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 Waterford Water Pollution Control Plant, Sewage Pumping Stations and the Waterford Linear Infrastructure.

Attached is the 2023 Annual Performance Report for the Waterford Water Pollution Control Plant (WPCP) located at 678 Deer Park Road in Norfolk County and all associated pumping stations (SPS's) and the Waterford linear infrastructure. This report has been completed in accordance with the following approvals:

- Section 11(4)(a) through (n) cited in Environmental Compliance Approval #7520-C7ZM73 issued on November 19, 2021 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 WPCP and 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 Waterford gravity separate sewers was provided by Norfolk County.

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

Sincerely,

Allison Billingsley
Process and Compliance Technician
Ontario Clean Water Agency
Southwest Region - Norfolk Cluster

Cc:
Stephanie Davis – Director, Environmental Services, Norfolk County
Shaun Earls - Manager, Water & Wastewater Compliance, Norfolk County
Kristina Hall – Water & Wastewater Compliance Officer, Norfolk County
Karl VanHeyst - Water Inspector, MECP
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Introduction:

The Waterford Water Pollution Control Plant (WPCP) is a lagoon wastewater treatment system comprises of the following key components:

- Preliminary treatment – one (1) manually cleaned course bar screen in the distribution channel, three (3) bar screens in the bar screen channels, two (2) shaftless conveyors in series discharging into the wash press. One (1) 3.0m diameter detritor.
- Secondary Treatment System – two (2) parallel Aerated Lagoons with fine bubble diffusers, one (1) Facultative Lagoon, two (2) parallel operated Submerged Attached Growth Reactor (SAGR)
- Post-Secondary Treatment System - Sand Filters **-** two (2) stage filtration system, each stage comprised of three (3) parallel filters
- Supplementary Treatment Systems - Phosphorus Removal - injecting solution upstream of each filter stage;
- Disinfection System - UV disinfection system comprised of two (2) banks of UV lamps (one standby)

The Nexom optAER System is a lagoon-based biological wastewater treatment system. Biological wastewater treatment is achieved through bacterial breakdown of organic matter in the waste stream. Using oxygen provided by the aeration system, a range of bacteria consume and degrade the contaminants in the wastewater (BOD5, NH3, and TSS) into carbon dioxide, water, and nitrates. Aerobic treatment systems effectively control odor, and provide for internal sludge digestion.
The Nexom optAER wastewater treatment system at the Waterford, ON facility uses a Submerged Attached Growth Reactor (SAGR) Aeration System. The Submerged Attached Growth Reactor (SAGR) is primarily designed to provide nitrification (ammonia removal) in cold to moderate climates. The SAGR follows the aerated lagoons in the process flow. The SAGR is essentially a clean gravel bed with evenly distributed wastewater flow across the width of the cell, and a collection chamber at the end of the treatment zone. LINEAR aeration throughout the floor of the SAGR provides aerobic conditions that are required for nitrification. The gravel bed is covered with a layer of wood chips or mulch for insulation.
Raw Wastewater Collection

Aerated Lagoons

Two (2) aerated lagoons operating in parallel with a total volume of approximately 19,256m3 equipped with suspended fine bubble diffuser systems and two (2) 30HP blower units for process air supply. Facultative Lagoon one (1) facultative lagoon with a volume of approximately 91,053m3 a pump chamber (named "SAGR Influent Pump Chamber"), equipped with two (2) 8.9 kW (12HP) submersible pumps (1 duty, 1 standby) with variable frequency drives, each rated at 51 L/sat a TDH of 11.6m, discharging the Facultative Lagoon's effluent to an Influent Splitter Box of the Submerged Attached Growth Reactor process Submerged Attached Growth Reactor (SAGR), one (1) flow distribution chamber directing flow to different locations in the SAGR system as required, via an Influent Splitter Box arrangement complete with four (4) 250mm long flat plate overflow weirs for flow distribution and SAGR cell isolation as required; two (2) parallel operated SAGR cells, each 75 m long with a liquid depth of 2m.

Post-Secondary Treatment

Sand Filters
one (1) Filter Influent Pumping Chamber equipped with two (2) 14.9 kW (20 HP) submersible pumps (1 duty 1 standby) with variable frequency drives, each pump rated at 51 L/s at a TDH of 16.5 m, pumping flow to a Sand Filtration System; a Blue PRO® deep-bed Sand Filtration System, consisting of 2 stages in series, each stage comprising three (3) parallel filters (2 duty 1 standby), each filter has a Peak Hourly Flow Rate of 91.7 m3/h and is a moving bed with a media depth of 1.5 m, configured with continuous airlift backwash control; one (1) Reject / Drain Pump Chamber, equipped with two (2) 8.2 kW (11 HP) submersible pumps (1 duty 1 standby) with variable frequency drives, each pump rated at 12.7 L/s at a TDH of 10.1 m, returning backwash water and process drain flows back to the front end of the Facultative Lagoon (the returning point to be relocated to upstream of the Aerated Lagoons, see Proposed Work);

Supplementary Treatment

Phosphorus Removal
Two (2) chemical (ferric chloride solution, or equivalent) storage tanks, each with a working capacity of 13,200 L; Two (2) metering pumps (1 duty 1 standby), each rated at 0-120 L/h; Dual-point injection: the first injection point upstream of the first stage filters, the second injection point on the first stage filter effluent ahead of the second stage filters; Coagulation and Flocculation one (1) 25,000 L capacity chemical storage tank, equipped with one (1) metering pump rated at 0.62 Litres per hour (L/h) (to be decommissioned and removed, see Proposed Works);

Disinfection Phase

One (1) floor-mounted UV disinfection package system (model: Trojan UV3000PTP, or equivalent), with a Peak Hourly Flow Rate of 183 m3/h, consisting of two (2) banks of low pressure UV lamps (1 duty 1 standby) configured in series: each bank capable of disinfecting the maximum pumped flow of 4,400 m3/d; installed in a single channel measured 5,842 mm length x 872 mm width (outer dimension) x 586 mm SWD; one (1) 300 mm diameter UV bypass pipe, located immediately upstream of the UV system and discharges immediately downstream of the UV channel;

Sludge Management System

Biosolids Removal and Disposal - sludge periodically removed from the lagoons by licensed hauler for offsite storage/disposal/land application;

Standby Power

The headworks building generator is a Cummins DFEJ-2140344:6500L Diesel.
The filter building generator is a Cummins DSGAC-1864989: 2000L Diesel with approximately 75 Hours of run-time at 50% load

Sewage Pumping Stations

The Norfolk County Municipal Wastewater Collection System is made up of five separate wastewater collection systems. The Waterford wastewater collection system (population 4,227) conveys sewage to the Waterford Wastewater Treatment Facility through a total of 33 kilometres of gravity separate sewers, 3.2 kilometres of forcemains and three (3) sewage pumping stations. For additional information on the individual SPS's listed below, please refer to CLI-ECA #070-W601 Issue #1

- WW479 – Blueline Road SPS located at 2270 Blueline Road in Waterford Ontario. Blueline Rd SPS is a duplex pumping station equipped with 2 pumps (1 duty, 1 standby), with a wet well of 28m^3 capacity. The station is connected to a 200 mm diameter forcemain discharging to manhole located at 225 St. James Street South.
- WW420 – Deer Park Road Main SPS located at 28 Deer Park Road in Waterford Ontario. Deer Park Rd Main SPS is a duplex pumping station equipped with 2 pumps (1 duty, 1 standby), with a wet well of 169m^3 capacity. The station is connected to a 350 mm diameter forcemain discharging to the Waterford WWTP located at 678 Deer Park Road in Waterford.
- WW422 – Deer Park Road Mini SPS located at 28 Deer Park Road in Waterford Ontario. Deer Park Rd Mini SPS is a duplex pumping station equipped with 2 pumps (1 duty, 1 standby), with a wet well of 3m^3 capacity. The station is connected to a 50 mm diameter forcemain discharging to the Deer Park Road Main SPS wet well located at 28 Deer Park Road in Waterford.

Waterford WPCP Facts:

Environmental Compliance Approval:	ECA 7520-C7ZM73 (issued November 19, 2021)
Rated Capacity:	2,200m^3/day
Receiving Water:	Nanticoke Creek

For 2023, the Waterford WPCP was operated in accordance with provincial regulations as required in ECA #7520-C7ZM73 (ECA) issued November 19, 2021. The following report is presented such that it corresponds with ECA #7520-C7ZM73 Section 11(4) (a) through (n) and satisfies the requirements for the sewage pumping stations and the Waterford linear infrastructure in CLI-ECA #070-W601 Issue #1 dated July 27, 2022.

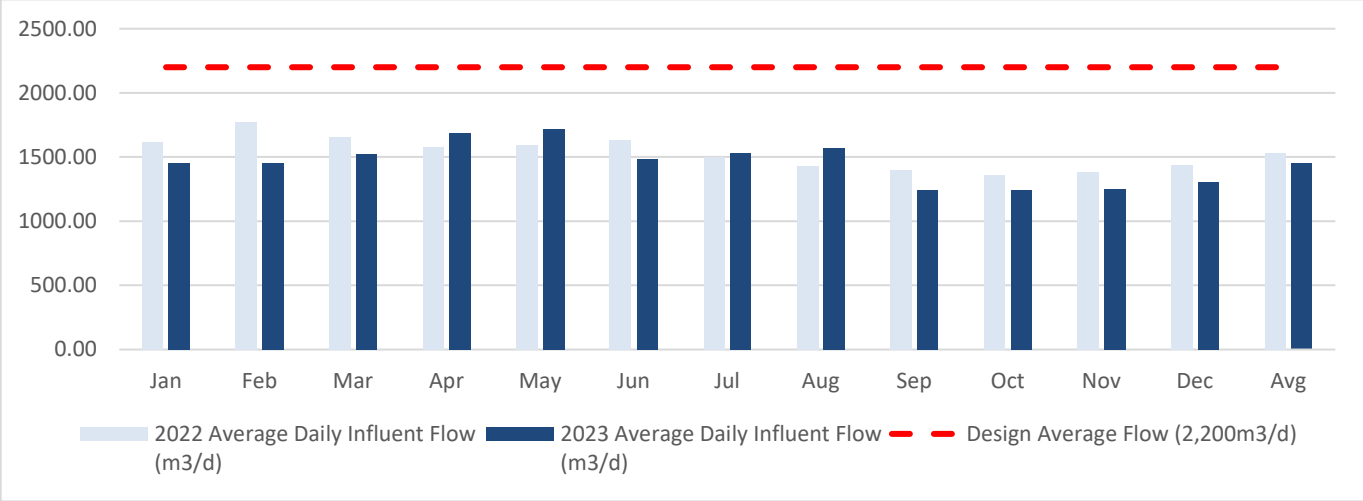
Section A: Influent Monitoring Data

As outlined in ECA#7520-C7ZM73 dated November 19, 2021 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 Flow Monitoring

As the headworks is not fully commissioned with an influent flow meter, the average daily flow of raw wastewater (influent) to the Waterford WPCP was estimated to be 1,456m^3/d in 2023. The following Graph 1 shows the average daily influent flows per month for 2023 compared to 2022.

Graph 1. Influent average daily flows for 2023 compared to 2022

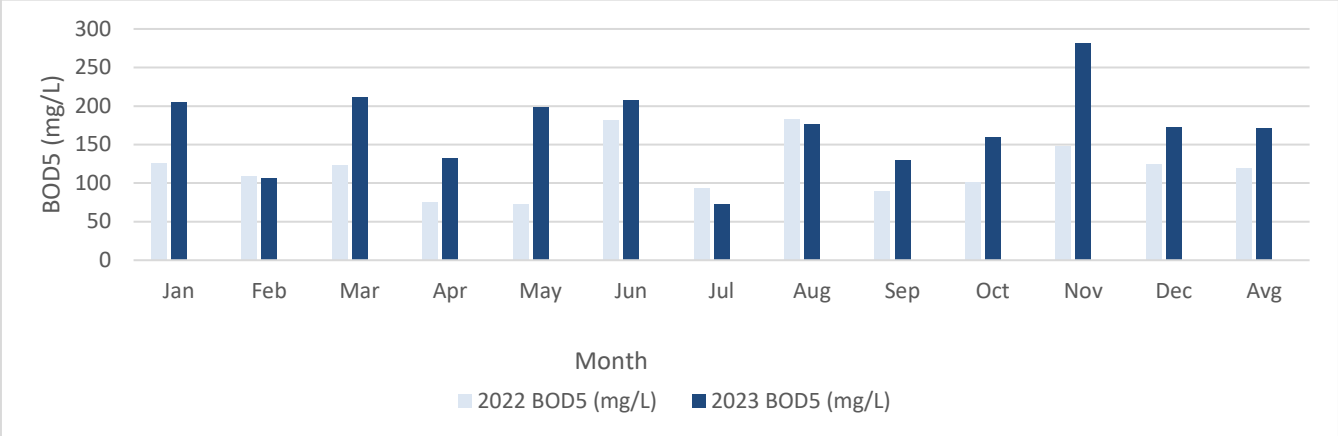


(II) Influent Data

The influent is monitored for BOD_5, total suspended solids, total phosphorus and total kjeldahl nitrogen on a monthly basis (minimum) by means of a composite sample. The plant was designed to treat based on influent characteristics identified in the Operations Manual from the design engineers. Refer to Appendix A for more detailed monthly results.

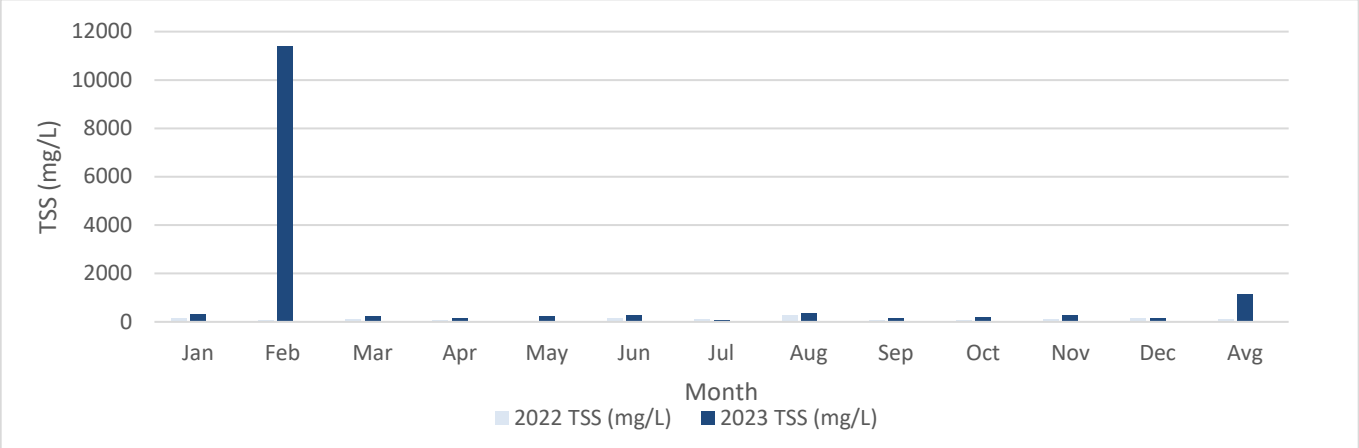
The annual average for influent BOD_5 concentration to the plant was 171mg/L. This is an increase from 2022 by 30.4%. Refer to Graph 2 for a comparison of monthly concentrations in 2023 and 2022.

Graph 2. Influent monthly average concentration of BOD_5 for 2023 compared to 2022.



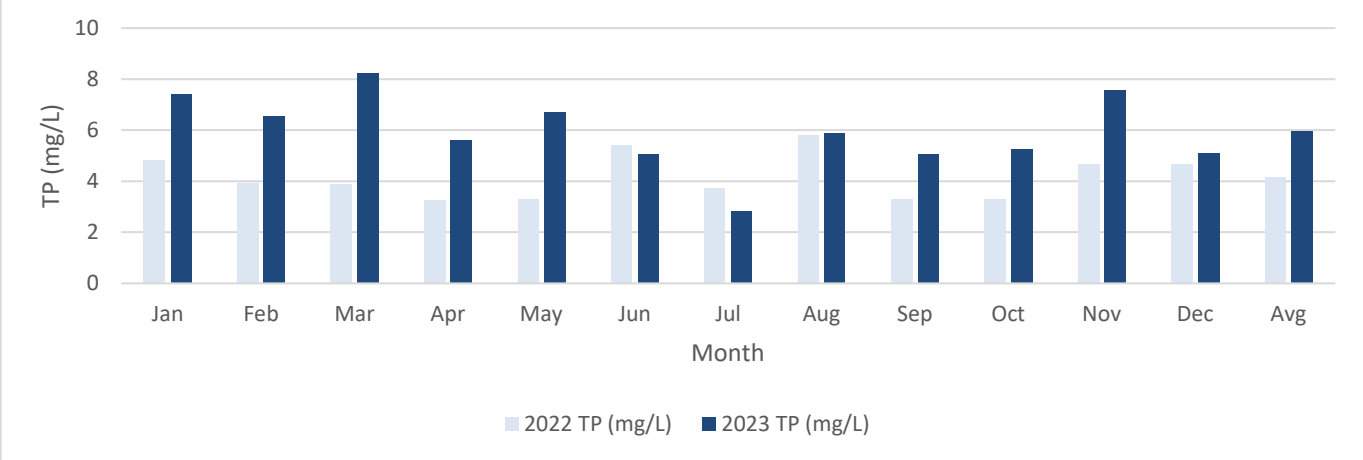
The annual average for influent total suspended solids (TSS) concentration to the plant was 1,151mg/L. This is an increase from 2022 by 90.6% due to the high outlier result obtained in February. The February TSS result has no direct cause that was identified and only offers a glimpse of what was coming into the facility during the 24hour composite sampling for that month. Refer to Graph 3 for a comparison of monthly concentrations in 2023 to 2022.

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



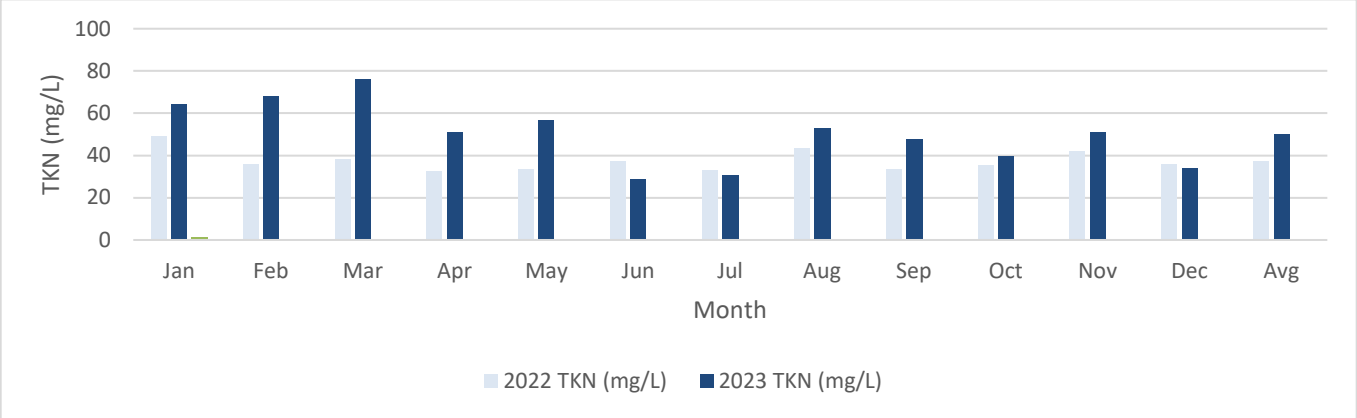
The annual average for influent total phosphorus (TP) concentration to the plant was 5.95mg/L. This is an increase from 2022 by 29.8%. Refer to Graph 4 for a comparison of monthly concentrations in 2023 to 2022.

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



The annual average for influent total kjeldahl nitrogen (TKN) concentration to the plant was 50.0mg/L. This is an increase from 2022 by 25.2%. Refer to Graph 5 for a comparison of monthly concentrations in 2023 compared to 2022.

Graph 5. Influent average monthly concentration of TKN for 2023 compared to 2022.



The influent characteristics have remained consistent throughout 2023 with the exception of Total Suspended Solids. All parameters have increased in 2023 compared to 2022.

(III) Sewage Pumping Station Monitoring Data

As per the CLI-ECA Schedule E Condition 4.6.3, there are no flow meters at the Waterford SPS's. 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 Waterford 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 Waterford SPS's in 2023 and 2022

Sewage Pumping Station (SPS)	Year	Pump #1 (hours)	Pump #2 (hours)
Blueline Road	2022	937.13	893.15
	2023	1015.90	951.20
Deer Park Road Main	2022	2128.90	2515.09
	2023	2098.65	2341.50
Deer Park Road Mini	2022	22.58	21.48
	2023	28.60	26.40

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

Sewage Pumping Station (SPS)	Total Hours 2022 (hours)	Total Hours 2023 (hours)	Percent Change (%)
Blueline Road	1830.28	1967.10	6.96
Deer Park Road Main	4643.99	4440.15	-4.59
Deer Park Road Mini	44.06	55.0	19.89

(IV) Imported sewage

There was no imported sewage received at the Waterford WPCP in 2023.

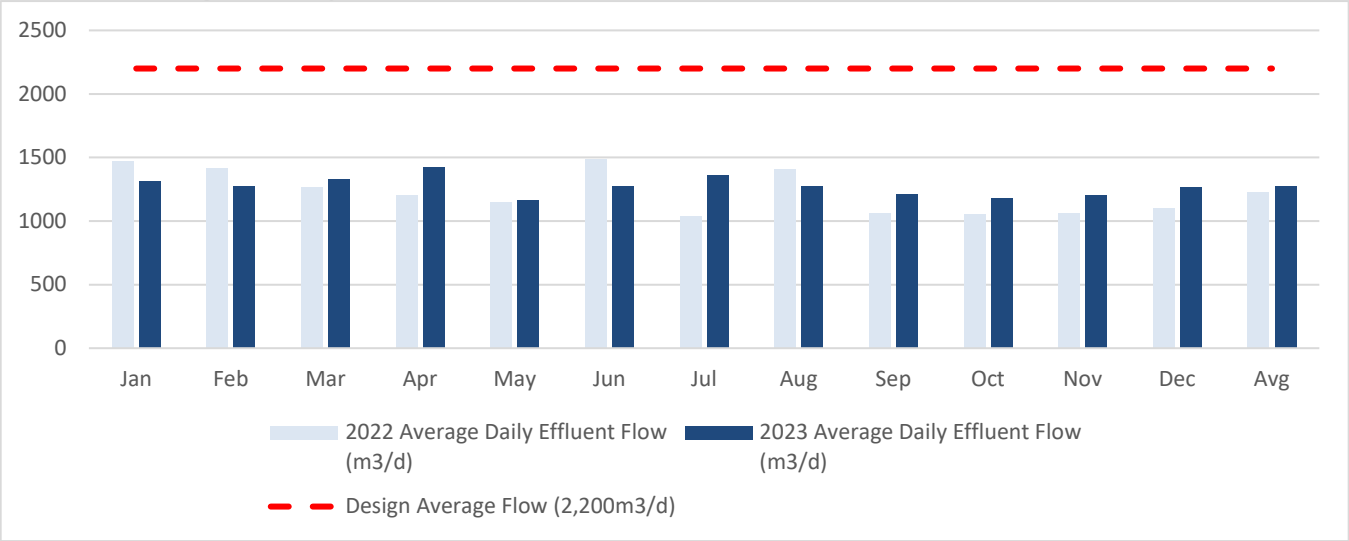
Section B: Effluent Monitoring Data

As outlined in the ECA #7520-C7ZM73 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.

(I) Effluent Flow Monitoring

The average daily flow of effluent wastewater discharging from the Waterford WPCP was 1,273m^3/d in 2023 which is 57.8% of the rated capacity of 2,200m^3/d. This is a 4% increase in flow compared to the 2022 average daily flow of 1,226m^3/d. The following Graph 6 shows a comparison of the average daily flows per month for 2023 and 2022 compared to the rated capacity of the facility.

Graph 6. Average monthly flows in 2023 compared to 2022.



(II) Effluent Data

The final effluent at the Waterford WPCP is sampled on a weekly basis and tested for $cBOD_5$, total suspended solids, total phosphorus, total ammonia, total kjeldahl nitrogen, nitrate as nitrogen, and nitrite as nitrogen by means of a composite sample. A grab sample is collected weekly and tested for E.coli, pH, temperature and un-ionized ammonia.
Detailed results of the data can be found in Appendix A. The following Tables 3, 4 and 5 show the monthly average effluent results of the composite samples, the monthly averages of the grab samples, and a comparison to the loading limits respectively.
Acronyms: n/a = not applicable

Table 3. Monthly average effluent results 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	1.3	0.08	0.03	0.005	21.7	0.9
February	2.0	1.0	0.06	0.04	0.007	22.2	0.7
March	2.0	1.8	0.05	0.03	0.004	18.7	0.7
April	2.0	2.5	0.06	0.04	0.008	15.2	0.8
May	2.1	1.6	0.05	0.03	0.006	14.7	0.7
June	2.0	1.5	0.02	0.04	0.020	14.4	0.9
July	2.0	1.0	0.05	0.04	0.011	3.5	0.7
August	2.0	1.0	0.05	0.03	0.006	2.0	0.7
September	2.0	1.0	0.03	0.03	0.009	3.4	0.6
October	2.0	2.8	0.05	0.31	0.116	5.2	1.1
November	2.0	1.2	0.07	0.03	0.004	9.8	0.9
December	2.8	1.5	0.06	0.03	0.008	13.0	0.9
Average	**2.1**	**1.5**	**0.05**	**0.06**	**0.017**	**12.0**	**0.8**
Objective	4.0	7.0	0.08	*0.6, 1.0, 3.0	n/a	n/a	n/a
Limit	6.0	10.0	0.1	*0.7, 2.0, 5.0	n/a	n/a	n/a

*The TAN objectives and limits are based on temperature as per the ECA

Table 4. Monthly average effluent ranges for 2023 obtained from weekly grab samples.

Month	E. coli (cfu/100mL) Geometric Mean	pH Min – Max Range	Temperature (°C)	Un-ionized Ammonia (mg/L) As calculated
January	1.0	7.01-7.72	8.7	0.0001
February	1.0	7.00-7.54	8.2	0.0001
March	1.0	6.85-7.38	8.5	0.0001
April	1.0	6.87-7.18	12.9	0.0001
May	1.0	6.79-6.98	16.1	0.0001
June	1.0	6.79-7.46	20.4	0.0001
July	1.0	6.68-7.87	22.4	0.0003
August	1.0	7.35-8.28	23.0	0.0006
September	1.0	7.38-7.85	21.3	0.0005
October	1.0	7.46-8.00	17.2	0.0047
November	1.0	7.51-7.86	11.7	0.0003
December	1.0	7.52-7.89	8.5	0.0002
Average	**1.0**	**6.68-8.28**	**14.9**	**0.0006**
Objective	100	6.0-8.5	n/a	n/a
Limit	200	6.0-9.5	n/a	n/a

Table 5. Monthly average loadings for 2023.

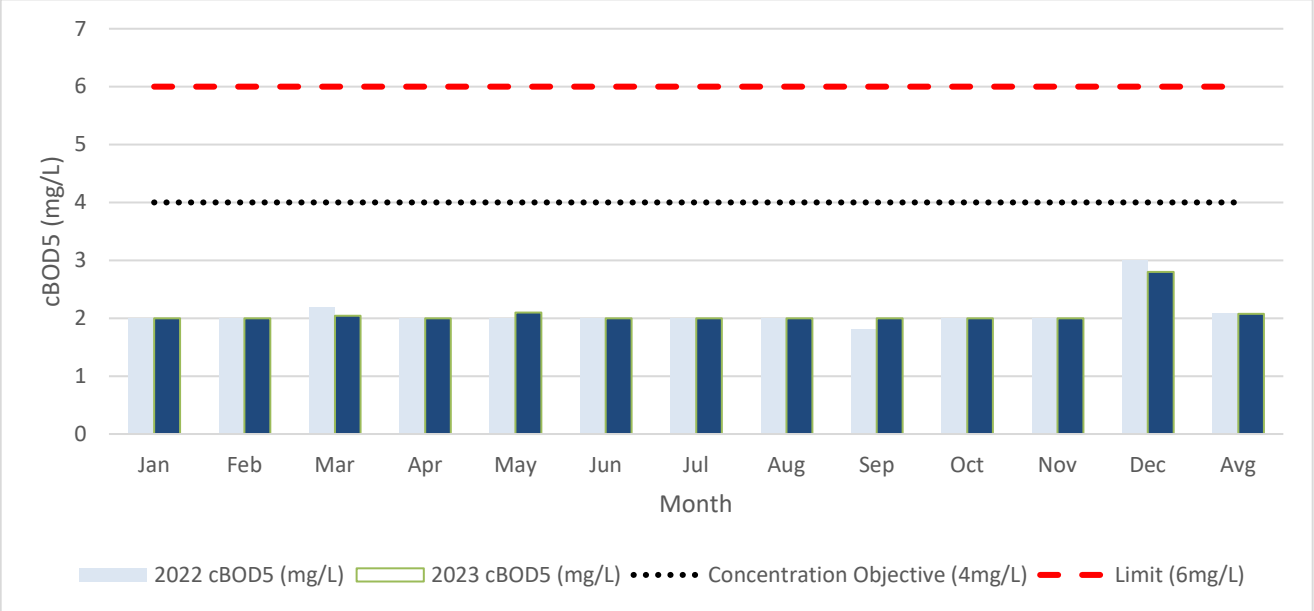
Month	cBOD5 (kg/d)	TSS (kg/d)	TP (kg/d)	TAN (kg/d)
January	2.63	1.64	0.11	0.04
February	2.54	1.27	0.08	0.05
March	2.72	2.40	0.07	0.04
April	2.84	3.55	0.09	0.06
May	2.44	1.86	0.06	0.03
June	2.55	1.91	0.03	0.05
July	2.72	1.36	0.07	0.05
August	2.55	1.28	0.06	0.04
September	2.42	1.21	0.04	0.04
October	2.36	3.24	0.06	0.37
November	2.41	1.45	0.08	0.04
December	3.55	1.90	0.08	0.04
Average	**2.64**	**1.92**	**0.07**	**0.07**
Limit	12.3	22.0	0.22	1.5, 4.4, 11.0

*The TAN objectives and limits are based on temperature as per the ECA

Comparison to Compliance Limits and Objectives

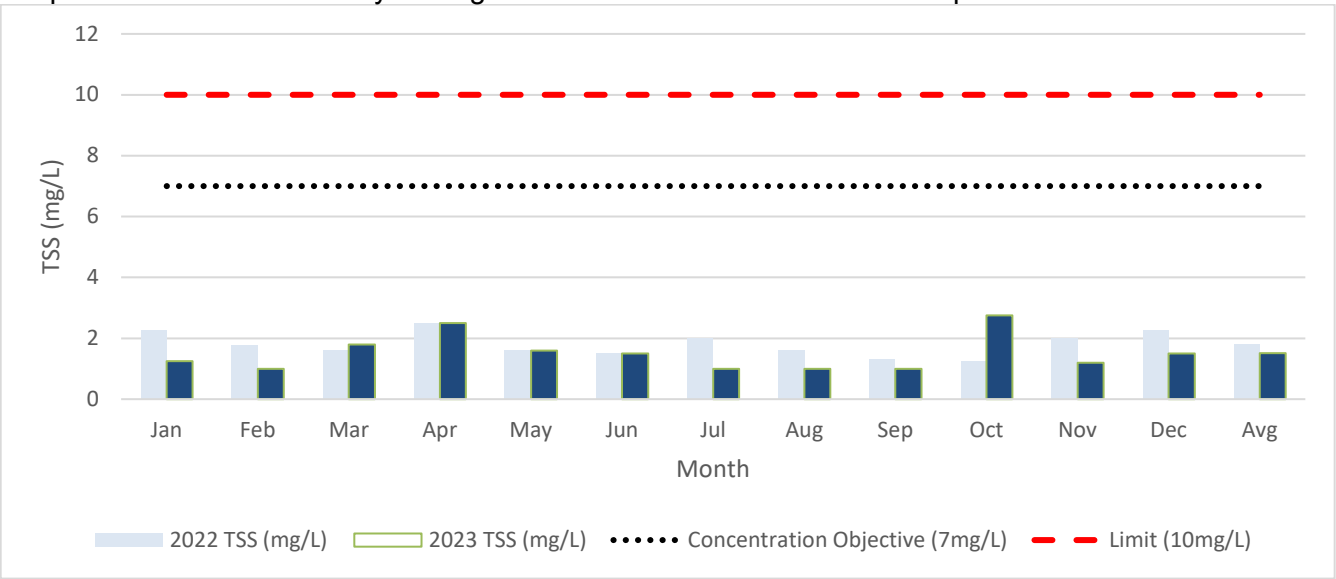
The annual average for effluent $cBOD_5$ in 2023 was 2.1mg/L; this value has increased by less than 1% compared to 2022. The annual loading of $cBOD_5$ was 2.64kg/d. The design objective, compliance limit and the loading limit for $cBOD_5$ were not exceeded in 2023. Refer to Graph 7 for a comparison of effluent monthly average concentration of $CBOD_5$.

Graph 7. The effluent monthly average concentration of $cBOD_5$ in 2023 compared to 2022.



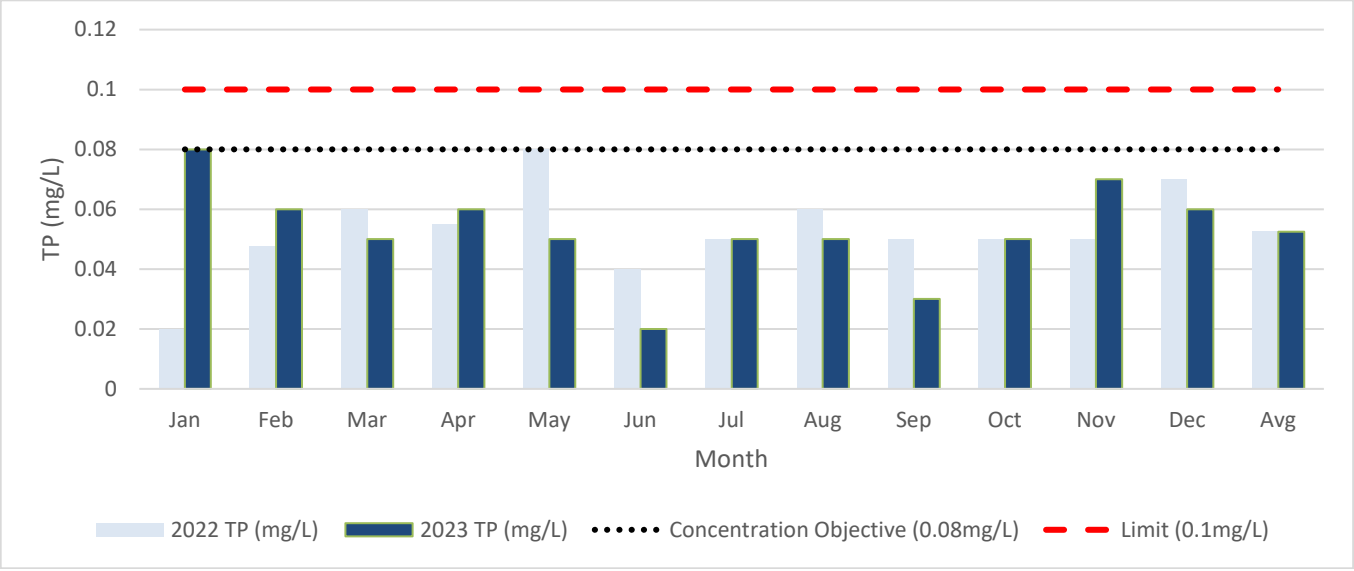
The annual average for effluent TSS in 2023 was 1.50mg/L; this value has decreased by 19% compared to 2022.The annual loading of TSS was 1.92kg/d. The design objective, compliance limit and the loading limit for TSS were not exceeded in 2023. Refer to Graph 8 for the effluent monthly average concentration of TSS.

Graph 8. The effluent monthly average concentration of TSS in 2023 compared to 2022.



The annual average for effluent TP in 2023 was 0.05mg/L.; this value has stayed the same compared to 2022. The annual loading of TP was 0.07kg/d. The design objective, compliance limit and the loading limit for TP were not exceeded in 2023. Refer to Graph 9 for a comparison of the effluent monthly average concentration of TP.

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

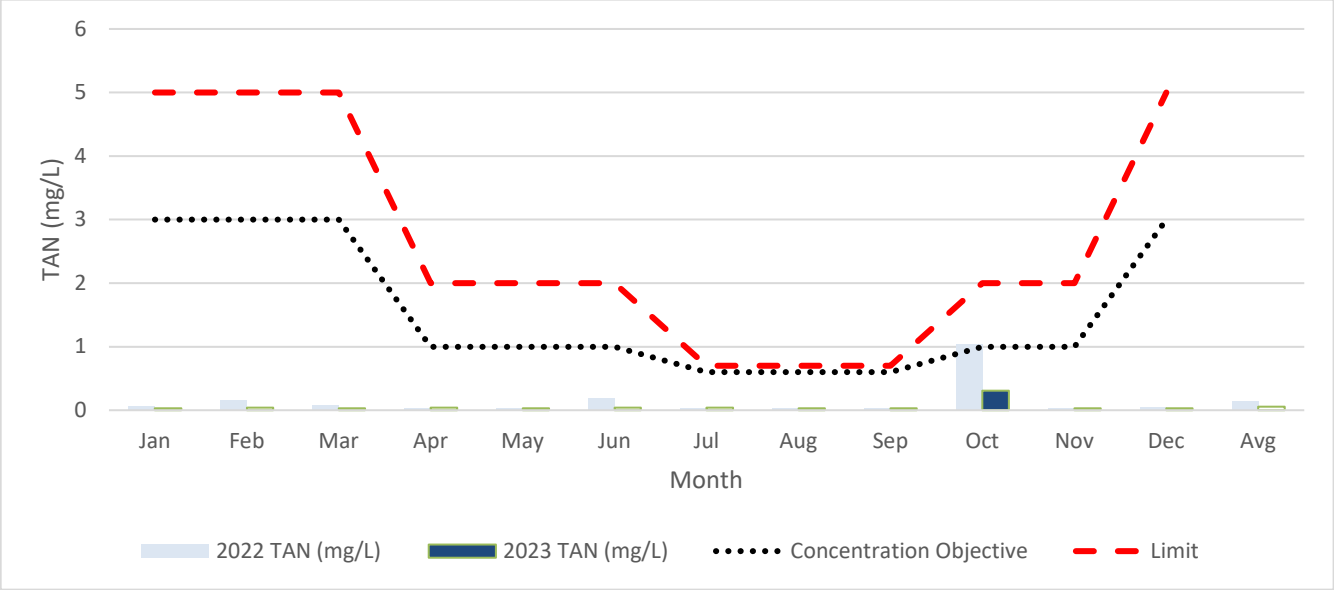


The annual average for effluent Total Ammonia Nitrogen (TAN) in 2023 was 0.06mg/L. The annual loading of TAN was 0.07kg/d. The limits and objectives for TAN are based on temperature:

- Dec 1st to March 31st – limit is 5.0mg/L, objective is 3.0mg/L
- April 1st to June 30th & Oct 1st to Nov 30th - limit is 2.0mg/L, objective is 1.0mg/L.
- July 1st to Sept 30th – limit is 0.7mg/L, objective is 0.6mg/L

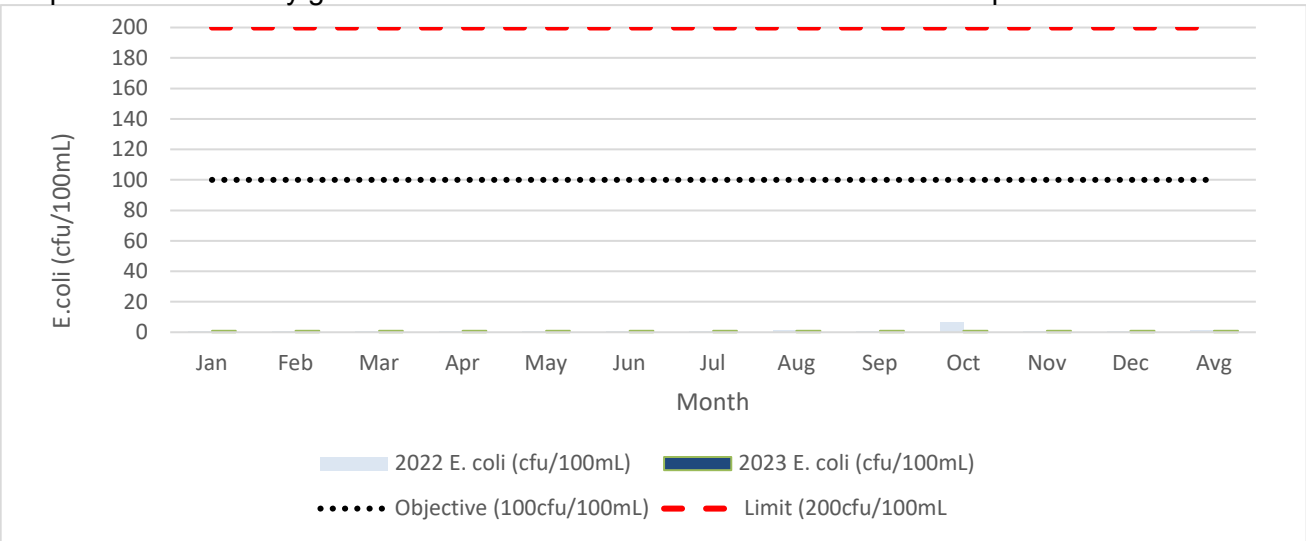
The design objective, compliance limit and the loading limit for TAN were not exceeded in 2023. Refer to Graph 10 for the effluent monthly average concentrations.

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



The annual geometric mean for effluent E. coli in 2023 was 1.0cfu/100mL; this value has decreased by 18% compared to 2022. The design objective and compliance limit for E.Coli was not exceeded in 2023. The objective for E.coli is 100cfu/100mL and the limit is 200cfu/100mL.

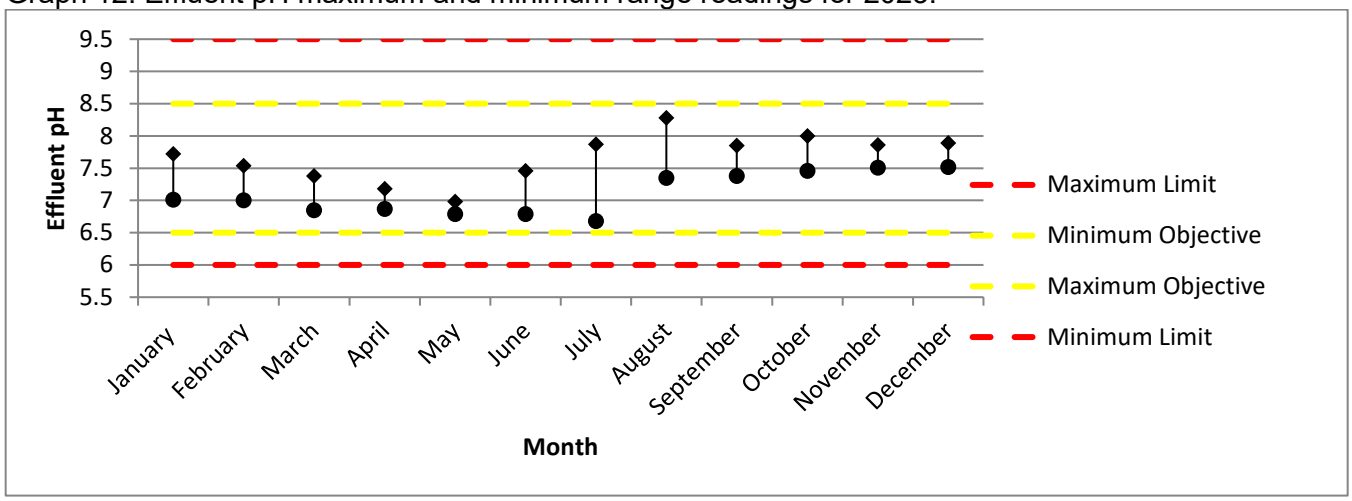
Graph 11. The monthly geometric mean concentration of E. coli in 2023 compared to 2022.



The effluent pH is monitored weekly at a minimum at the Waterford WWTP. Overall the plant has provided effective treatment as there have been no results below or above the design objectives of 6.5-

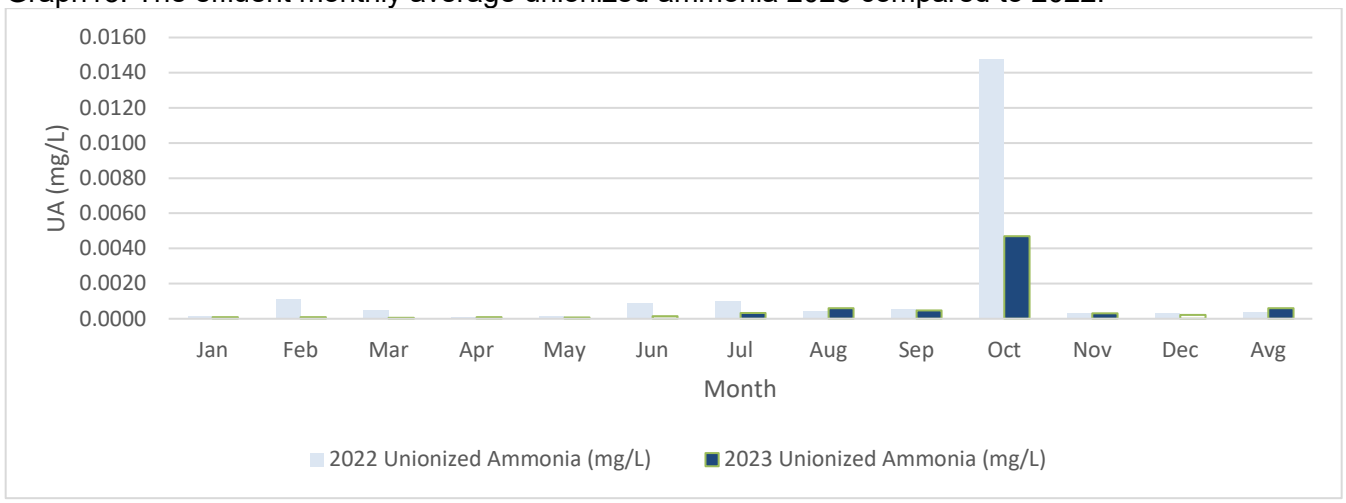
8.5 or the compliance limits of 6.0-9.5 in 2023. Refer to Graph12 for the monthly minimum and maximum ranges for the 2023 pH readings.

Graph 12. Effluent pH maximum and minimum range readings for 2023.



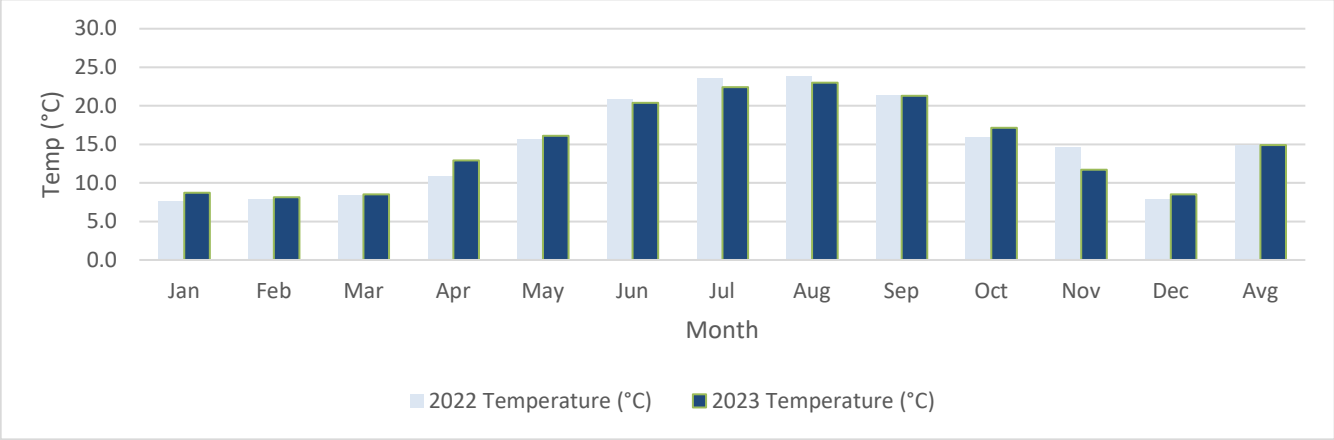
The annual average for effluent concentration of unionized ammonia (UA) was 0.0006mg/L in 2023. There is no limit or objective for unionized ammonia.

Graph13. The effluent monthly average unionized ammonia 2023 compared to 2022.



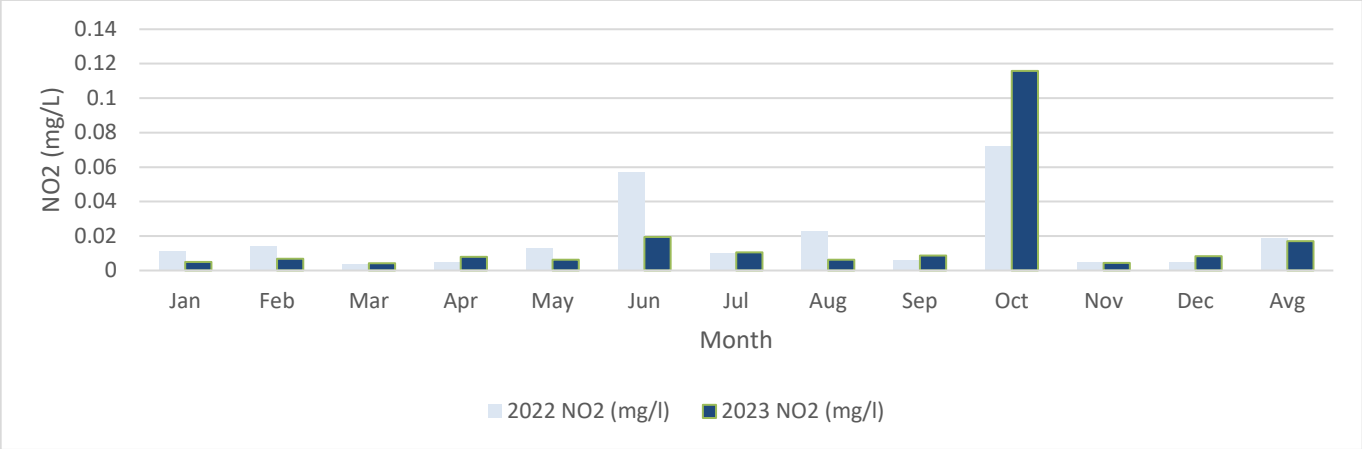
The annual average for effluent temperature was 14.9°C in 2023. There are no limit or objectives for temperature.

Graph 14. The effluent monthly average temperature in 2023 compared to 2022.



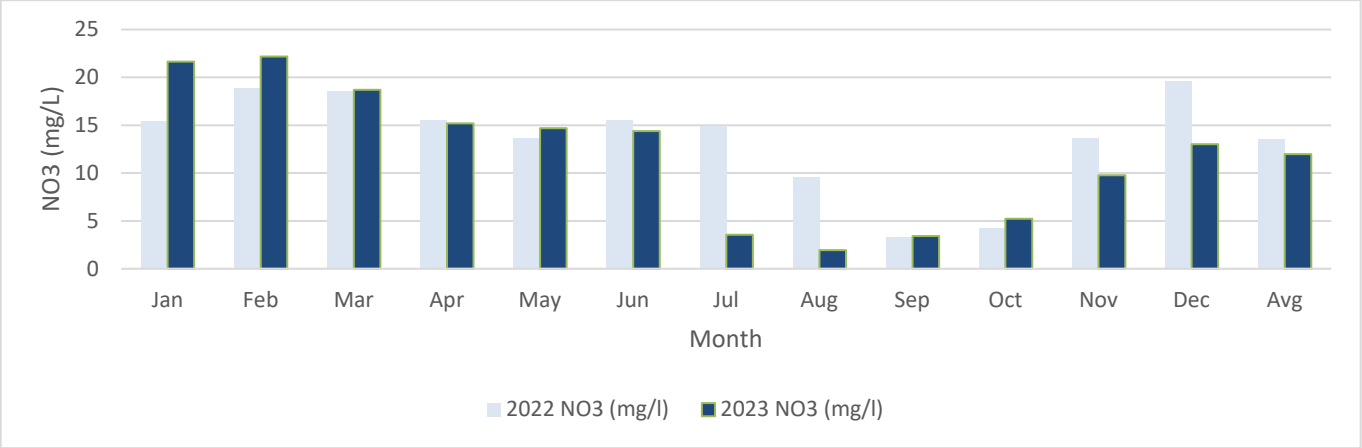
The annual average for effluent NO_2 in 2023 was 0.02mg/L. There are no limits or objectives for NO_2.

Graph 15. The effluent monthly average concentration of NO_2 in 2023 compared to 2022.



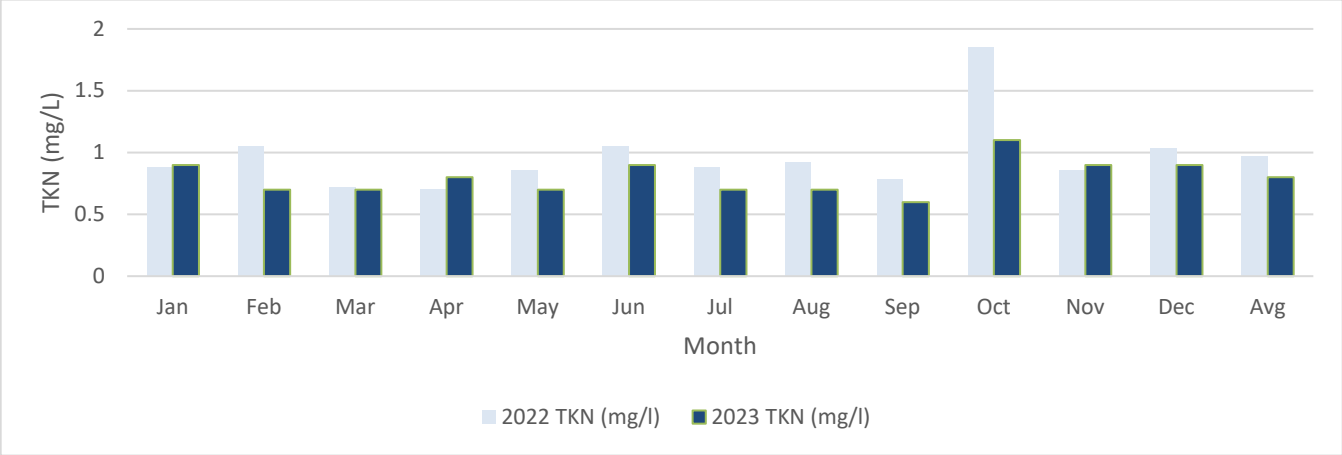
The annual average for effluent NO_3 in 2023 was 12.0mg/L. There are no limits or objectives for NO_3.

Graph 16. The effluent monthly average concentration of NO_3 in 2023 compared to 2022.



The annual average for effluent TKN in 2023 was 0.8mg/L; this value has decreased by 21% from the annual average in 2022. Refer to Graph 17 for the effluent monthly average concentration of TKN.

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



The Waterford Water Pollution Control Plant performed well in 2023 producing quality effluent meeting all limits and objectives for all required parameters.

Section C: Operating Problems and Corrective Actions

As part of the headworks upgrades, a contractor was retained to perform a clean-out of the West Aeration Lagoon. Upon inspection post clean-out, it became evident that significant damage had occurred to the lagoon liner as a result of the equipment used during the clean-out. A preliminary pollution incident report was submitted to the MECP's Spills Action Centre (SAC) on July 7, 2023 Ref#1-3LYIN8 while the status of the damage to the liner was surveyed. Once the survey was completed, there was no evidence that a spill had occurred. The condition of the liner remains idem at this time. Resolution strategies and repair procedures are ongoing.

The Waterford headworks upgrades are ongoing at this time but have been delayed as a result of the damage sustained to the west aeration lagoon liner. For more information on the upgrades completed, refer to **Section M: Changes or Updates for Construction at Plant**

As per the CLI-ECA Schedule E Condition 4.6.4, there were no operating problems at the sewage pumping stations or with the linear infrastructure that required corrective actions for 2023.

Section D: Maintenance Activities

Regular scheduled monthly preventative maintenance for the Waterford WPCP 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 were as follows:

Table 6. Waterford WPCP Major Maintenance Completed in 2023

Date	Maintenance Activities
January 12	Operations replaced all filters on air-dryer
March 16	Contractor installed internet bridge to headworks building – installed May 18
April 6	Operations replaced UPS in filter PLC
April 6	South end gate install completed
April 14	Contractor onsite to x-ray filter discharge pipes
May 4	Contractor onsite to complete calibrations on influent and effluent flow meters
May 23	Contractor onsite for annual check on compressors
June 2	Operations installed new belts on SAGR blower #2
June 5	Contractor on site to measure sludge blankets
June 10	Contractor onsite completed a sludge survey of the facultative lagoon
June 13	Contractor onsite to flush out SAGR and lagoon discharge lines.
June 19	Contractor onsite to clean out the outer lines of the SAGR bed
June 27	Contractor tied the forcemain into the headworks
June 28	Contractor tied headworks into the reject line
June 30	Electrical contractor on site to install new wire on water sensor on filter 403B
July 7	Contractor completed west aerated lagoon clean out resulting in damage to the floor.
July 25	Mechanical Contractor onsite inspecting and repairing blowers
July 31	New headworks grit system was brought online.
August 29	Contractor onsite to repair overhead crane in filter room
September 12	Contractor installed raw sampler in the blower room
October 23	Contractor onsite to repair overhead crane in filter room
October 23	Contractor onsite to complete calibrations of in house laboratory equipment
October 25	Mechanical Contractor onsite to install gate valve on lagoon bypass pipe
October 27	Contractor onsite to fix heaters and air handling units
November 1	Contractor installed new board for headworks generator
November 3	Operations replaced 3 UV bulbs in the UV system
November 6	Contractor onsite to clean out aeration inlet/discharge wetwells
November 15	Hydro One installed power monitors at headworks – removed November 22
November 27	Backflow preventer inspections completed by third party
November 28	Contractor installed weirs on the raw sewage meter channel
November 28	Contractor onsite installing gas monitoring system
December 5	Contractor onsite to complete concrete work at headworks building
December 11	Mechanical Contractor onsite to repair leak on the effluent pump discharge line and install two ceiling fans in filter building
December 12	Electrical Contractor on site to fix GFI plug at lagoon plc cabinet
December 13	Contractor onsite to fix rake on grit system
December 21	Contractor onsite to repair outdoor lights on headworks building

Table 7. Blueline Road SPS Major Maintenance Completed in 2023

Date	Maintenance Activities
April 12	Contractor onsite for wet well clean out
April 17	Coolant heater timer replaced on generator
June 8	Mechanical contractor onsite to install new lids and cut larger opening for pump removals

Table 8. Deer Park Road Main SPS Major Maintenance Completed in 2023

Date	Maintenance Activities
April 12	Contractor onsite for wet well clean out
June 27	Shut down station, Sludge haulers on site while contractor tied the forcemain into the headworks at the WPCP
September 5	Replaced battery on Damar dialer box
November 6	Contractor onsite for wet well clean out

Table 9. Deer Park Road Mini SPS Major Maintenance Completed in 2023

Date	Maintenance Activities
April 12	Contractor onsite for wet well clean out
November 6	Contractor onsite for wet well clean out

Section E: Effluent Quality and 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 SAGR beds. These tests include pH, temperature, ammonia, total suspended solids and total phosphorus 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 Records

The influent and effluent flow meters were calibrated by JBF Controls Ltd. on May 4, 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 - There are no flow meters at the Waterford sewage pumping stations that required calibration in 2023.

Section G: Summary of Efforts Made to Achieve Design Objectives

Table 10. Individual 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 Objective Exceedances
$cBOD_5$	4.0	2.0-2.8	0	13.2	2.36-3.55	0
TSS	7.0	1.0-2.8	0	22.0	1.21-3.55	0
TP	0.08	0.02-0.08	0	0.22	0.03-0.11	0
TAN	0.6(1.0,3.0)	0.03-0.31	0	1.5(4.4,11.0)	0.03-0.37	0
E. coli (cfu/100mL)*	100	1.0-1.0	0	n/a	n/a	n/a
pH**	6.5 – 8.5	6.68-8.28	0	n/a	n/a	n/a

*effluent objectives and limits are seasonal first value Jul 1-Sept 30, second value Apr 1-Jun 30 and Oct 1-Nov 30, third value Dec 1-Mar 31
**expressed as geometric mean

There were no objective exceedances at the Waterford WPCP in 2023.

Section H: Sludge Handling and Generation

There was 7,982m^3 hauled during the Waterford Aerated Lagoon clean out event in June 2023. 2,762m^3 was sent to field and 5,220m^3 was sent to Wessuc's Brantford Storage Lagoon. The sludge disposal locations are identified below in Table 11. The estimated sludge volume generated in 2023 is not quantifiable as it is a lagoon system, therefore the sludge volume expected to be generated in 2024 in unknown.

A sludge survey was completed by a third party in June of 2023 prior to the facultative lagoon clean out event and the sludge blankets in the facultative lagoon were showing a range of 1-4ft of sludge depths compared to 5-7ft of water.

Table 11. Lagoon Sludge Field Disposal Locations 2023.

Site	NASM#	Lot	Concession	Township	Volume (m3)	Date Spread
B1166	60530	2	9	Burford	1,050.00	June 14, 2023
B1166	60530	2	9	Burford	750.00	June 15, 2023
HN1248	60498	9	1	Townsend	962.00	June 23, 2023
Total					**2,762.00**	

Section I: Complaints

There were no complaints received for the Waterford WPCP in 2023.

As per the CLI-ECA Schedule E Condition 4.6.6 - there were no community complaints received for the Waterford sewage pumping stations or gravity separate sewers in 2023.

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

There were no bypasses, overflows, spills or abnormal discharge events at the Waterford WPCP in 2023.

As per CLI-ECA Schedule E Condition 4.6.3, 4.6.8 and 4.6.9 - There were no overflow events (raw sewage spills) at the Waterford SPS's, or linear infrastructure in 2023.

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

In 2023 Norfolk County conducted a flow monitoring, inflow and infiltration (I&I) reduction study to assist

in the evaluation of higher flow to the facility. In 2023 six 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. Refer to *Appendix B* (2023 I&I Summary Report - 04December2023) for program results.

Section K: Notice of Modification to the Works and Construction and Commissioning of Proposed Works

There were no notices of modifications to the Waterford WPCP completed in the 2023 reporting year. The newly constructed headworks was connected on June 27, 2023 but the influent flow meter is not operational preventing the commissioning of the upgraded headworks facility to the Waterford WPCP. The construction and commissioning schedule can be found in Appendix D.

As per the CLI-ECA Schedule E Condition 4.6.7 – There were no alterations to the Waterford SPS's in 2023. The following alterations to the linear infrastructure were made in 2023:

Wellington Street Sanitary Sewer Replacement
Form SS1 - Existing sanitary sewer on Wellington Street, from Brown Street to Alice Street to be replaced with new 200mm diameter PVC SDR35. Sanitary manholes in project area will be replaced, and sanitary service laterals replaced to property line.

SFO Townhouses – Norfolk Street Sanitary Sewer Extension
Form SS1 - To allow servicing of a single unit past the existing limits of the sanitary pipe, a 24m extension on Norfolk Street (at the corner of College Street and Norfolk Street) must be installed.

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

The Waterford WPCP secondary and post-secondary treatment is provided by two aerated lagoons, two submerged activated growth reactor cells and a Blue PRO deep-bed sand filtration system with final disinfection provided by ultraviolet light. Supplementary phosphorus removal is also achieved with the addition of a ferric chloride solution. The treatment components are capable of producing effluent quality that exceeds the effluent design objectives specified in F-5-1. The Waterford WPCP is required to achieve higher effluent quality standards than the Effluent guideline criteria as specified in the ECA.

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 Waterford WPCP 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 to the monitoring schedule at the Waterford WPCP in 2023. Refer to Appendix E for the monitoring schedule for 2024.

APPENDIX A – Waterford WPCP Monitoring Data

APPENDIX B – Summary of efforts to reduce CSOs, Spills, STP Overflows, STP Bypasses

APPENDIX C – Maintenance Schedule

APPENDIX D – Construction and Commissioning Schedule

APPENDIX E – 2024 Sampling Schedule