Queenston Wastewater Treatment Plant Annual Performance Report –Treatment Reporting Year: 2024

Niagara Region

Table of Contents:

Queenston Wastewater Treatment Plant Annual Performance Report (QN-T)

Table of Contents: 2
List of Tables: 3
List of Figures: 3
QN-T-2 Wastewater Treatment Process Description 4
QN-T-3 Review of Plant Flows and Influent Sampling and Monitoring 5
Review of 2024 Plant Flows 5
Review of Influent Sampling and Monitoring Activities 6
Review of Final Effluent Sampling and Monitoring Activities 7
Effluent Quality Assurance Measurements and Control Measures 9
Deviations from Scheduled Monitoring Program 9
QN-T-4 Description of Operating Problems Encountered and Corrective Actions Taken 13
QN-T-5 Summary of Major Maintenance Activities and Capital Works 13
Summary of Maintenance Carried out on Major Equipment 13
Planned Capital Upgrades 14
Summary and Update of Notice of Modifications Completed 14
Proposed Works – Status Update 14
QN-T-6 Summary Calibration Activities 14
Flow Meter Calibration – Influent and Effluent 14
Effluent Monitoring Equipment Calibration/Verification 15
QN-T-7 Solids Handling 15
Processed Organics Received 15
Volumes of Sludge Generated and Removed From Site 15
Sludge Quality Monitoring 16
QN-T-8 Complaints 16
QN-T-9 Bypasses, Overflows, Other Situations Outside Normal Operating, Spills and Abnormal Discharge Events 17
Bypasses and Overflows 17
Situations Outside of Normal Operating Conditions 18
Spills 18
Abnormal Discharges 19
QN-T-10 Summary of Efforts to Achieve Conformance with F-5-1 and/or F-5-5 19
Summary of Efforts – Procedure F-5-1 – Secondary Treatment Equivalent 19
Summary of Efforts – Procedure F-5-1 – Sewage Bypass/Overflow from Nominally Separated System 19
Industrial Waste 20
Summary of Efforts – Procedure F-5-5 20
Public Reporting of Bypasses and Overflows 20

List of Tables:

Table QN-T-1: Table of Queenston WWTP 2024 Treated Flows 5
Table QN-T-2: Evaluation of Final Effluent sample results to ECA objectives and compliance limits 8
Table QN-T-3: Table of 2024 sampling schedule deviations 10
Table QN-T-4: Annual Summary of Plant Flows, Influent and Effluent Sampling and Monitoring Results..... 11
Table QN-T-5: Summary of Flow Meter Calibration..... 14
Table QN-T-6: Summary of Calibration/Verification of Effluent Monitoring Equipment..... 15
Table QN-T-7: Summary of Sludge Removed from Site 2024..... 16
Table QN-T-8: Annual Summary of Overflow Events by Month..... 17
Table QN-T-9: 2024 Queenston WWTP Overflow Sampling Results 18
Table QN-T-10: Summary of spills occurring at the Queenston WWTP during the reporting year..... 18

List of Figures:

Figure QN-T-1: Graph displaying the Monthly Average Daily Flow Rate in MLD..... 6
Figure QN-T-2: Figure of monthly plant loadings to the Queenston WWTP for CBOD, TSS, TKN and TP (in kg/d) for the period 2022 to 2024. 7

QN-T-2 Wastewater Treatment Process Description

The Queenston (Niagara-on-the-Lake) Wastewater Treatment Plant (WWTP) is located at 30 Front Street in the Town of Niagara-on-the-Lake and provides wastewater treatment to the village of Queenston. The Queenston WWTP is a class II modified Ludzack-Ettinger treatment facility and has been designed to treat an average daily flow (ADF) of 500 cubic meters per day (m^3/d). This facility has peak design flow rate of 1,700 m^3/d.

The Queenston WWTP operates under the following MECP approvals:

Environmental Compliance Approval (Sewage): 0371-93YM2L, Issued February 22, 2013
Environmental Compliance Approval (Air): 5305-7G6L32, Issued July 3, 2008

The Queenston WWTP uses the following processes to treat wastewater:

- Raw Influent Pumping
- Screening
- Grit Removal
- Phosphorus Removal
- Secondary Treatment
- Disinfection (Chlorination/Dechlorination)
- Solids Handling (Storage and Transportation)

Raw Influent Pumping: Wastewater from the collection system enters the facility at the raw sewage wet well chamber. This chamber is equipped with raw sewage pumps. The wet well provides a low point for the collection system to discharge to while the raw sewage pumps lift the wastewater to allow the remainder of the treatment process to occur by gravity.

Screening: Wastewater flows through a bar screen to remove rags and large debris that could harm pumps and process equipment downstream. Screenings are sent for disposal in landfill.

Grit Removal: Grit channels slow the speed of the wastewater allowing heavy suspended material such as sand and small stones (grit) to settle towards the bottom while lighter organic particles are kept in suspension and pass through the tank with the wastewater for further treatment. The grit is collected and sent to landfill for disposal.

Phosphorus Removal: A coagulant, ferric sulphate, is added to the treatment process to aid in phosphorus and suspended solids removal.

Secondary Treatment:

Aeration Tank: Aeration tanks equipped with air bubble diffusers oxygenate the wastewater to encourage microorganisms (or “bugs”) to remove dissolved and suspended organics and nutrients from the wastewater. Return Activated Sludge (RAS); a mixture of bugs and

wastewater, is recycled back through the aeration process to ensure enough bugs are present to provide adequate wastewater treatment.

Secondary Clarifier: The secondary clarifier receives effluent from the aeration tanks. The flow of wastewater slows down and the solids settle quickly as Activated Sludge. The clear effluent on top discharges over a weir for further treatment. A portion of the activated sludge collected on the bottom of the clarifier is pumped back to the front of the aeration tanks to ensure a healthy microbial population (RAS). Any excess or Waste Activated Sludge (WAS) is removed from the process by pumping to the solids handling treatment process.

Disinfection (chlorination/dechlorination):

Chlorine in the form of liquid sodium hypochlorite is added into the effluent stream for pathogen control during the chlorination season from April 1st to October 31st. Adequate contact time is provided as the effluent flows through the chlorine contact chambers. As chlorine can be toxic to aquatic species, disinfected effluent is dechlorinated with a dechlorinating agent before being discharged to the Niagara River.

Solids Handling:

Waste Activated Sludge Storage: Waste activated sludge from the secondary treatment process is transferred to a storage tank for holding until it can be hauled to another WWTP facility for further treatment and processing.

QN-T-3 Review of Plant Flows and Influent Sampling and Monitoring

Review of 2024 Plant Flows

Table QN-T-1 below outlines the volume of sewage treated at the Queenston WWTP during the reporting year.

Table QN-T-1: Table of Queenston WWTP 2024 Treated Flows

Flow Statistic	Value
Design Average Daily Flow (ML/d)	0.500
Design Peak Flow Rate - Dry Weather (ML/d)	1.700
Total Volume Processed (ML)	63.853
Annual Average Daily Flow (MLD)	0.174
% Annual Average Daily Flow Utilization	35%
% Increase/Decrease over prior year	-22%

Reviewing the treated flows in 2024, it was observed that, on average, the plant utilizes 35% of its design Average Daily Flow. This indicates that the facility has the hydraulic capacity to meet the needs of the collection system with room for additional flows that may be added from development. Where the average becomes greater than 80%, plant expansion should be considered.

Daily flows to the plant were reviewed. In 2024, there were five (5) instances where the flow to the plant was greater than the design Average Daily Flow, amounting to approximately 1% of the year.

A review of the monthly average daily flow rate for the prior 10-year period was completed. This can be observed below in Figure QN-T-1 below. This can be observed below in Figure QN-T-1 below. It was observed that average daily flow rates have been in decline over the past 10 years. The closure of businesses and tourist attractions because of the COVID-19 Pandemic resulted in lower flows in 2020 and 2021. The trend is now returning to typical flow observed prior to the pandemic. Spikes during typical wet weather seasons further support increased flows are occurring due to Inflow and Infiltration.

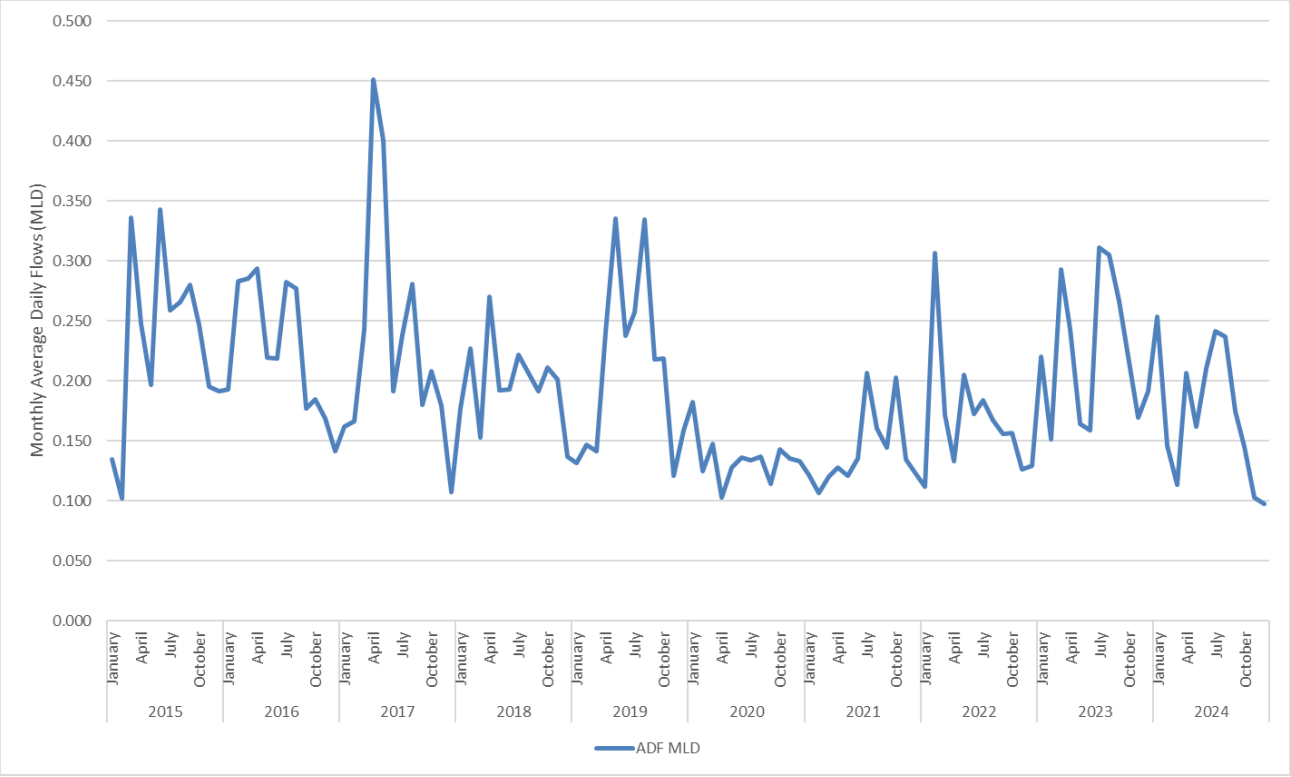

Figure QN-T-1: Graph displaying the Monthly Average Daily Flow Rate in MLD

Review of Influent Sampling and Monitoring Activities

In 2024, there were 104 samples of influent collected and tested. An annual summary of influent sampling can be observed in Table QN-T-4.

Although the volume of sewage is an important consideration for the effective operation of a wastewater treatment plant, another important factor to monitor is plant loading. Plant loading displays if the strength of the sewage received at the plant is getting stronger or weaker. Stronger sewage may impact the amount of sewage the plant can treat effectively.

Plant loading is calculated by measuring the average strength of a pollutant per liter of influent sewage and multiplying it by the average volume of sewage received. This is generally displayed as kilograms of pollutant per day or kg/d. Below in Figure QN-T-2, is a graph depicting four (4) commonly monitored pollutant loadings to the plant for the period of 2022-2024.

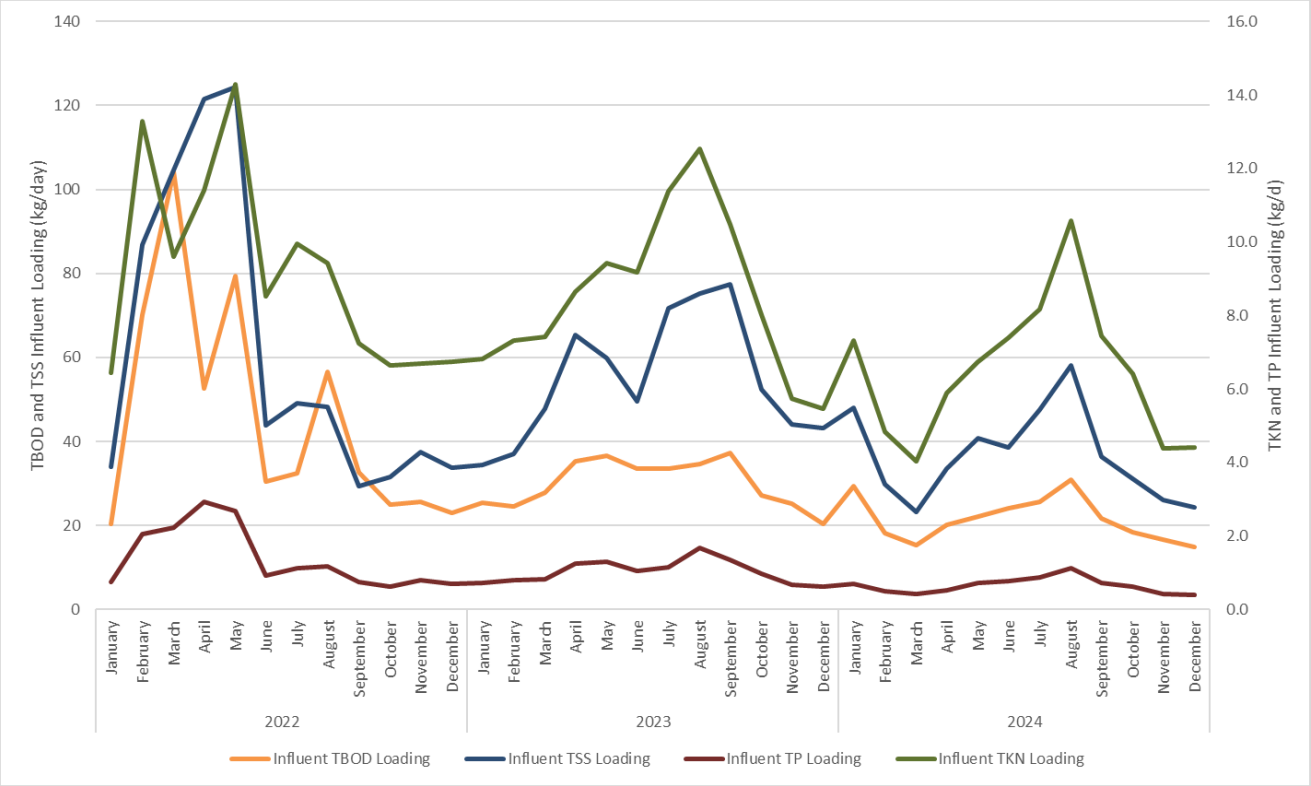

Figure QN-T-2: Figure of monthly plant loadings to the Queenston WWTP for TBOD, TSS, TKN and TP (in kg/d) for the period 2022 to 2024.

Reviewing the calculated loadings for TBOD, TSS, TKN and TP for the past three (3) years there is a decreasing trend for all four parameters. The decreased loadings are likely related to the decrease in average daily flows over the same period. These parameters will continue to be monitored to see if the trend persists.

Review of Final Effluent Sampling and Monitoring Activities

In 2024, there were 104 samples of final effluent were collected and tested. Individual as well as monthly average results are reviewed and compared to the objective and compliance limits

stated in the facility ECA. Table QN-T-2 below summarizes the number of monthly objective and compliance limit exceedances at the Queenston WWTP in the reporting year.

Table QN-T-2: Evaluation of Final Effluent sample results to ECA objectives and compliance limits

Pollutant	ECA Monthly Concentration Objective	ECA Monthly Concentration Limit	Number of Monthly Objective Concentration Exceedances	Number of Monthly Limit Concentration Exceedances	ECA Annual Average Loading Limit	Number of Annual Loading Limit Exceeded
pH[1]	6.0-9.5	6.0-9.5	1	1	-	-
Carbonaceous Biological Oxygen Demand (CBOD)	15 mg/L	25 mg/L	0	0	12.5 kg/d	0
Total Suspended Solids (TSS)	15 mg/L	25 mg/L	3	1	12.5 kg/d	0
Total Phosphorus (TP)	1.0 mg/L	-	0	0	-	-
Total Residual Chlorine (TRC)[2]	0.50 mg/L	-	0	-	-	-
E-Coli (*geomean*)[3]	200 CFU/100 mL	200 CFU/100 mL	0	0	-	-

The Queenston WWTP did not met all ECA compliance limits for the 2024 reporting year. The limit for pH was not met on December 2, 2024, with a recorded value of 5.80. The monthly average limit for Total Suspended Solids was not met in July. Full details regarding the non-compliances are described in full in section QN-T-4 below.

Queenston WWTP had two (2) monthly objective exceedance for Total Suspended Solids (TSS) in November and December. These objective exceedances were caused by nitrification and poor settling of the activated sludge in the final clarifier leading to solids carryover in the final effluent.

A review of individual results against ECA objectives was also complete. Below summarizes the percentage of individual samples that were over the ECA objective:

[1]pH must meet objectives/limits at all times (inclusive)
[2] Total Residual Chlorine monitoring only required April 01 to October 31 inclusive
[3] E.Coli monitoring only required April 01 to October 31 inclusive

- CBOD – 0%
- TSS – 22%
- TP – 1%
- E.Coli – 10%

Final Effluent sample results did not exceed the ECA objective greater than 50% of the time.

The plant continues to effectively treat all wastewater received for treatment. An annual summary of monthly average final effluent sample results can be observed in Table QN-T-4 below.

Effluent Quality Assurance Measurements and Control Measures

To ensure Queenston WWTP continues to produce a high-quality effluent the following measures have been implemented:

- Development and implementation of a Wastewater Quality Management System (WWQMS) program
    - This program promotes an environment of continuous improvement for all staff impacting the quality of wastewater
- Development of an ISO 14001:2015 Environmental Management System
- Compliance samples are analyzed by an ISO 17025:2017 accredited laboratory unless sample results are required to be collected in the field at the time of sampling
- Standard Operating Procedures (SOPs) are in place to support proper sampling and field measurements
- A compliance sampling schedule is created each year to ensure regulatory requirements are being met, as a minimum
- Equipment used in the monitoring and measurement of Final Effluent quality are calibrated annually

Deviations from Scheduled Monitoring Program

Compliance sampling activities at the Queenston WWTP follow a scheduled monitoring program to ensure all provincial and federal requirements are met. A schedule is prepared for the upcoming year and is submitted to the MECP as part of the annual reporting requirement.

In 2024, three (3) deviations from the scheduled sampling days occurred. Table QN-T-3 below provides the instances where a deviation occurred and a reason for the deviation.

The 2025 sampling schedule is available upon request.

Table QN-T-3: Table of 2024 sampling schedule deviations

Sampling Date Deviation	Sample Type(s)	Reason
2024-01-08	Influent	Sampler malfunction. Sample submitted the following day.
2024-01-10	Influent, Final Effluent	Sample schedule updated to accommodate staffing levels – samples submitted 2024-01-11.
2024-12-19	Influent	Sampler malfunction. Sample submitted the following day.

Table QN-T-4: Annual Summary of Plant Flows, Influent and Effluent Sampling and Monitoring Results

Measured Parameter	January	February	March	April	May	June	July	August	September	October	November	December	Total / Average	Total Samples Collected
Influent - Monthly Average TSS (mg/L)	190	204	206	162	252	183	197	245	208	214	254	249	214	
Number of Influent TSS Samples	10	8	8	8	9	8	10	8	9	9	8	9		104
Influent - Monthly Average TBOD5 (mg/L)	116	124	135	98	137	114	106	130	124	126	161	152	127	
Number of Influent TBOD5 Samples	10	8	8	8	9	8	10	8	9	9	8	9		104
Influent - Monthly Average TP (mg/L)	2.8	3.4	3.8	2.5	4.4	3.7	3.6	4.7	4.1	4.3	4.2	4.0	3.8	
Number of Influent TP Samples	10	8	8	8	9	8	10	8	9	9	8	9		104
Influent - Monthly Average TKN (mg/L)	28.87	33.14	35.58	28.53	41.67	35.09	33.90	44.55	42.56	44.04	42.55	45.31	37.98	
Number of Influent TKN Samples	10	8	8	8	9	8	10	8	9	9	8	9		104
Total Plant Flows (ML)	7.853	4.242	3.512	6.197	5.022	6.321	7.478	7.352	5.254	4.508	3.091	3.023	63.853	
Daily Average (MLD)	0.253	0.146	0.113	0.207	0.162	0.211	0.241	0.237	0.175	0.145	0.103	0.098	0.174	
Maximum Flow (ML)	1.191	0.227	0.149	0.601	0.200	0.521	0.426	0.306	0.308	0.172	0.149	0.192	**MAX**	1.191
Minimum Flow (ML)	0.073	0.066	0.079	0.101	0.134	0.144	0.175	0.155	0.129	0.119	0.076	0.068	**MIN**	0.066
Final Effluent - Monthly Average TSS (mg/L)	14.2	11.1	6.0	12.8	7.1	7.1	27.4	13.5	11.4	12.6	17.6	21.6	13.5	
Final Effluent - Average Daily TSS Loading (kg/d)	4	2	1	3	1	1	7	3	2	2	2	2	2	
Number of Final Effluent TSS Samples	10	8	8	8	9	8	10	8	9	9	8	9		104
Final Effluent - Monthly Average CBOD5 (mg/L)	4.0	4.0	4.3	4.0	4.0	4.0	5.0	4.0	4.0	4.0	4.0	4.0	4.1	
Final Effluent - Average Daily CBOD5 Loading (kg/d)	1	1	0	1	1	1	1	1	1	1	0	0	1	
Number of Final Effluent CBOD5 Samples	10	8	8	8	9	8	10	8	9	9	8	9		104
Final Effluent - Monthly Average TP (mg/L)	0.23	0.26	0.27	0.34	0.27	0.29	0.80	0.52	0.44	0.44	0.56	0.61	0.42	
Final Effluent - Average Daily TP Loading (kg/d)	0.06	0.04	0.03	0.07	0.04	0.06	0.19	0.12	0.08	0.06	0.06	0.06	0.07	
Number of Final Effluent TP Samples	10	8	8	8	9	8	10	8	9	9	8	9		104
Final Effluent - Monthly Average TKN (mg/L)	1.14	1.18	1.01	1.54	2.16	1.25	2.28	1.73	1.34	1.31	1.51	4.90	1.78	
Number of Final Effluent TKN Samples	10	8	8	8	9	8	10	8	9	9	8	9		104
Final Effluent - Monthly Average NH3 (mg/L)	0.05	0.07	0.06	0.22	0.81	0.19	0.31	0.30	0.13	0.06	0.09	2.39	0.39	
Number of Final Effluent NH3 Samples	10	8	8	8	9	8	10	8	9	9	8	9		104
Final Effluent - Monthly Average NO3 (mg/L)	12.03	16.78	13.76	8.54	11.64	15.03	13.47	12.81	15.98	23.08	23.85	14.91	15.16	
Number of Final Effluent NO3 Samples	10	8	8	8	9	8	10	8	9	9	8	9		104
Final Effluent - Monthly Average NO2 (mg/L)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.53	0.55	0.43	0.43	
Number of Final Effluent NO2 Samples	10	8	8	8	9	8	10	8	9	9	8	9		104
Final Effluent - Monthly Geomean E.Coli (cfu/100mL)			100	10	3	15	16	2	3	3			8	
Number of Final Effluent E.Coli Samples			1	9	9	8	9	9	9	9				63
Final Effluent - Monthly Average TRC (mg/L)				0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00	

2024 Annual Performance and Summary Report - Treatment

Measured Parameter	January	February	March	April	May	June	July	August	September	October	November	December	Total / Average	Total Samples Collected
Number of Final Effluent TRC Samples				30	31	30	29	27	28	28				203
Final Effluent - Monthly Average Temperature (°C)	9.72	9.14	10.66	11.89	16.17	17.65	20.49	21.44	19.62	15.20	13.83	10.87	14.72	
Number of Final Effluent Temperature Samples	10	8	8	8	9	8	10	8	9	9	8	9		104
Final Effluent - Monthly Average pH	7.05	6.83	6.81	7.00	6.79	7.00	6.87	6.79	6.94	6.77	6.39	6.64	6.82	
Number of Final Effluent pH Samples	10	8	8	8	9	8	10	8	9	9	8	9		104

QN-T-4 Description of Operating Problems Encountered and Corrective Actions Taken

Total Suspended Solids Compliance Limit Exceedance – July 2024

On July 10 and July 11, a significant rainfall event occurred. Flows to the small Queenston plant were double the typical flow. A sample of the effluent was collected during this period as scheduled in the compliance sampling schedule. The sample collected during the wet weather/high flow event had a TSS result of 173 mg/L. This is not typical of effluent quality at the Queenston WWTP and is suspected to be caused by solids carryover from the final clarifier into the final effluent based on visual observation of the sample.

All other compliance effluent samples for the month of July were well within the ECA limit for TSS.

pH Compliance Limit Exceedance – December 2, 2024

pH is required by the facility ECA to be between the values of 6.0 and 9.5 at all times. On December 2, 2024, operations staff recorded a field pH of 5.8. Investigation was initiated to identify the source of the low pH values.

Environmental enforcement staff were dispatched to check the incoming sewer for signs of a spill or foreign material being discharged to the plant that could be affecting the pH. No source of low pH was found.

Dissolved oxygen (DO) levels in aeration cells #1 and #2 were noted to be significantly higher than typically observed. It is believed that the higher DO levels in aeration were encouraging nitrification to occur. Since nitrification utilizes alkalinity in the wastewater, this would lower the pH of the plant effluent.

Aeration blower speed was decreased to reduce the DO in each cell. Additionally, operations staff added small quantities of magnesium oxide daily to the aeration zone to increase the pH to levels greater than 6.0. Chemical addition was continued until the effluent pH was stable and in compliance with the ECA limits.

QN-T-5 Summary of Major Maintenance Activities and Capital Works

Summary of Maintenance Carried out on Major Equipment

Niagara Region works to keep wastewater infrastructure in a state of good repair. Maintenance activities completed include regular preventative maintenance (PM) activities and normal and emergency equipment repair or replacement. Where a substantial amount of upgrade is required, this work is carried out under the capital works program.

Below is a summary of normal and emergency repairs carried out on major equipment at the Queenston WWTP:

- Purchase of spare raw sewage pump

This list does not include PM activities. PMs are completed and tracked in a computerized maintenance management system. PMs completed during the reporting year are available upon request.

Planned Capital Upgrades

A sustainability upgrade is occurring at the Queenston WWTP. A condition assessment was completed in 2023. Further inspection and survey of the clarifier was completed in April 2024. A new bridge supported clarifier assembly has been ordered and delivery is anticipated in 2026.

Summary and Update of Notice of Modifications Completed

Through the facility ECA, the MECP has given System Owners the ability to complete low risk changes to a treatment plant without requiring approval from the MECP. These modifications are documented on a Notice of Modification form and are signed off by the Owner or delegate of the system. Any pre-authorized modifications must be reported on annually to the MECP.

During the reporting year 2024, no Notices of Modification were completed.

No Notice of Modification forms were completed in previous reporting years. No status update is required.

Proposed Works – Status Update

There were no Proposed Works to be reported on for the 2024 reporting period.

QN-T-6 Summary Calibration Activities

Flow Meter Calibration – Influent and Effluent

Flow meters measuring flows discharging to the environment are calibrated at minimum, once per calendar year. Below in Table QN-T-5 provides a summary of flow meter calibration.

Table QN-T-5: Summary of Flow Meter Calibration

Meter Name	Date Calibrated	Comments
Queenston Final Effluent Meter	2024-12-12	Pass

Calibration certificates are available upon request.

Effluent Monitoring Equipment Calibration/Verification

It is a requirement to calibrate, or, where unable to calibrate, verify equipment that is used to measure effluent quality.

Some effluent monitoring equipment calibration or verification is completed daily or as used by operations staff such as pH meter calibration or verification of the Total Residual Chlorine colorimeter.

Once annually, a third-party contractor performs calibration or verification on all effluent monitoring equipment. A summary of third-party calibration/verification activities are available in Table QN-T-6 below.

Table QN-T-6: Summary of Calibration/Verification of Effluent Monitoring Equipment

Equipment Description	Date Calibrated	Comments
pH Meter	2024-09-17	Passed
Chlorine Portable Pocket Colorimeter (asset 37666)	2024-09-17	Passed

Calibration certificates are available upon request.

QN-T-7 Solids Handling

Processed Organics Received

One (1) load, 43 m^3, of mixed liquor was shipped from the Anger Avenue WWTP to the Queenston WWTP in December 2024. This was to improve the plant biomass and settling of solids in the final clarifier.

Volumes of Sludge Generated and Removed From Site

Solids removed from the treatment process are stored and transported from site for further processing and beneficial re-use. All sludge removed from the Queenston WWTP is taken to another WWTP for further processing and anaerobic digestion. Table QN-T-7 provides a summary of 2023 and 2024 sludge volumes removed from site.

Table QN-T-7: Summary of Sludge Removed from Site 2024

Month	2024 Volume Sludge Hauled (ML)	Prior Year Volume Sludge Hauled (ML)
January	0.217	0.173
February	0.130	0.217
March	0.173	0.217
April	0.173	0.347
May	0.173	0.390
June	0.130	0.390
July	0.130	0.347
August	0.304	0.173
September	0.260	0.260
October	0.260	0.390
November	0.173	0.260
December	0.130	0.260
TOTAL	**2.255**	**3.425**

The volume of sludge hauled decreased by 34 % in 2024. 2023 saw an increase of 23% due to draining of tankage on site to facilitate condition assessment of tankage. The reduction in 2024 is a return to normal sludge haulage volumes.

No changes are anticipated for sludge handling in 2025 at the Queenston WWTP.

Sludge Quality Monitoring

Sludges are sampled and analyzed bi-weekly to meet regulatory requirements of the Garner Road Biosolids Facility ECA and maintain our ability to beneficially re-use biosolids. Results are trended and compared to Nutrient Management Act (NMA) limits. Where a trend is detected, investigations are initiated to identify potential sources of the pollutant and correct any issue identified.

The Queenston WWTP does not directly haul sludge to Garner Road Biosolids Facility. Queenston WWTP does not have an on-site digester for storage and treatment of solids. Instead, sludge generated at this WWTP is directed to neighbouring wastewater treatment plants so that it may receive further treatment and processing.

As a result, no sludge samples are collected from Queenston WWTP.

QN-T-8 Complaints

No complaints were received for the Queenston WWTP in 2024.

QN-T-9 Bypasses, Overflows, Other Situations Outside Normal Operating, Spills and Abnormal Discharge Events

Bypasses and Overflows

There were no overflow events at the Queenston WWTP in 2024. This facility normally does not overflow. Table QN-T-8 provides a monthly breakdown of overflow events occurring at the Queenston WWTP during the reporting period. A complete listing of individual events is available upon request.

Table QN-T-8: Annual Summary of Overflow Events by Month

Month	Number of Overflow Events	Total Volume (ML)
January	0	0.000
February	0	0.000
March	0	0.000
April	0	0.000
May	0	0.000
June	0	0.000
July	0	0.000
August	0	0.000
September	0	0.000
October	0	0.000
November	0	0.000
December	0	0.000
Total	**0**	**0.000**

Overflows are sampled and submitted for analysis. Results are shown in Table QN-T-9 below.

Table QN-T-9: 2024 Queenston WWTP Overflow Sampling Results

Date	CBOD (mg/L)	Total Suspended Solids (mg/L)	Phosphorus (total) (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Ammonia as N (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)
No bypass or overflow events occurred.							

Situations Outside of Normal Operating Conditions

The MECP defines “Normal Operating Conditions” as when all unit process(es), excluding Preliminary Treatment System, in a treatment train is operating within its design capacity.

The plant did not operate outside of Normal Operating Conditions during the reporting year.

Spills

Niagara Region strives to maintain and operate wastewater infrastructure so spills to the environment do not occur. However, circumstances may arise and a spill occurs due to equipment malfunction, failure or other reasons. Occasionally, a planned spill may be required in order to safely complete required maintenance to critical equipment. In the event that this is necessary, approval from the MECP is obtained in advance.

All spills are reported to the MECP Spills Action Centre upon discovery. Spills are investigated and written reports are submitted to the MECP and Environment and Climate Change Canada as required by legislation. Below in Table QN-T-10 summarizes spills that occurred at the Queenston WWTP in 2024.

Table QN-T-10: Summary of spills occurring at the Queenston WWTP during the reporting year.

Spill Date	MECP Incident Number	Short Description of Spill	Link to Public Spill Report
No spills occurred in 2024			

Abnormal Discharges

An abnormal discharge is a discharge to the environment that is abnormal in quality or quantity. There were no abnormal discharges from the Queenston WWTP during this reporting year.

QN-T-10 Summary of Efforts to Achieve Conformance with F-5-1 and/or F-5-5

Summary of Efforts – Procedure F-5-1 – Secondary Treatment Equivalent

Procedure F-5-1 states wastewater treatment facilities are to provide treatment of wastewater to a minimum of secondary treatment equivalence. This means the WWTP should be designed to meet objectives of 15 mg/L for CBOD and TSS and 1 mg/L for TP.

As demonstrated above in section QN-T-2 and Table QN-T-4, Queenston achieved effluent quality that met or exceeded design objectives. The Final Effluent annual average quality achieved in 2024 was equivalent with the MECP design objectives for advanced treatment plants. The observed annual average for CBOD was less than 5 mg/L, the observed annual average for TSS was 13.5 mg/L, while the annual average TP concentration of the Final Effluent was less than 0.5 mg/L.

Summary of Efforts – Procedure F-5-1 – Sewage Bypass/Overflow from Nominally Separated System

Procedure F-5-1 states that bypasses and overflows from nominally separated systems are not allowed except in emergency situations. Emergency situations include protection from basement flooding, preventing damage to WWTP equipment or pumping stations or to prevent treatment process washout.

The Queenston WWTP has adequate capacity to fully treat all flows received to the WWTP and is not required to bypass or overflow during wet weather. However, it is noted that high flow conditions occur during wet weather indicating inflow and infiltration in the system. Being a two-tier system, Niagara Region works closely with the Town of Niagara-on-the-Lake to reduce inflow and infiltration. Niagara Region participates in a cost sharing strategy with lower tier municipalities to fund overflow reduction projects. In 2024, Niagara Region had an approved budget totaling $2.0M for the overflow reduction cost sharing program. No projects were included for cost sharing with the Town of Niagara-on-the-Lake.

Industrial Waste

Industrial waste can contain material that can have negative impacts on collection system infrastructure as well as the wastewater treatment process itself. Upsets to the treatment process can cause a plant to become non-compliant with ECA objectives and limits. To protect our infrastructure, the Niagara Region has a Sewer Use By-law in place. Environmental Enforcement Officers conduct industry inspections, sampling and monitoring of industrial discharges on a routine basis to ensure that they meet the Sewer Use By-law limits.

In 2024, an update to the Sewer Use By-law was approved by Council. Sewer Use By-law 2024-51 is now in place ensuring better protection of Niagara Region wastewater infrastructure.

Summary of Efforts – Procedure F-5-5

The MECP Procedure F-5-5 applies to combined sewage systems. The Queenston wastewater collection system is considered nominally separated. This procedure does not apply.

Public Reporting of Bypasses and Overflows

Niagara Region reports all bypass and overflow events publicly on the Niagara Region website (https://www.niagararegion.ca/living/sewage/CSO/Reporting/CSOLocations.aspx)

Niagara Region updates the data on recent overflows four times a year and displays any overflows that may have occurred in the past 12 months.

A listing of overflow data back to 2008 is available through the Niagara Open Data website (https://niagaraopendata.ca/dataset/combined-sewage-overflow)

An active project is underway to improve public reporting of bypasses and overflows including making the data available in near real time.