Corporation of the City of Quinte West

Batawa Wastewater Treatment Plant

2023 Annual Performance Report

A Natural Attraction

Executive Summary

The Batawa Wastewater Treatment Plant (BWWTP), assigned MOE Identifier number 110000668, is located at 1378 Trenton-Frankford Road in the City of Quinte West. This Class II facility operates in accordance with Environmental Compliance Approval (ECA) number 1380-CGNKQ6 issued by the Ministry of Environment on August 19, 2022.

The facility can be described as a Conventional Activated Sludge treatment plant with UV irradiation for Final Effluent disinfection before final discharge to the Trent River through a culvert. The facility employs aerobic digestion with mechanical mixing in the final sludge storage tank. The facility has a rated capacity of 783 cu.m/day with a peak flow rating of 2,879 cu.m/day. Condition 11(5) of the ECA requires provision of an annual performance report to MECP District Manager by March 31 of the calendar year following the end of the period being reported upon. The report is required to include the following information at minimum:

- *a summary and interpretation of all Influent, Imported Sewage monitoring data, and a review of the historical trend of the sewage characteristics and flow rates;*
- *a summary and interpretation of all Final Effluent monitoring data, including concentration, flow rates, loading and a comparison to the design objectives and compliance limits in this Approval, including an overview of the success and adequacy of the Works;*
- *a summary of all operating issues encountered and corrective actions taken;*
- *a summary of all normal and emergency repairs and maintenance activities carried out on any major structure, equipment, apparatus or mechanism forming part of the Works;*
- *a summary of any effluent quality assurance or control measures undertaken;*
- *a summary of the calibration and maintenance carried out on all Influent and Final Effluent monitoring equipment to ensure that the accuracy is within the tolerance of that equipment as required in this Approval or recommended by the manufacturer;*
- *a summary of efforts made to achieve the design objectives in this Approval, including an assessment of the issues and recommendations for proactive actions if any are required under the following situations:*

i. when any of the design objectives is not achieved more than 50% of the time in a year, or there is an increasing trend in deterioration of Final Effluent quality;
ii. when the Annual Average Daily Influent Flow reaches 80% of the Rated Capacity;

- *a tabulation of the volume of sludge generated, an outline of anticipated volumes to be generated in the next reporting period and a summary of the locations to where the sludge was disposed;*
- *a summary of any complaints received and any steps taken to address the complaints;*
- *a summary of all Bypasses, Overflows, other situations outside Normal Operating Conditions and spills within the meaning of Part X of EPA and abnormal discharge events;*
- *a summary of all Notice of Modifications to Sewage Works completed under Paragraph 1.d. Of Condition 10, including a report on status of implementation of all modifications.*
- *a summary of efforts made to achieve conformance with Procedure F-5-1 including but not limited to projects undertaken and completed in the sanitary sewer system that result in overall Bypass/Overflow elimination including expenditures and proposed projects to eliminate Bypass/Overflows with estimated budget forecast for the year following that for which the report is submitted.*

Summary and Interpretation of Monitoring Data

Final Effluent parameter monitoring											
Month	**[CBOD5]** *(mg/L)*	**[TSS]** *(mg/L)*	**[TP]** *(mg/L)*	**[TAN]** *(mg/L)*	**GMD E.Coli** *(cfu/100mL)*	**Unionized Ammonia** *(mg/L)*	**Acute Lethality RBT** *(% Mortality)*	**Acute Lethality DM** *(% Mortality)*	**pH - MIN**	**pH - MAX**	**Temp.** *(deg.C)*
	Limit: 25.0mg/L; Objective: 15.0mg/L	*Limit: 25.0mg/L; Objective: 15.0mg/L*	*Limit: 0.35mg/L; Objective: 0.30mg/L*	*See TAN section for Limits*	*Limit: 200 cfu/100mL; Object.: 100 cfu/100mL*	**No Limit**	**Non-lethal**	**Non-lethal**	*Limit: 6.0*	*Limit: 9.5*	**No Limit**
January	2.00	3.00	0.10	0.10	2.00	0.0010	0	0	6.78	7.20	7.46
February	2.50	5.80	0.09	0.10	1.68	0.0010			6.63	7.07	6.71
March	2.20	3.20	0.04	0.10	2.30	0.0010			6.83	7.07	6.87
April	2.00	2.40	0.03	0.10	2.00	0.0010			7.02	7.44	9.12
May	2.00	3.20	0.04	0.10	3.44	0.0010			7.06	7.29	13.00
June	2.00	2.30	0.07	0.10	2.00	0.0010			6.78	7.40	16.65
July	2.00	4.00	0.13	0.10	2.38	0.0010			6.67	7.41	20.39
August	2.60	2.80	0.12	0.10	3.39	0.0012			7.23	7.93	20.09
September	2.00	3.30	0.12	0.10	4.76	0.0010			6.58	7.20	19.88
October	2.00	4.30	0.17	0.10	5.75	0.0010			6.26	7.06	17.60
November	2.00	2.40	0.09	0.28	2.00	0.0012			6.29	7.39	12.29
December	2.00	2.30	0.05	0.10	1.41	0.0010			6.77	7.66	10.14
Annual Avg	**2.11**	**3.25**	**0.09**	**0.12**	**2.76**	**0.0010**			**6.74**	**7.34**	**13.35**

Monthly Average Effluent Waste Loadings				
Month	**CBOD5** *(kg/d)*	**Total Suspended Solids** *(kg/d)*	**Total Phosphorus** *(kg/d)*	**Total Ammonia Nitrogen** *(kg/d)*
	Limit: 19.6 kg/d	*Limit: 19.6 kg/d*	*Limit: 0.27 kg/d*	*See TAN section for Limits*
January	1.30	1.95	0.03	0.07
February	1.71	3.92	0.06	0.07
March	1.69	2.46	0.03	0.08
April	1.42	1.71	0.02	0.07
May	1.09	1.74	0.02	0.05
June	0.74	0.83	0.03	0.04
July	0.63	1.26	0.04	0.03
August	0.95	1.02	0.04	0.04
September	0.50	0.82	0.03	0.03
October	0.41	0.88	0.04	0.02
November	0.48	0.58	0.02	0.07
December	1.13	1.27	0.03	0.06
Annual Avg	**1.00**	**1.54**	**0.03**	**0.05**

Raw Sewage Monthly Average Concentrations				
	Monthly Average BOD5 Concentration *(mg/L)*	**Monthly Average Total Suspended Solids Concentration *(mg/L)***	**Monthly Average Total Phosphorus Concentration *(mg/L)***	**Monthly Average Total Kjeldahl Nitrogen Concentration *(mg/L)***
January	37.00	40.00	0.96	8.50
February	50.75	64.00	1.11	9.98
March	56.20	68.00	1.10	9.74
April	117.25	81.75	1.42	8.85
May	57.40	66.60	1.76	14.56
June	76.25	155.00	1.83	15.53
July	65.50	55.50	1.87	17.40
August	102.40	131.40	1.57	11.40
September	191.25	213.00	3.12	29.63
October	181.25	161.75	3.33	30.18
November	126.00	172.40	2.63	21.90
December	79.00	101.00	1.39	10.88
Annual Avg	**95.02**	**109.20**	**1.84**	**15.71**

Facility Flow Monitoring			
Month	**Average Daily Flow** *(cu.m./day)*	**Month Max Daily Flow** *(cu.m./day)*	**Total Monthly Flow** *(cu.m./month)*
	Rated Capacity: 783 cu.m./day	*Peak Rated Capacity: 2879 cu.m./day*	
January	650	1597	20153
February	682	1748	19096
March	769	1709	23830
April	712	1403	21350
May	546	1608	16933
June	370	763	11098
July	316	645	9798
August	364	685	11291
September	252	315	7546
October	207	245	6429
November	242	452	7267
December	565	1088	17509
	Annual Avg Daily Flow = 473 cu.m./day	**Max Daily Flow = 1,748 cu.m./day**	**Total Annual Flow = 172,301 cu.m.**

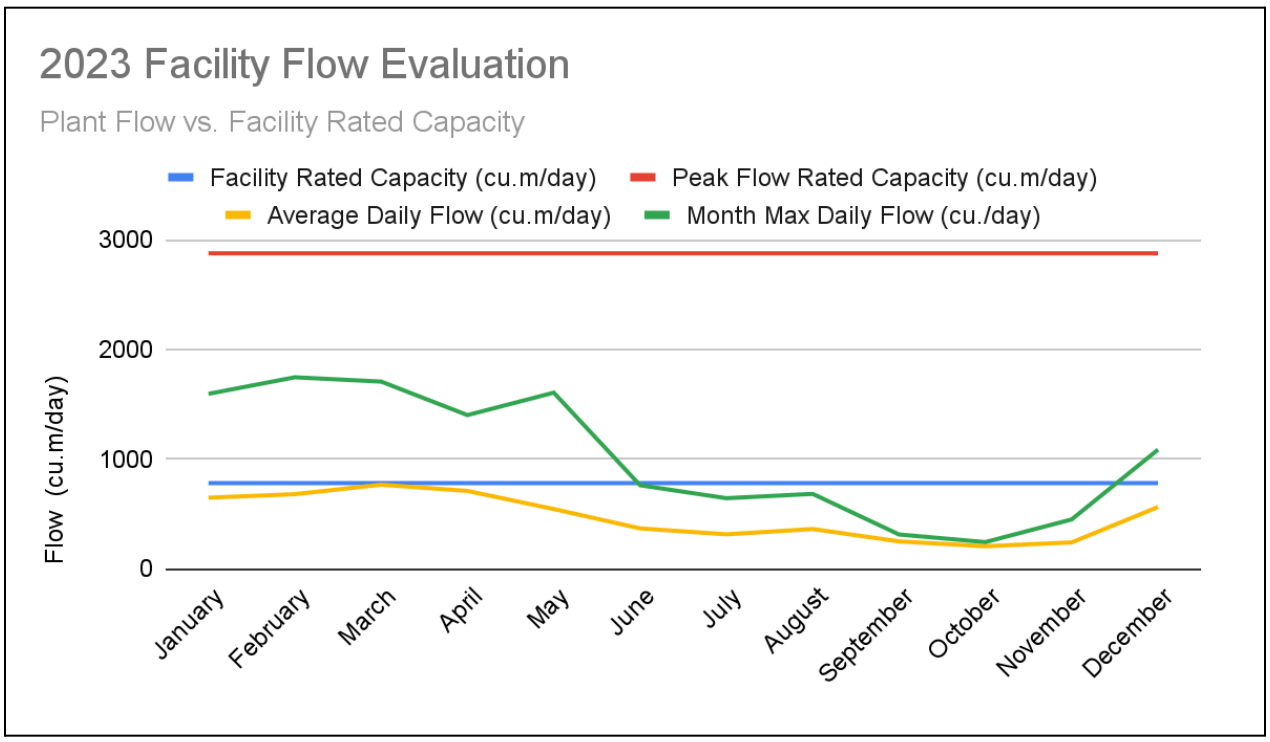
Summary of Bypass, Spill, or Abnormal Discharge Event(s)

No Bypasses, Spills, or Abnormal Discharge Events to report for the monitoring period.

Summary of Operating Problems throughout Monitoring Period

This plant performed well throughout the reporting period. There were no operating problems to report.

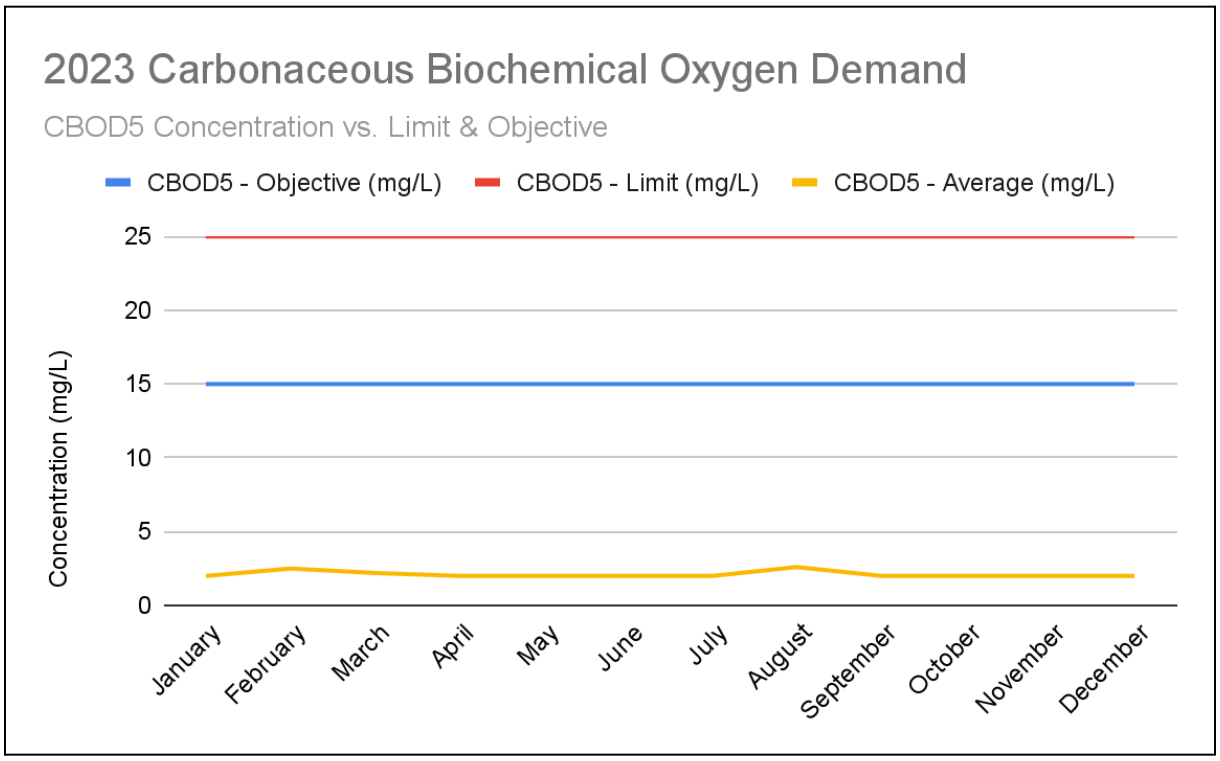
The following figure depicts Average Daily Flow and monthly Maximum Daily Flows against the facility Rated Capacity. The highest Max Daily Flow reached 1,748 cu.m/ day. In 2023 there was an increase in annual plant flow and a subsequent increase in Average Daily Flow (ADF) of 7%. While the 3-year and 5-year ADF both decreased by 2% and 3%, respectively.

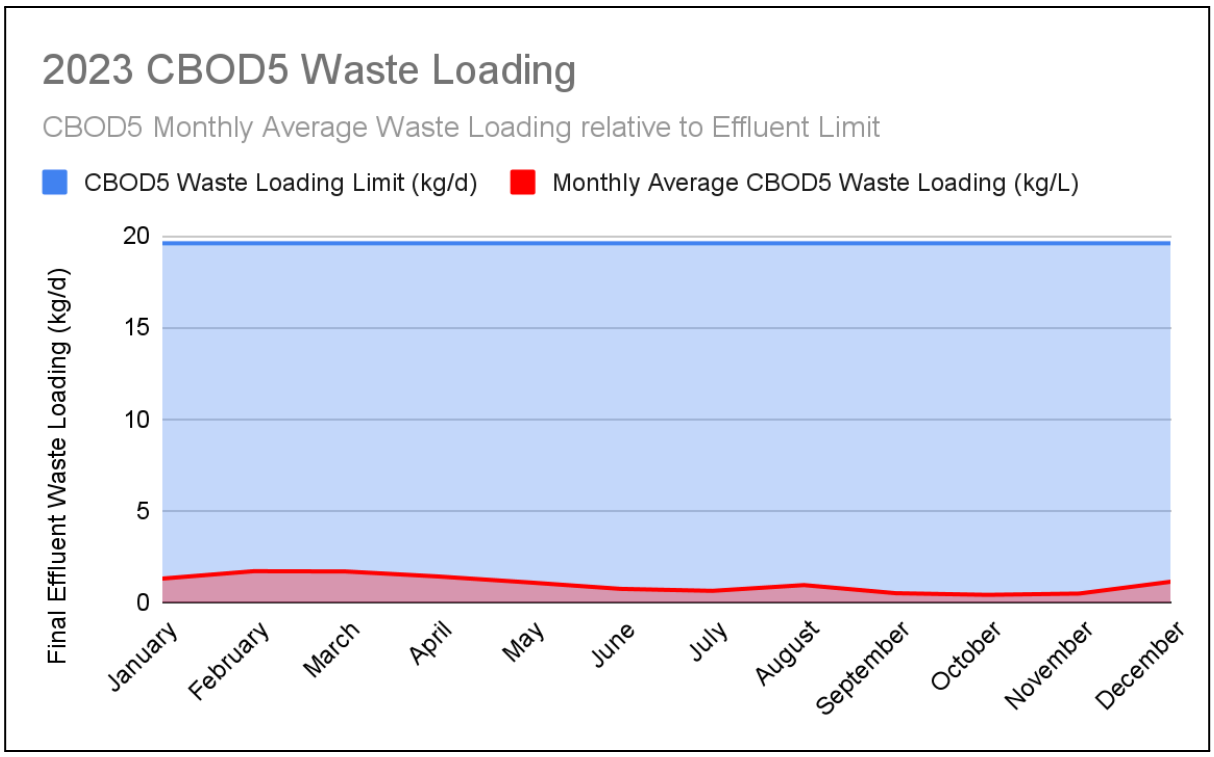


Analysis of Final Effluent Monitoring Dataset

Carbonaceous Biochemical Oxygen Demand (CBOD5) / Biochemical Oxygen Demand (BOD5)

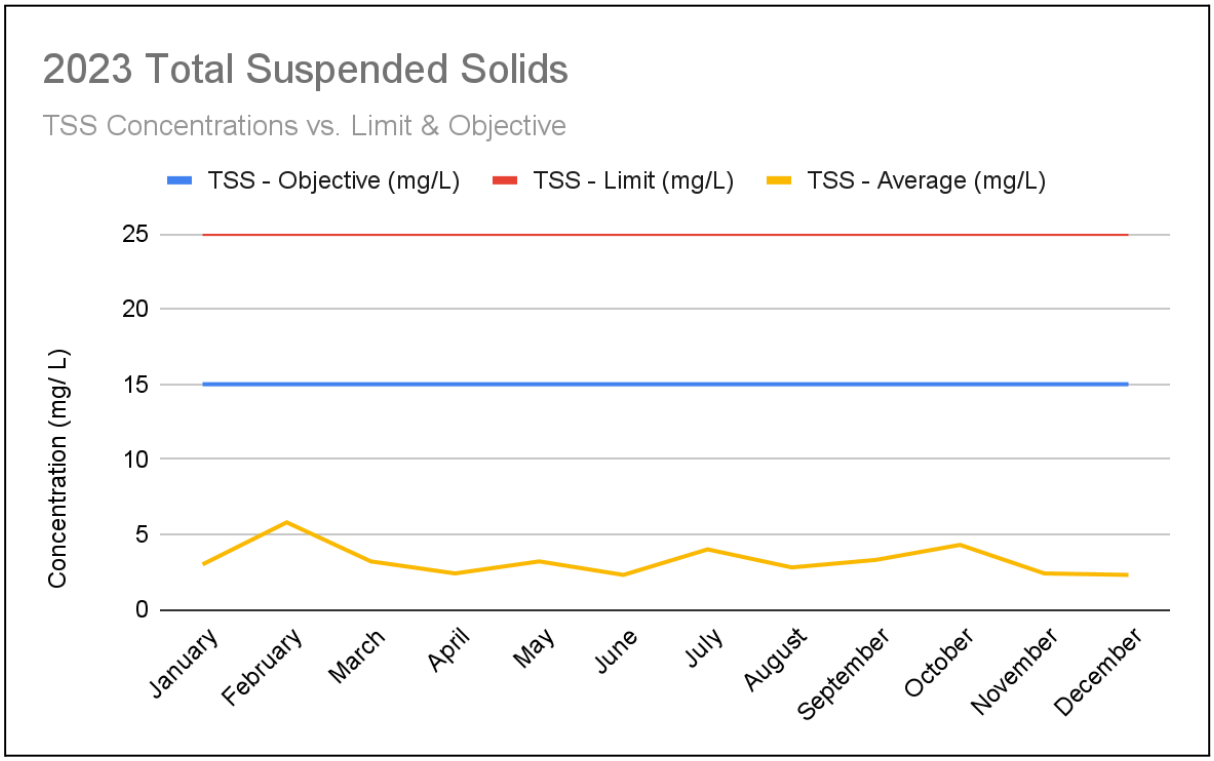
The facility effectively removed an average 97.17% of BOD throughout the reporting period. The following figure depicts the Monthly Average CBOD Concentrations measured in samples from Final Effluent against the Monthly Average Concentration Limit and Objective. The second figure depicts the Monthly Average Waste Loading against the Waste Loading Limit. As shown in both figures, the facility consistently maintained compliance with the regulatory Limits and Objectives.

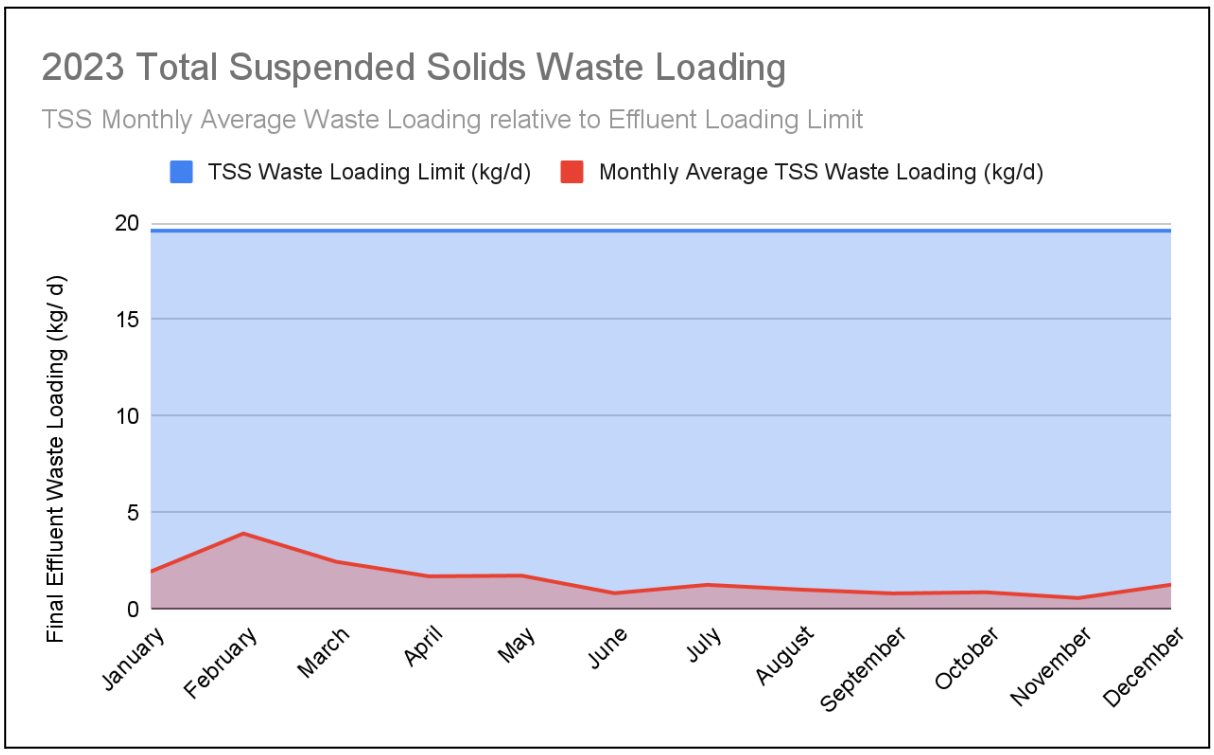




Total Suspended Solids (TSS)

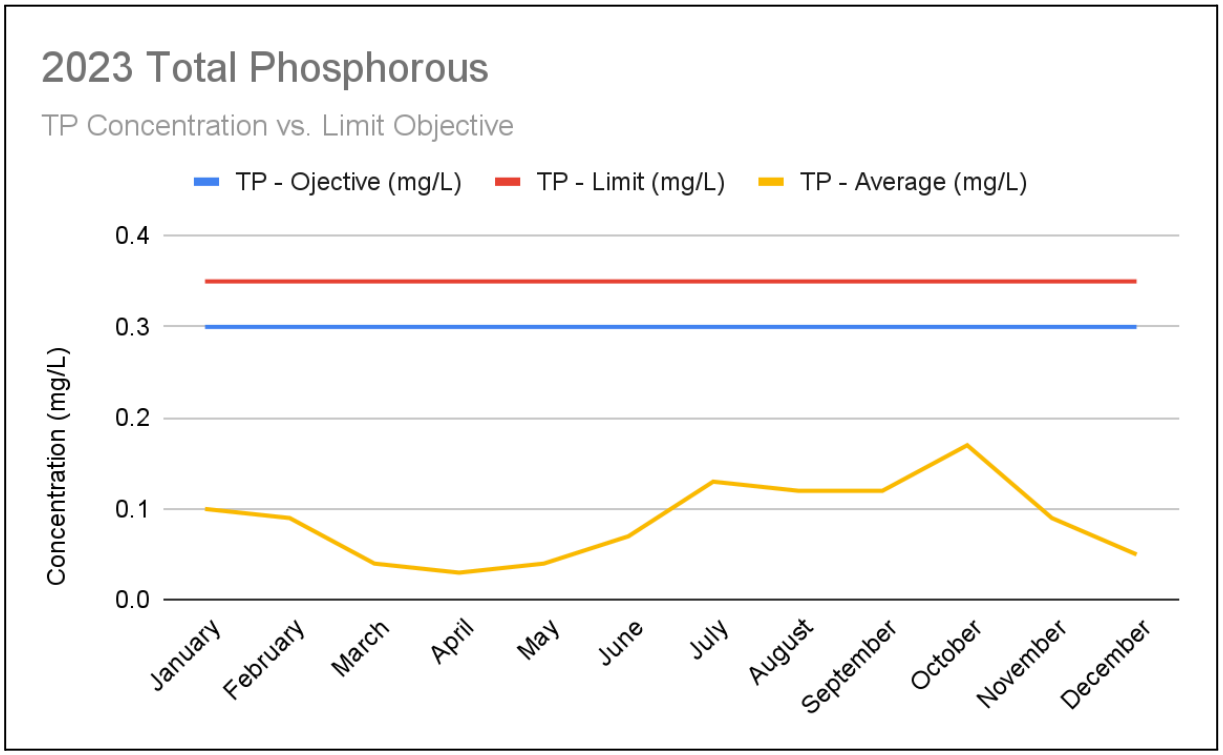
Final Effluent Suspended Solids Monthly Average Concentrations increased as a result of increase in hydraulic flow through the facility during wet weather events. However, apparent in the following Figures, is that while the suspended solids concentrations and corresponding waste loadings increased, the facility still operated efficiently by remaining well below the Effluent Objective. The facility effectively reduced TSS concentrations by 96.02%.

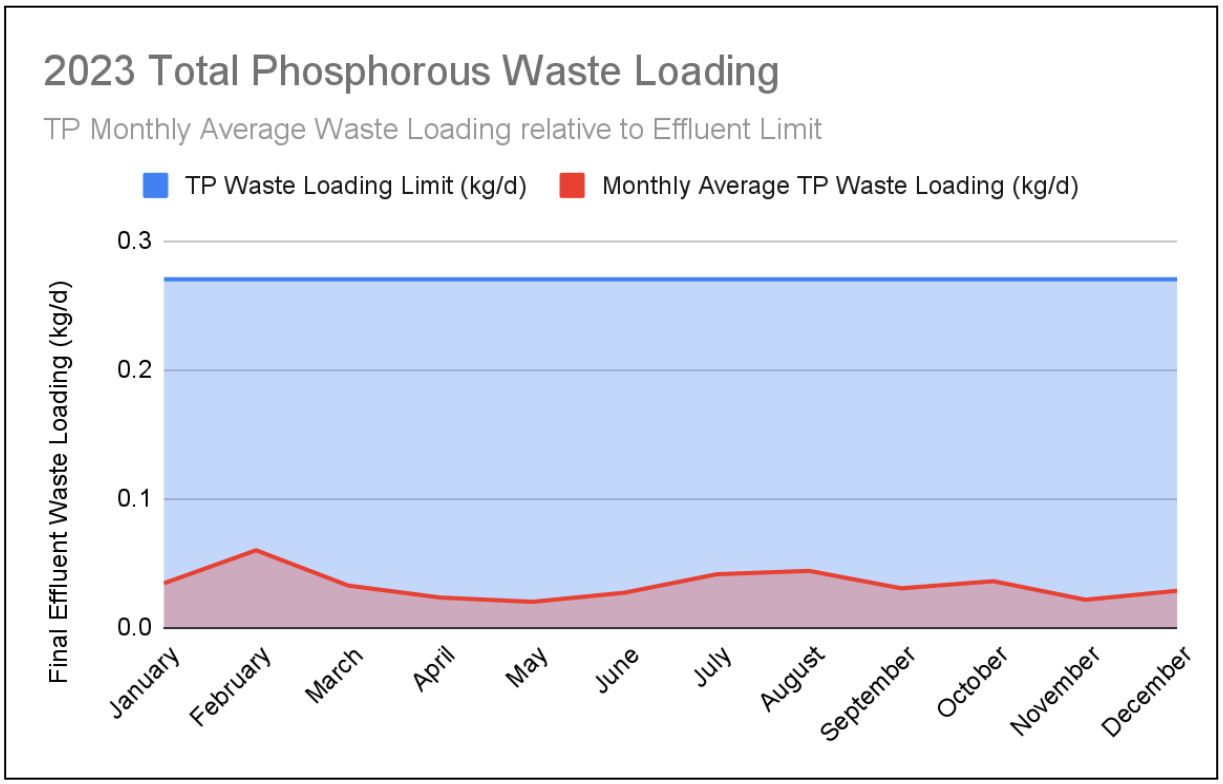

2023 Total Suspended Solids
TSS Concentrations vs. Limit & Objective
TSS - Objective (mg/L)
TSS - Limit (mg/L)
TSS - Average (mg/L)
Concentration (mg/ L)
25
20
15
10
5
0
January
February
March
April
May
June
July
August
September
October
November
December


2023 Total Suspended Solids Waste Loading
TSS Monthly Average Waste Loading relative to Effluent Loading Limit
TSS Waste Loading Limit (kg/d)
Monthly Average TSS Waste Loading (kg/d)
Final Effluent Waste Loading (kg/ d)
20
15
10
5
0
January
February
March
April
May
June
July
August
September
October
November
December

Total Phosphorus (TP)

The following two figures depict Monthly Average TP Concentration in the Final Effluent, and the calculated Monthly Average Waste Loadings in Final Effluent. It is apparent the facility operated well, remaining below the Effluent Objective and Limit, even during those months where the facility operated outside of its Rated Capacity. The 2023 annual average coagulant dosage was 44.64 mg/L, while the 2022 annual average dosage was 44.69 mg/L. The average chemical dose has changed very little indicating that there has not been any notable change in process.

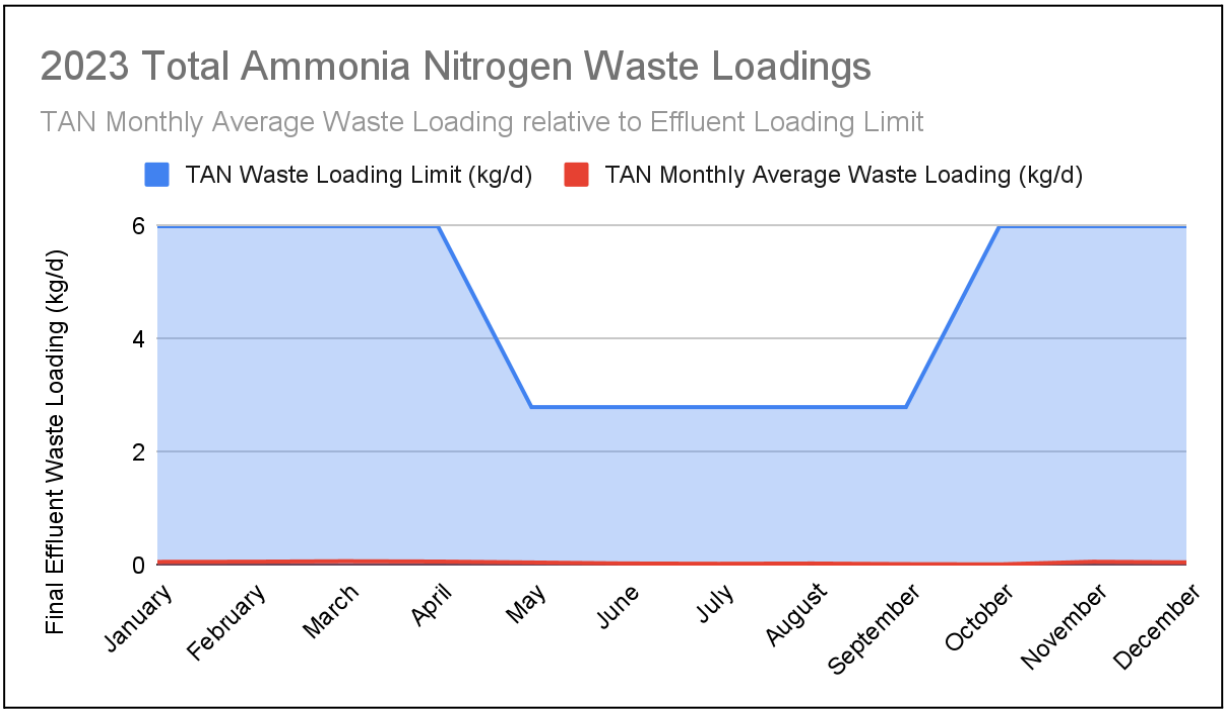




Total Ammonia Nitrogen (TAN) - Ammonia (NH_3) / Ammonium (NH_4^+)

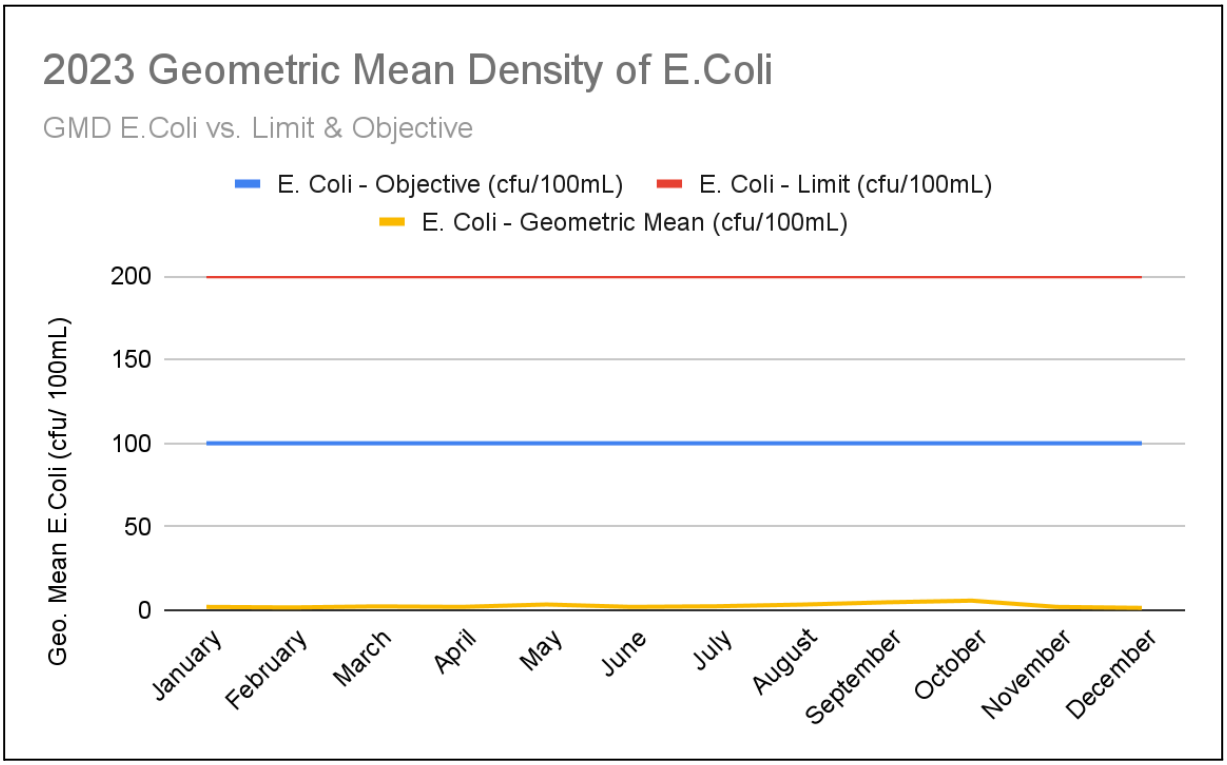
The measure of both Ammonia and Ammonium is called the Total Ammonia Nitrogen (TAN) content.

The neutral, unionized form of ammonia (NH_3) is highly toxic to fish and other aquatic life; Condition 9(1) of the ECA requires the Owner to monitor for this. The yearly average unionized ammonia concentration in the Final Effluent was 0.001 mg/L. The facility operated well throughout the entire year, such that the Monthly Average TAN Concentrations and Waste Loadings remained well below the Effluent Objective, and Limits, as evidenced by the figure below.



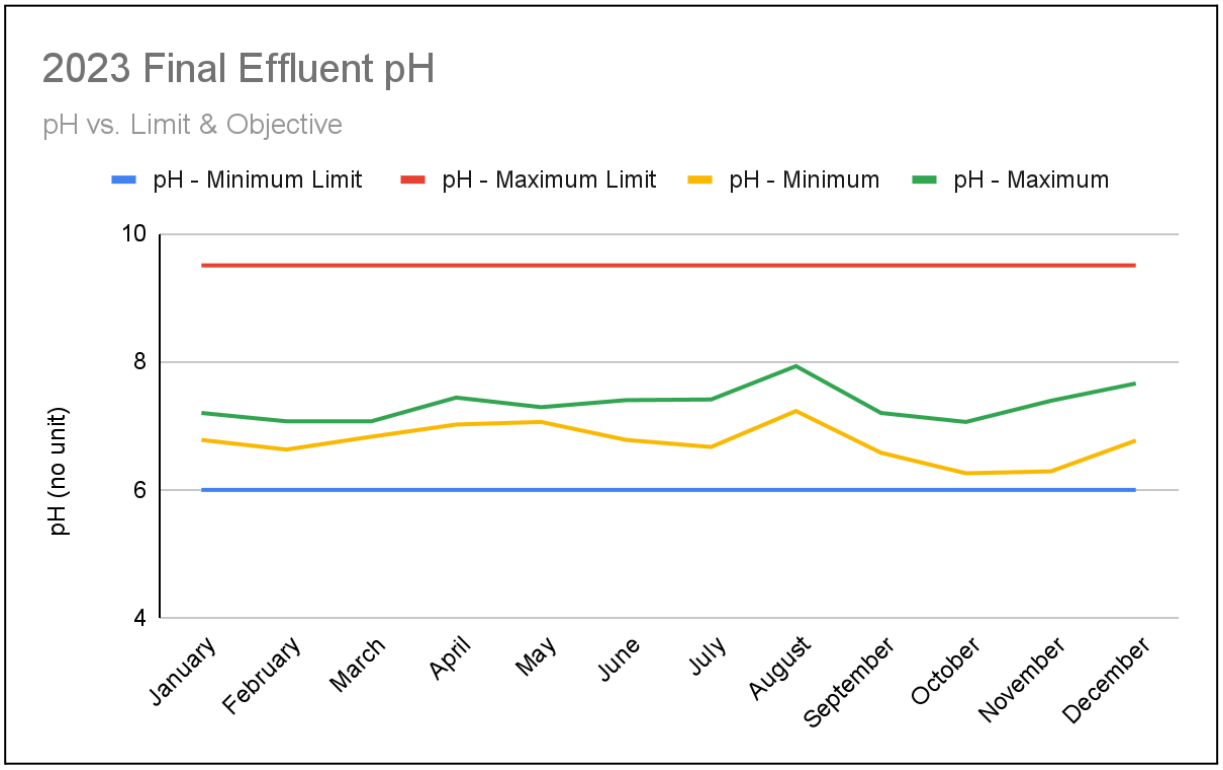
Geometric Mean Density of E. Coli

The Geometric Mean Density (GMD) of E.Coli remained well below the Effluent Objective and Limit established in the ECA, as demonstrated in the figure below. With regular Preventative Maintenance, the UV Disinfection Systems continues to operate well.



Final Effluent pH

As shown in the following figure, the Final Effluent pH remained within allowable limits established in the ECA. The ECA requires the Owner to collect a grab sample of the Final Effluent on a weekly basis and test for pH. The Operators collected 146 samples of Final Effluent throughout the reporting period, and tested pH in-house.



Acute Lethality to Rainbow Trout and Daphnia Magna

In accordance with Condition 9(4) of the ECA, this Reporting Period marks the eleventh year of annual sampling frequency for Acute Lethality.

The City contracts all Acute Lethality testing to *Nautilus Environmental*. Results from the sample collected on January 18, 2023, yielded 0% mortality in Daphnia Magna at 100% Effluent Concentration, and 0% mortality in Rainbow Trout at 100% Effluent Concentration. In accordance with the Wastewater Systems Effluent Regulations, effluent is deemed acutely lethal if there is greater than 50% mortality in rainbow trout at full strength effluent.

Note, Rainbow Trout are susceptible to Ammonia concentrations. Final Effluent results obtained from SGS Canada on this sample day are outlined in the table below:

Final Effluent Ammonia Results, January 18, 2023	
TAN concentration (mg/L)	**Calculated Unionized Ammonia Concentration (mg/L)**
0.1	0.001

Summary of Maintenance performed throughout Reporting Period

The City continues to support an active Preventative Maintenance (PM) program to ensure the facility is maintained in a fit state of repair. Outside of Preventative Maintenance, the following Reactive Maintenance activities were completed by staff, or outside contractors as identified:

- New influent sampler was installed
- New UV controller was installed

Biosolids Management Summary

Date Hauled	**Volume Hauled**	**Biosolids Destination**
July 5	40	Land Application - NASM Plan #24590
September 1 & 7	160	Storage ECA# S-3708-42
September 7	40	Land Application - NASM Plan #60611
Total Volume of Sludge generated in 2023 = 240 cu.m.		
Estimated biosolids generation in 2024 = 280 cu.m.		

Summary of Effluent Quality Assurance and Control Measures

The City collects samples from Raw Sewage, Primary Clarifier Effluent, Aeration Tank Effluent, and Final Effluent on a regular basis throughout the week. The City satisfies its regulatory compliance requirements by submitting a set of samples to an accredited laboratory, SGS Canada Inc. on a weekly basis, normally on Wednesdays. These sample results are manually entered into a spreadsheet and evaluated for compliance with the ECA. In addition to these samples, Operators perform in-house analysis for Total Suspended Solids, pH, temperature, alkalinity, and dissolved reactive phosphorus. Sample results are entered into a spreadsheet for facility evaluation and process optimization. On an annual basis, the spectrophotometer is calibrated by a third party. Operators calibrate other instrumentation, such as the pH meter, regularly.

Monitoring Schedule

The facility sampled in accordance with the ECA every Wednesday. In 2024, the facility will collect samples in accordance with the ECA, every Tuesday each week.

Final Effluent Monitoring Equipment Calibration and Maintenance

Work Orders are generated on an annual basis to calibrate the facility Flow Meter. This calibration is completed by a third party contractor. The following figure is a copy of the Calibration Certificate.

Tower Electronics Canada Inc.
Instrument Calibration Certificate

Customer:
The City of Quinte West
7 Creswell Drive
PO Box 490
Trenton, ON K8V 5R6

Calibration by:
Dan Matchett

Standards:
Fluke 289 S/N 96220182 NIST Cal Due April 2024

Instrument Type
Open Channel

Meter Information

Date of Test:	2023-08-31
Location:	Batawa WWTP
Meter Under Test	Influent Flow
Client Tag:	QW00003508
Manufacturer:	Siemens
Model:	OCMIII
Serial Number:	PBD/X8060040XV
Totalizer As Found:	2440592M3
Totalizer As Left:	2440628M3
Acceptable Error:	15%
Programming Parameters:	
Max Flow	148.2LPS
Max Head	0.550M
Primary Device	6" Parshall Flume
Calibration Due:	Aug-24

Method of verification
Head Simulation

Units: LPS
Zero: 0.00
Span: 148.20
Totalizer: M3

Flow Test

Head Applied	Sim Flow	Meter Display	Current Output	Disp Error%	mA Error %
0.000	0.000	2.560	4.269	1.727	6.725
0.100	10.027	10.570	5.190	0.366	2.114
0.350	72.574	74.260	12.025	1.138	1.603
0.460	111.766	113.780	16.273	1.359	1.285
0.550	148.227	149.990	20.177	1.190	0.870
			Average Error%	1.16	2.52
			Result:	PASS	PASS

Totalizer Test

Sim Flow Rate	148.227	LPS
Start Totalizer	2440611.000	M3
End Totalizer	2440620.000	M3
Volume Simulated	9.000	M3
Time(Seconds)	60.000	
Calculated Totalizer(MUT)	8.894	
Error%	1.196	
Result:	PASS	

Comments:
Unit passes verification.
0.947m empty distance measured

Tower Electronics Canada Inc
2687 Hwy 40
K0K 3M0
Wooler On
Canada

Email: Dan@Tecanada.ca
Website: www.tecanada.ca

Calibrations Service Sales
Temporary and Permanent Meter Installations
Instrumentation For Flow Level Pressure.

Notice of Modifications

There were no 'Notice of Modifications' forms submitted to the Ministry during this Reporting Period.

Summary of complaints received throughout the reporting period

There were no complaints received by City staff with respect to the Batawa WWTP throughout the reporting period.

Procedure F-5-1 compliance

The City will continue to consult its Asset Management Planning modeling tools in conjunction with Capital Planning exercises to determine reconstruction projects. Sanitary Collection rehabilitation projects are identified in the Sanitary Collection System 2023 Annual Report.

As outlined in Summary of Bypass, Spill, or Abnormal Discharge Event(s), there were no bypasses, spills or abnormal discharges to report during this monitoring period.