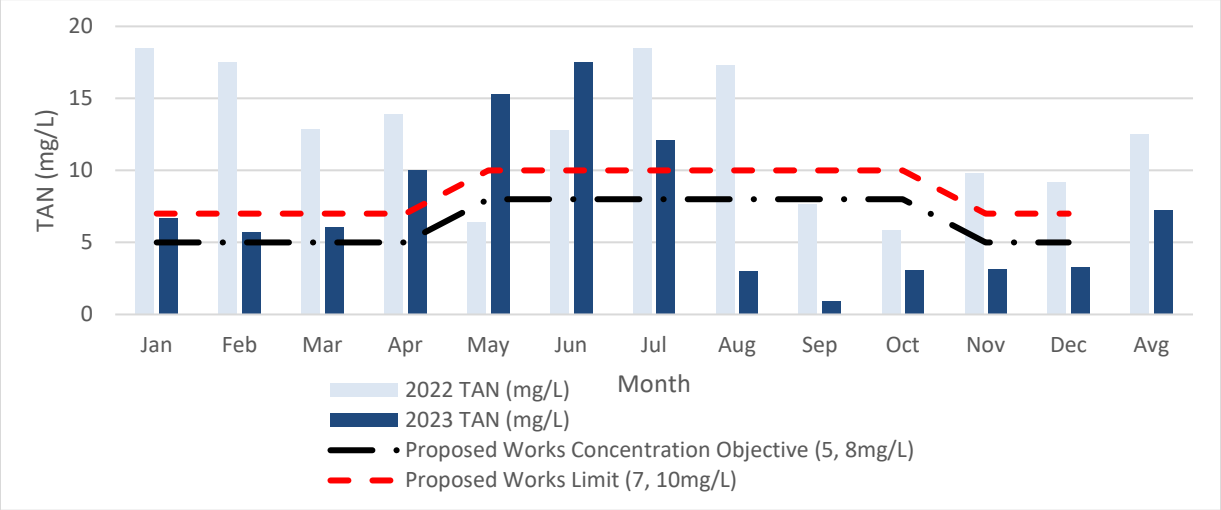
The annual average concentration for effluent Total Ammonia Nitrogen (TAN) in 2023 was 7.25mg/L. The annual loading of TAN was 32kg/d. There are currently no limits or objectives for TAN prior to construction of the proposed works. The proposed limits and objectives (upon

completion of all proposed works) for TAN vary based on the freezing period:

- November 1st to April 30th - the objective is 5.0mg/L and the limit is 7.0mg/L.
- May 1st to October 31th - the objective is 8.0mg/L and the limit is 10.0mg/L.

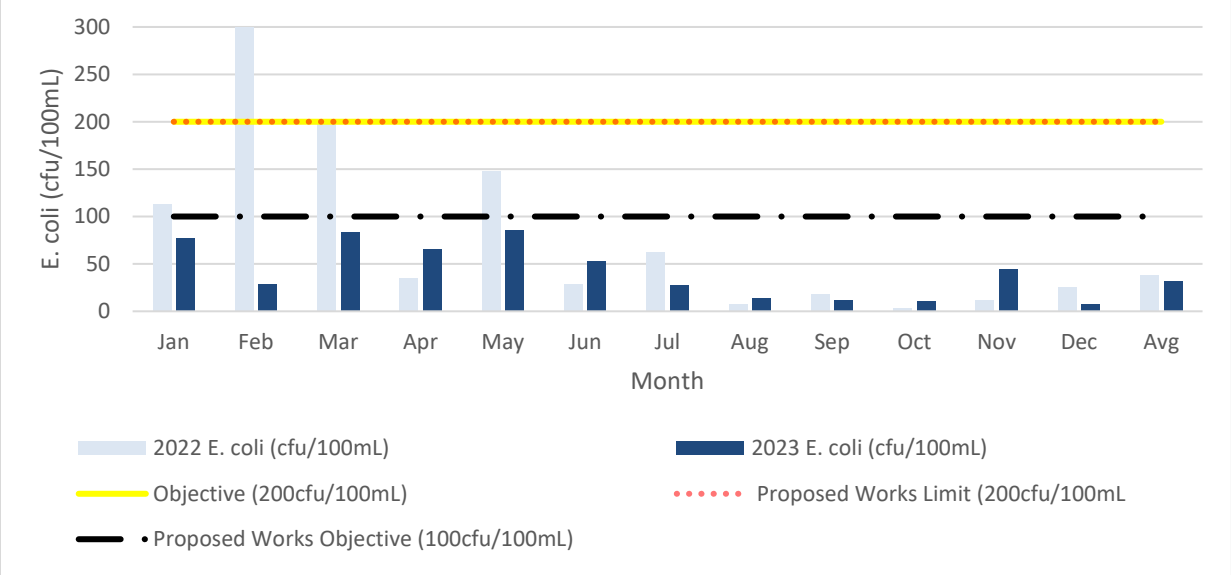
Once the proposed works are completed, the TAN concentrations will have to be monitored to ensure compliance of these limits and objectives. Refer to Graph 12 for the effluent monthly average concentrations of TAN for 2023 and 2022.

Graph 12. The effluent monthly average concentration of TAN in 2023 compared to 2022.



The annual geometric mean for effluent E.coli in 2023 was 42.5cfu/100mL; this value has decreased by 22.7% from the annual geometric mean in 2022. There were no exceedances in 2023. Note: there is only an objective of 200cfu/100mL as stated in the ECA. Refer to Graph 13 for the effluent geometric mean (geomean) for effluent E.coli for 2023 and 2022.

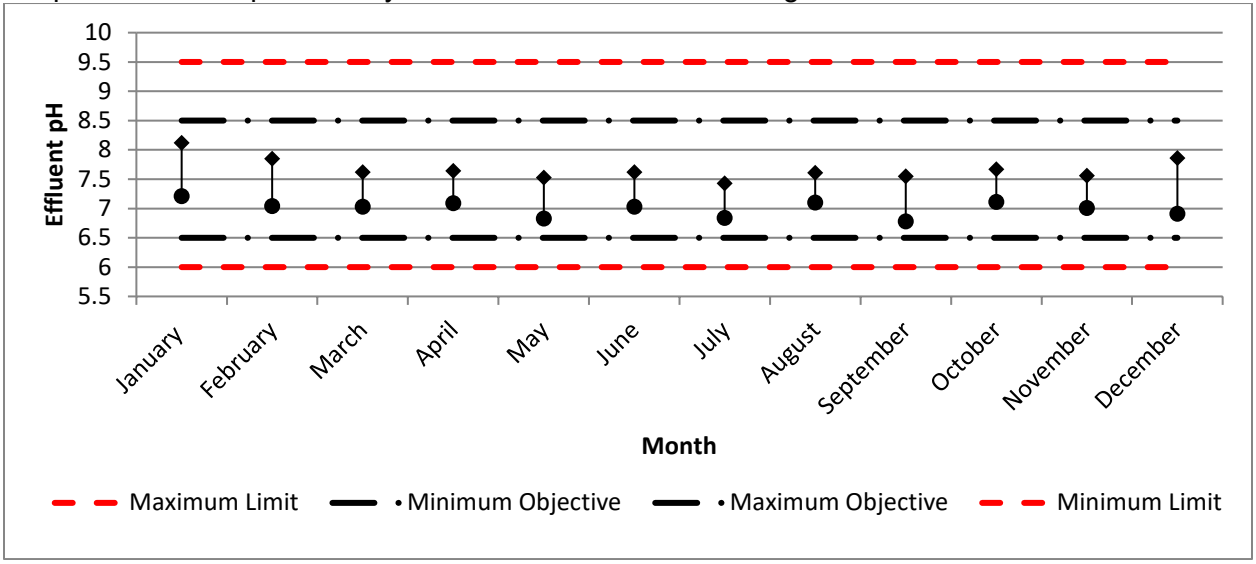
Graph 13. The effluent monthly geomean concentration of E.coli in 2023 compared to 2022.



The effluent pH is monitored daily at a minimum at the Port Dover WWTP. Overall the plant has

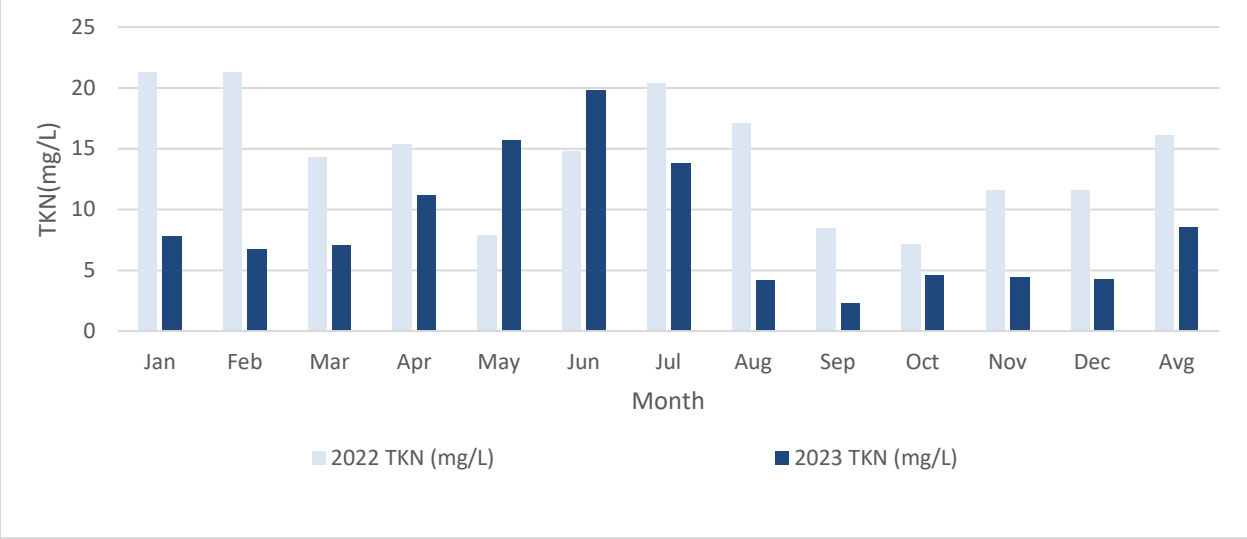
provided effective treatment as there have been no results below or above the compliance objectives or limits of 6.5-9.0 and 6.0-9.5 respectively in 2023. The pH is required to be maintained between 6.0-9.5 at all times. Refer to Graph 14 for the monthly minimum and maximum pH readings.

Graph 14. Effluent pH monthly minimum to maximum readings for 2023.



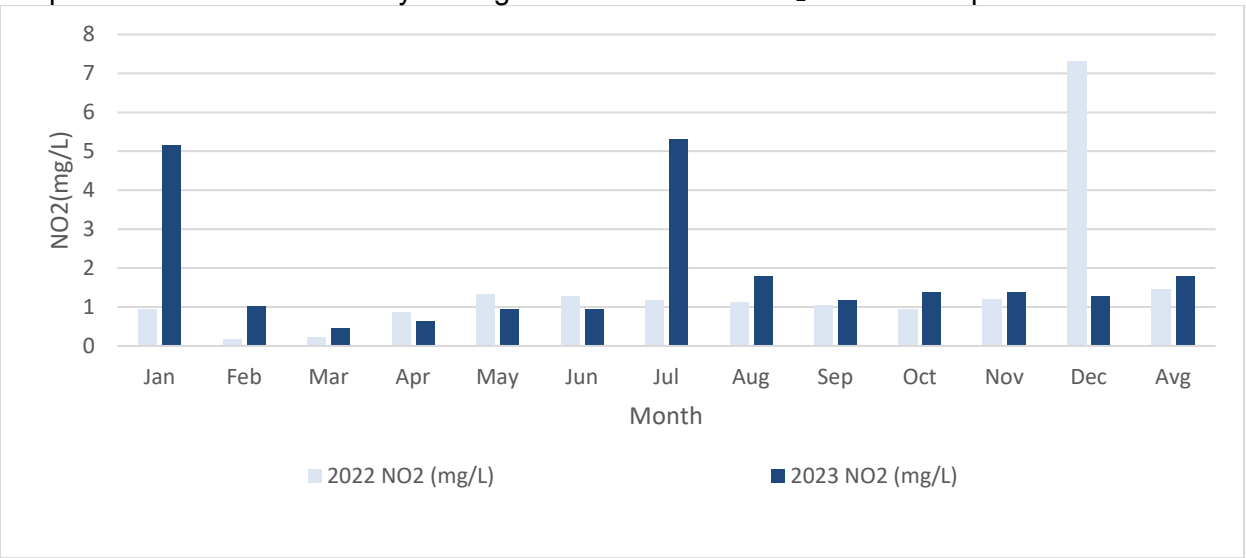
The annual average for effluent TKN in 2023 was 8.48mg/L. There are no limits or objectives for TKN. Refer to Graph 15 for the monthly TKN concentrations for 2023 and 2022

Graph 15. The effluent monthly average concentration of TKN for 2023 and 2022.

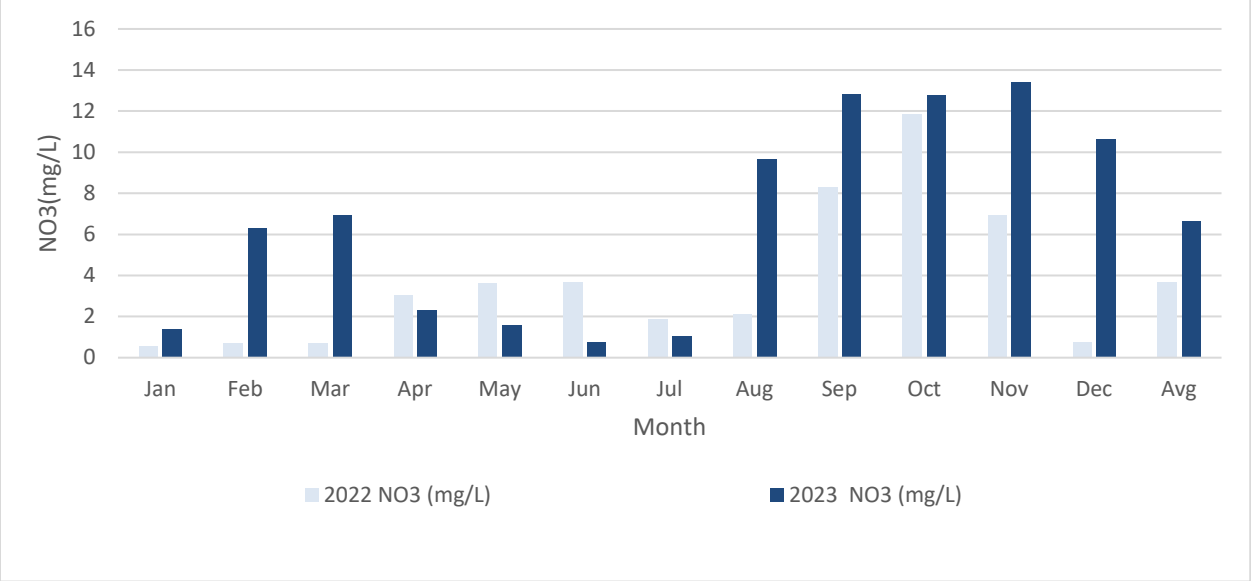


The annual average for effluent NO_2 was 1.78mg/L and the average for effluent NO_3 was 6.65mg/L in 2023. There are no limits or objectives for NO_2 and NO_3. Refer to Graphs 16 and 17 for the NO_2 and NO_3 comparison for 2023 and 2022.

Graph 16. The effluent monthly average concentration of NO_2 in 2023 compared to 2022.

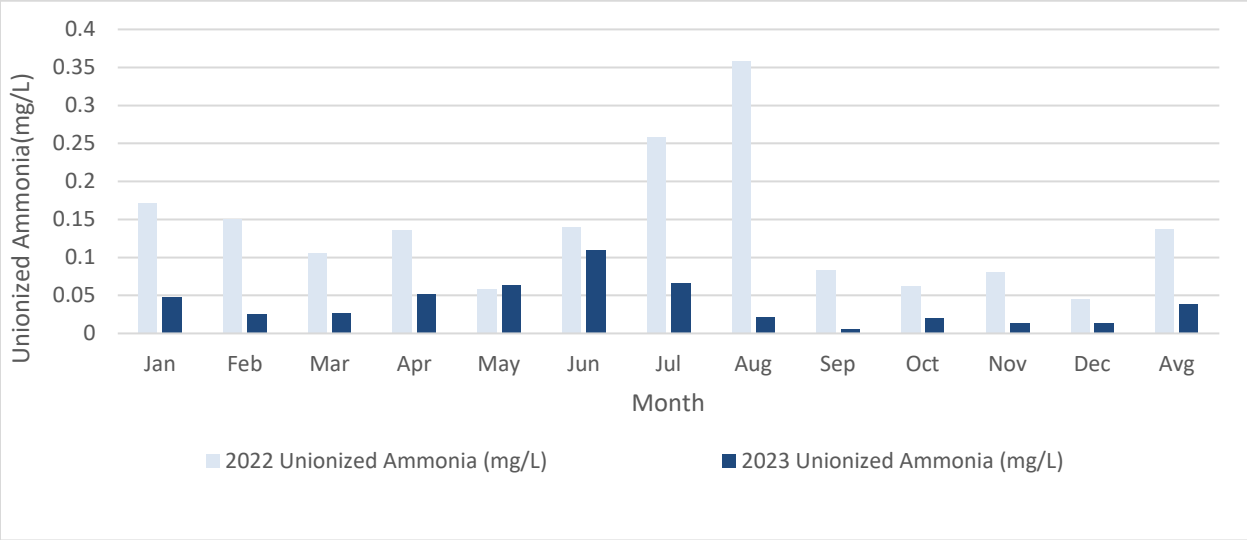


Graph 17. The effluent monthly average concentration of NO_3 in 2023 compared to 2022.



The annual average effluent concentration of unionized ammonia (as calculated) was 0.04mg/L in 2023. There is no limit or objective specified for unionized ammonia.

Graph 18. The effluent monthly average unionized ammonia in 2023 compared to 2022.



The Port Dover WWTP performed well in 2023 producing quality effluent meeting all the objectives and limits for all required parameters. As specified in the ECA, objectives are based on monthly average effluent concentrations. Refer below to Table 9 for a summary of objectives compared against the effluent results ranges.

Section C: Operating Problems and Corrective Actions

Operating problems experienced at the facility coincide with problems within the collection system for the Port Dover system. As per ECA #7884-C94HQT Section 11(4)(c) and as per the CLI-ECA Schedule E Condition 4.6.4, the collection system is experiencing inflow and infiltration issues during rain and snow melt events. There were sixty-three (63) days in 2023 where the daily flow rate exceeded the rated capacity. There are plant upgrades that will be completed which include a higher design capacity for the facility. As part of the new CLI-ECA issued for the collections system, Norfolk County is currently conducting a flow monitoring, inflow and infiltration reduction study to assist in the evaluation of the higher flows to the facility. (Details provided in **Section J(b): Summary of efforts to reduce CSOs, Spills, STP Overflows, STP Bypasses.)**

As required by the Environment Canada Wastewater System Effluent Regulations (WSER) acute lethality samples are required on a quarterly basis until four (4) consecutive samples pass (<50% mortality), then sampling can move to an annual basis. Any samples that result in >50% mortality were required to be reported to Environment Canada and sampled twice a month for three (3) consecutive passing samples in order to revert back to the quarterly sampling frequency.

In 2023, the Port Dover WWTP collected the required acute lethality samples and continues to strive for four (4) consecutive quarterly samples. The table below shows the Acute Lethality samples collected in 2023 and the corresponding results.

Table 8. Acute Lethality Results for 2023

Date	% Mortality	SAC Ref# (if required)
January 26	0%	-
April 5	0%	-
June 29	100%	1-3LPBHY
July 13	10%	-
July 27	0%	-
August 10	0%	-
October 11	0%	-
December 14	0%	-

As per the CLI-ECA Schedule E Condition 4.6.4, in the collection system (gravity separate sewers) there was one (1) plugged sewer event, which was corrected, details below.

May 26, 2023
3 Lynn River Court

- Resident reported plugged lateral, Operator found MH #92 blocked causing surcharge upstream, determined rocks were cause of blockage. Rocks were removed, debris and sewage were vacuumed, flow returned to normal. Upstream pipes inspected post-repair, no damage found.

There was one (1) spill event on May 26, 2023 (3 Lynn River Court). This event is discussed in Section J: By-pass, Spill or Abnormal Discharge Events.

Section D: Maintenance Activities

Regular scheduled monthly preventative maintenance for the Port Dover WWTP and associated SPS's (as per the CLI-ECA Schedule E Condition 4.6.5) are assigned and monitored using the Workplace Management System (WMS) program. Refer to *Appendix C* for preventative maintenance schedule. Norfolk County's preventative maintenance of the gravity separate sewers involves a sanitary flushing program (including manhole inspections), aiming to flush 20% of each system on an annual basis.
Items that were repaired or replaced in 2023 are as follows:

Table 9. Major Maintenance Completed at the Port Dover WWTP in 2023

Date	Maintenance Activities
January 23	Contractor on site for Gas Monitoring System maintenance
January 23-24	Electrical Contractor onsite to replace and adjust spark plug wire on flare
February 1	Electrical Contractor installed sodium bisulphite vent fan
February 6	Operations replaced grit blower belt
February 8	Operations installed new float on sump pump in electrical manhole
February 23	Contractor onsite to clear sludge overflow line
February 27	Contractor onsite to clean out digester
March 2	Mechanical Contractor replaced sludge distribution valve
March 21	Contractors on site to clear scum pit and line
March 22	Contractor on site to clear sludge overflow line
March 28	Lifting device inspections were completed by third party
May 3	Flow meter calibrations completed by third party
June 27	Operations cleaned VFD's
July 15	Operations replaced belt on Return Pump #2
July 26	Contractor on site to install flow meter and rain gauge
August 3	Gas detector calibrations were completed by a third party
August 8	Contractor inspected and reattached inlet channel level sensor
August 14	Operations replaced shear pin on primary clarifier 1
August 16	Mechanical contractor replaced wear strips in primary clarifier 2
August 25	Mechanical contractor replaced hardware in primary splitter box
September 14	Contractor on site to repair boiler room door alarm
September 29	ESA Inspection completed
October 11	Contractor installed new low level float at Woodhouse SPS
October 26	Contractor on site to clear scum line
November 1	Vortex Grit Annual Inspection completed by operations
November 9	Contractor completed wet well clean out at Woodhouse SPS
November 10	Contractor cleared digester overflow line
November 14	Electrical and Mechanical Contractors on site to disconnect and remove raw sewage pump #3 for rebuild
November 16	Electrical contractor disconnected and reconnected aerator 2 motor to replace bearings
November 27	Backflow preventers were inspected by third party

Table 10. Major Maintenance Completed at Donjon SPS

Date	Maintenance Activities
January 10	Replaced UPS
April 21	Contractor completed wet well clean out
July 14	Contractor fixed phone line to station
August 10	Operations installed new latches on wet well.
October 19	Overflow Inspection completed as per CLI-ECA
December 1	ESA Inspections completed

Table 11. Major Maintenance Completed at Harbour Street SPS

Date	Maintenance Activities
April 21	Contractor completed wet well clean out
October 19	Overflow Inspection completed as per CLI-ECA
November 8	Contractor completed wet well clean out
December 1	ESA Inspections completed

Table 12. Major Maintenance Completed at Lynn Street SPS

Date	Maintenance Activities
August 29	Contractor repaired phone line to station
October 25	Inspection completed as per CLI-ECA.
November 17	Operations sealed off overflow pipe in wet well
December 1	ESA Inspections completed
December 13	Operations installed new ladder rungs in manhole

Table 13. Major Maintenance Completed at Bridge Street SPS

Date	Maintenance Activities
February 9	Contractor repaired phone line to the dialer.
February 27	Contractor onsite to rebuild backflow preventer
March 2	Contractor completed fix on phone line from February 9th
April 14	Contractor completed wet well clean out
May 3	Flow meter calibration completed by third party
August 11	Electrical Contractor replaced ATS Controller
August 17	Electrical Contractor performed tap change due to high voltage. Transformers on hydro pole required replacement
September 18	Mechanical Contractor installed new backflow prevention check valve
October 19	Overflow Inspection completed as per CLI-ECA
November 8	Contractor completed wet well clean out
December 1	ESA Inspections completed
December 27	Backflow preventers were tested and inspected by third party

Table 14. Major Maintenance Completed at Nelson Street SPS

Date	Maintenance Activities
April 21	Contractor completed wet well clean out
October 19	Overflow Inspection completed as per CLI-ECA
November 9	Contractor completed wet well clean out

Table 15. Major Maintenance Completed at Ryerse Cres SPS

Date	Maintenance Activities
April 21	Contractor completed wet well clean out
April 25	Electrical Contractor relocated thermostat
May 3	Flow meter calibration completed by third party
May 30	Contractor installed new regulator on natural gas line
October 19	Overflow Inspection completed as per CLI-ECA
December 1	ESA Inspections completed
December 13	Contractor installed new low level float

Table 16. Major Maintenance Completed at River Drive SPS

Date	Maintenance Activities
March 14	Contractor installed new diesel tank
August 25	Electrical Contractor installed portable generator
August 29	Contractor on site to repair generator
September 19	Contractor reinstalled radiator for the generator
September 20	Electrical contractor uninstalled portable generator
October 19	Overflow Inspection completed as per CLI-ECA
December 1	ESA Inspections completed

Section E: Effluent Quality Assurance

Effluent quality assurance is evaluated by monitoring parameters and changes throughout the plants processes. The operators monitor the basin by performing weekly tests on the mixed liquor. These tests include dissolved oxygen, pH, temperature, settling tests and Mixed Liquor Suspended Solids (MLSS). As well, monitoring of chemical dosages and wasting volumes are completed. Data collected from these tests provide valuable information to the operators to make the appropriate adjustments in the treatment process and take corrective actions before the plant reaches its effluent limits.

Section F: Calibration and Maintenance on Effluent Monitoring Equipment

The Port Dover WWTP does not have an influent meter installed and utilizes the effluent flow meter for the purpose of estimating influent flows. The effluent flow meter was calibrated by JBF Controls Ltd. on May 3, 2023. In house meters for pH and dissolved oxygen were calibrated by JBF Controls Ltd on October 23, 2023 as per manufacturer's instructions.

As per the CLI-ECA Schedule E Condition 4.6.5 –Bridge Street SPS and Ryerse Cres. SPS have flow meters that require calibrations and they were calibrated by JBF Controls Ltd. on May 3, 2023.

Section G: Objective Exceedances & Best Efforts

Table 17. Effluent sample results compared against the effluent objectives and loading limits.

Parameter	Effluent Objective (mg/L)	Monthly Effluent Result Ranges (mg/L)	# of Objective Exceedances	Effluent Loading Limit (kg/d)	Monthly Loadings Result Ranges (kg/d)	# of Loading Exceedances
$cBOD_5$	15.0	2.0-4.6	0	135.0	6.55-18.19	0
TSS	15.0	2.3-7.5	0	135.0	9.17-29.43	0
TP	0.80	0.14-0.58	0	5.4	0.47-2.57	0
E. coli (cfu/100mL)	200	7.36-85.4	0	n/a	n/a	n/a
pH*	6.5 – 9.0	6.83-8.12	0	n/a	n/a	n/a

The Port Dover WWTP performed well in 2023 producing quality effluent. There were zero (0) objective exceedances in 2023.

Section H: Sludge Handling and Generated

Sludge sampling results can be found in Appendix D. Sludge is removed from the Port Dover WWTP and taken to field for land application. The total volume generated in 2023 was 3,276m^3, refer to Table 18 below for the sludge disposal locations in 2023.

It is expected that sludge generation and disposal in 2024 will be similar to 2023 with approximately 3,300m^3 being required to be removed from the Port Dover WWTP.

Table 18. Port Dover WWTP Sludge Disposal Locations 2023.

Site	NASM#	Lot	Concession	Township	Volume (m3)	Date Spread
HN1412	60284	13	4	Woodhouse	428.0	April 13, 2023
HN1412	60284	13	4	Woodhouse	38.0	April 14, 2023
HN1334	60288	14	5	Woodhouse	274.0	April 14, 2023
HN1334	60288	14	5	Woodhouse	130.0	April 15, 2023
B1165	60695	17	1	Onondaga	174.0	September 29, 2023
HN1084	25183	9-12	7	Woodhouse	516.0	October 12, 2023
HN1411	60829	23-24	6	Woodhouse	699.0	October 18, 2023
HN1411	60829	23-24	6	Woodhouse	567.0	October 19, 2023
HN1411	60829	23-24	6	Woodhouse	180.0	October 23, 2023
HN1411	60829	23-24	6	Woodhouse	270.0	October 24, 2023
Total					**3,276**	

Section I: Complaints

There was one (1) complaint received for the area near Port Dover WWTP in 2023. On November 20, 2023, a complaint was received about an odour that was noticed at Doverwood Park and new Lakeshore Road for the previous week. OCWA staff investigated and odours were not detected at the time of the complaint but may have been caused by a septage hauler that was offloading at the Port Dover WWTP.

As per the CLI-ECA Schedule E Condition 4.6.6 - there were no community complaints received for the Port Dover sewage pumping stations or linear infrastructure in 2023.

Section J(a): By-pass, Spill or Abnormal Discharge Events

There was one (1) overflow event at the Port Dover WWTP in 2023. Details of the event are as follows:

July 29, 2023
Incident #1-30PLJM
Volume: 151.2m^3
Duration: 1 hour
Disinfection: no
Verbal and written notification sent to SAC for overflow due to heavy rainfall overloading the facility.

As per CLI-ECA Schedule E Condition 4.6.3, 4.6.8 and 4.6.9 - There were three (3) overflow events at the Bridge Street SPS in 2023. Details of the events are as follows:

March 4, 2023
Incident #1-329PKH: Bridge Street Sewage Pumping Station
Volume: 622.5m^3
Duration: 18 hours, 30min
Disinfection: no
Verbal and written notification sent to SAC for overflow due to heavy rainfall overloading the facility. There was no adverse impact to the receiving stream.

April 1, 2023
Incident #1-346KXD: Bridge Street Sewage Pumping Station
Volume: 309m^3
Duration: 15 hours, 30min
Disinfection: no
Verbal and written notification sent to SAC for overflow due to heavy rainfall overloading the facility. There was no adverse impact to the receiving stream.

July 29, 2023
Incident #1-3OP675: Bridge Street Sewage Pumping Station
Volume: 135.3m^3
Duration: 3 hours, 14min
Disinfection: no
Verbal and written notification sent to SAC for overflow due to heavy rainfall overloading the facility. There was no adverse impact to the receiving stream.

As per CLI-ECA Schedule E Condition 4.6.3, 4.6.8 and 4.6.9 – There was one (1) spill event in the collection system – gravity separate sewers in 2023. Details of the events are as follows:

May 26, 2023
Incident #1-3H8WCA (SAC): 3 Lynn River Court
Volume: n/a
Duration: 24 hours
Disinfection: n/a
Backed up sewer lateral, opened and spilled into front yard. Spill contained at all times, repair and restoration completed May 27th.

Section J(b): Summary of efforts to reduce CSOs, Spills, STP Overflows, STP Bypasses

Norfolk County is currently conducting a flow monitoring, inflow and infiltration (I&I) reduction study to assist in the evaluation of the higher flows to the facility. In 2023 six (6) flow meters were strategically installed to capture all flows in the Port Dover and Waterford areas of Norfolk County. Along with the flow meters, two rain gauges were installed. Further field investigations to locate and identify sources of I&I (including flow monitoring, rainfall monitoring, public notification, lot drainage inspections, smoke testing, dye testing and reporting) have been recommended for Port Dover. Refer to Appendix B ("2023 I&I Summary Report - 04December2023" and "I&I Workplan for Additional Investigations - Port Dover") for program results.

Section K: Copy of Notice of Modifications Submitted

There were no modifications to the process at the Port Dover WWTP that required a Notice of Modification to Sewage Works Form in 2023.

As per the CLI-ECA Schedule E Condition 4.6.7 – The following alterations were made to the Lynn Street SPS in 2023:

Asset ID and Name: WW486 - Lynn Street Pumping Station SPS 2
Site Location: 13 Lynn Street, Port Dover, Ontario

The Lynn Street SPS overflow outfall was decommissioned by sealing off the overflow pipe in the wet well on November 17, 2023. The high wet well alarm at the Lynn Street Pumping Station provides a significant amount of time for the appropriate haulers to be on location if required. An SS2 Form was completed and filed on November 17, 2023. A Director Notification Form was completed and provided to the MECP on December 12, 2023.

Section L: Efforts made to achieve conformance with F-5-1

The Port Dover WWTP is a conventional activated sludge treatment plant providing treatment by preliminary screening, primary clarification, aeration basins and secondary clarification. The final disinfection is provided by common chlorination/dechlorination. Supplementary phosphorus removal is also achieved with the addition of a ferrous chloride solution. The treatment components are capable of producing effluent quality that exceeds the effluent design objectives specified in F-5-1. The Port Dover WWTP is required to achieve higher effluent quality standards than the Effluent guideline criteria as specified in the ECA.

There were no bypass events within the Port Dover WWTP or SPS's. There were three (3) raw sewage spill (overflow) events in the collections system at Bridge Street Pumping Station, and one (1) overflow event at the Port Dover WWTP for 2023 as discussed above in **Section J: By-pass, Spill or Abnormal Discharge Events.**

The Corporation of Norfolk County completes the following:
CCTV flushing and camera inspections
Manhole inspections

Section M: Changes or Updates for Construction at Plant

There were no changes or updates to the schedule for the completion of construction and commissioning operation of major process(es)/equipment groups in the Proposed Works at the Port Dover WWTP in 2023.

Section N: Summary of Deviations from Monitoring Schedule

Compliance samples were collected on Wednesdays in 2023 and the current weekly sampling, as per the 2024 schedule, is now completed on Thursdays. There were no deviations made to the monitoring schedule in 2023. Refer to *Appendix E* for the monitoring schedule for 2024.

Appendix A: Port Dover WWTP Monitoring Data

Appendix B: Summary of efforts to reduce CSOs, Spills, STP Overflows, STP Bypasses

Appendix C: Preventative Maintenance Schedule

Appendix D: Sludge Sampling Monitoring Data

Appendix E: 2024 Sampling Calendar