Corporation of the City of Quinte West

Batawa Wastewater Treatment Plant

2021 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 the Conditions of Certificate of Approval (CoA) number 7781-7NYSL9 issued by the Ministry of Environment on March 10, 2009.

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 2879 cu.m/day. Condition 10 (6) of the CoA requires provision of an annual Performance Report to MECP District Manager 90 days 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 monitoring data and a comparison to the effluent limits outlined in Condition 7, including an overview of the success and adequacy of the Works;*
- *A description of any operating problems encountered and corrective actions taken;*
- *A summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works;*
- *A summary of any effluent quality assurance or control measures undertaken in the reporting period;*
- *A summary of the calibration and maintenance carried out on all effluent monitoring equipment;*
- *A description of efforts made and results achieved in meeting the Effluent Objectives of Condition 6;*
- *A tabulation of the volume of sludge generated in the reporting period, 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 during the reporting period and any steps taken to address the complaints;*
- *A summary of all By-pass, spill or abnormal discharge events; and*
- *Any other information the District Manager requires from time to time.*

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. - MAX** *(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	2.8	2.5	0.06	0.1	3	0.001	0	0	7.56	7.72	8.1
February	2.0	2.5	0.06	0.1	2	0.001			7.36	7.77	6.4
March	2.2	2.2	0.06	0.1	2	0.001			7.11	7.63	8.6
April	2.0	2.5	0.05	0.1	2	0.001			7.39	7.75	12.5
May	2.0	2.3	0.05	0.1	2	0.001			7.62	7.79	15.4
June	2.0	2.4	0.08	0.1	2	0.001			7.03	7.83	24.7
July	2.0	3.3	0.10	0.1	6	0.001			7.38	7.59	22.4
August	2.0	2.8	0.14	0.1	7	0.001			7.22	7.67	22.5
September	2.0	2.2	0.09	0.1	2	0.001			7.14	7.76	21.3
October	2.0	2.5	0.06	0.1	3	0.001			7.24	8.26	18.4
November	2.0	3.0	0.07	0.1	2	0.001			6.87	7.71	15.5
December	3.6	2.2	0.06	0.1	2	0.001			7.04	7.90	11.3

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	1.5	1.4	0.03	0.05
February	0.7	0.8	0.02	0.03
March	1.3	13	0.03	0.06
April	1.1	1.4	0.03	0.06
May	0.8	0.9	0.02	0.04
June	0.6	0.7	0.02	0.03
July	0.8	1.3	0.04	0.04
August	0.5	0.7	0.04	0.03
September	1.1	1.2	0.05	0.06
October	1.2	1.5	0.04	0.06
November	1.2	1.7	0.04	0.06
December	2.1	1.3	0.03	0.06

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	106.3	133.5	1.7	11.3
February	236.5	285.5	4.3	20.0
March	150.4	183.4	3.5	11.8
April	63.5	62.5	1.3	10.4
May	74.8	90.3	1.5	12.3
June	305.2	567.8	6.8	46.5
July	126.5	220.8	2.2	15.0
August	356.0	505.0	5.1	30.4
September	273.0	486.4	6.0	29.5
October	86.8	121.3	1.1	8.3
November	96.3	88.3	0.9	7.0
December	179.0	178.0	2.8	15.3

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	548.5	770.3	17,004
February	325.3	487.7	9,109
March	575.1	1,145.0	17,827
April	568.3	1,707.0	17,050
May	406.4	608.0	12,598
June	275.9	342.9	8,276
July	412.8	572.8	12,798
August	261.3	366.5	8,100
September	550.5	2,834.4[1]	16,516
October	601.4	1,194.0	18,643
November	580.1	890.6	17,404
December	589.9	982.3	18,286
	Annual Avg Daily Flow = 475.6 cu.m./day	**Max Daily Flow = 2,834.4 cu.m./day**	**Total Annual Flow = 173,611 cu.m.**

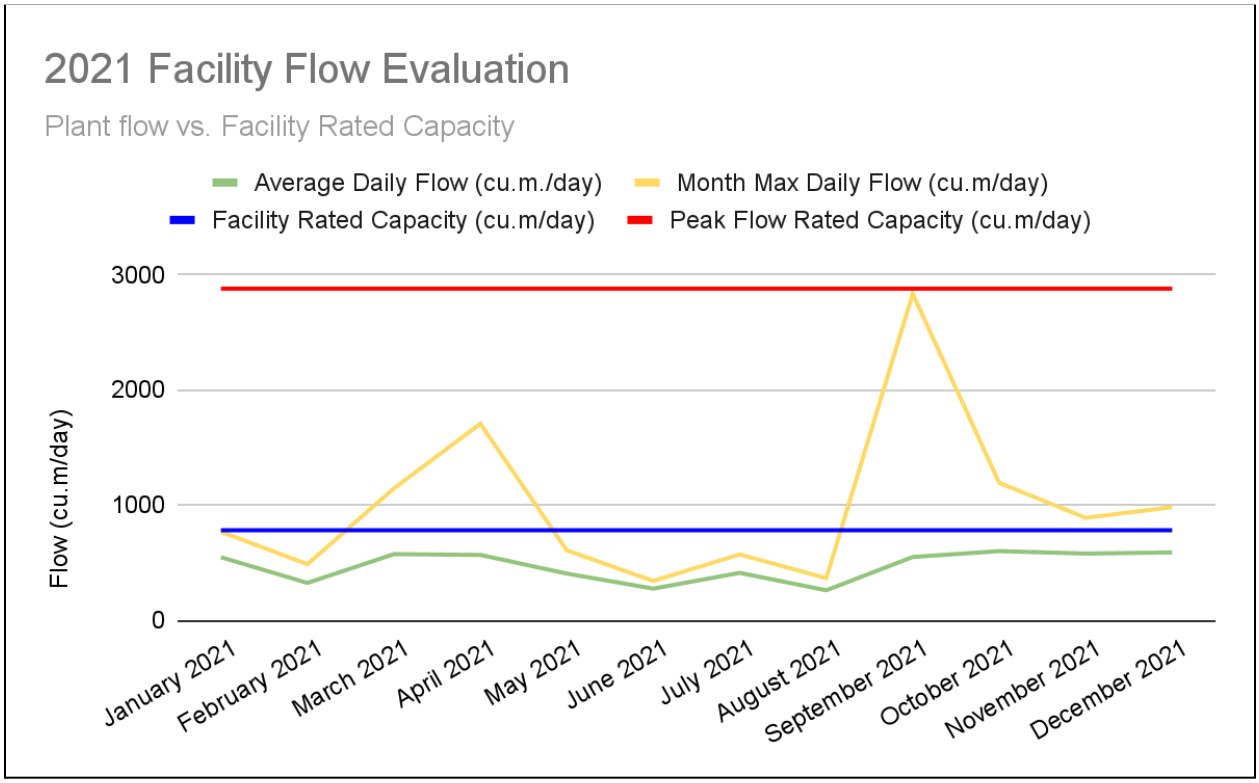
[1] Heavy rainfall event between September 22 and 23 resulted in an increase in flow

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

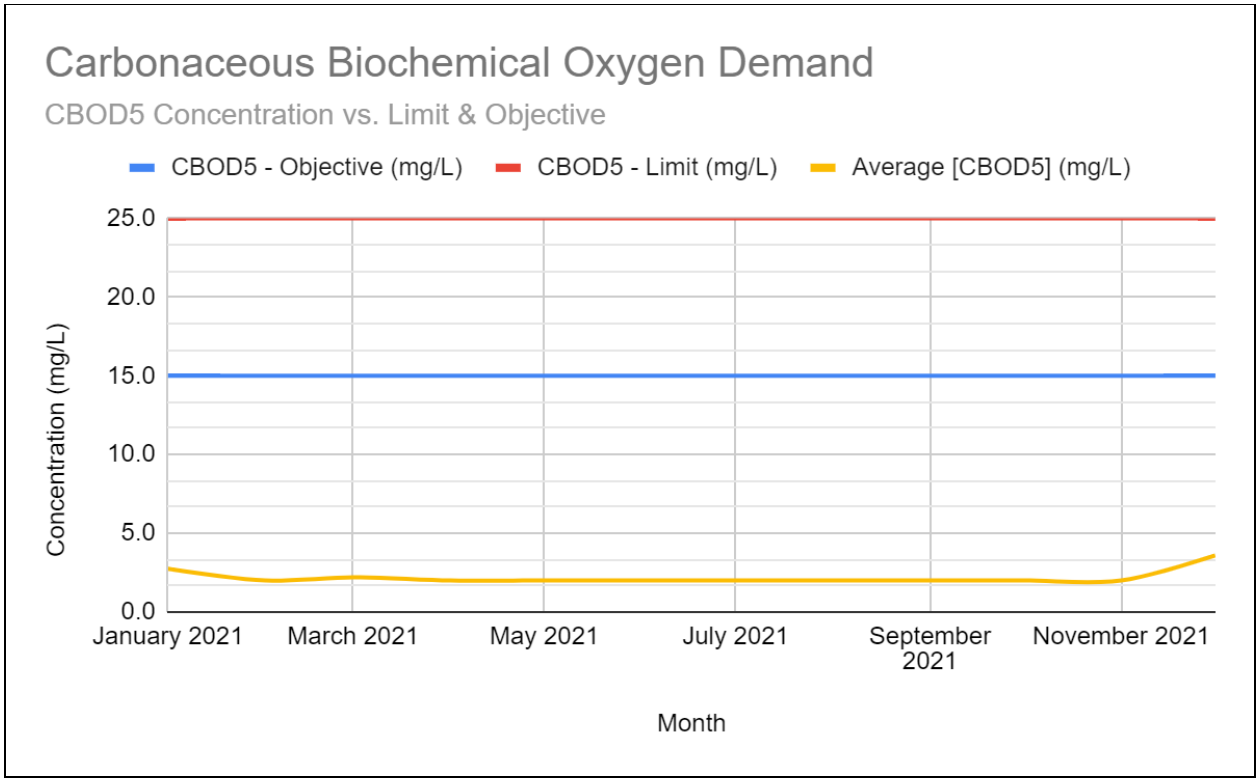
This plant performed well throughout the reporting period. There were no operating problems to report.

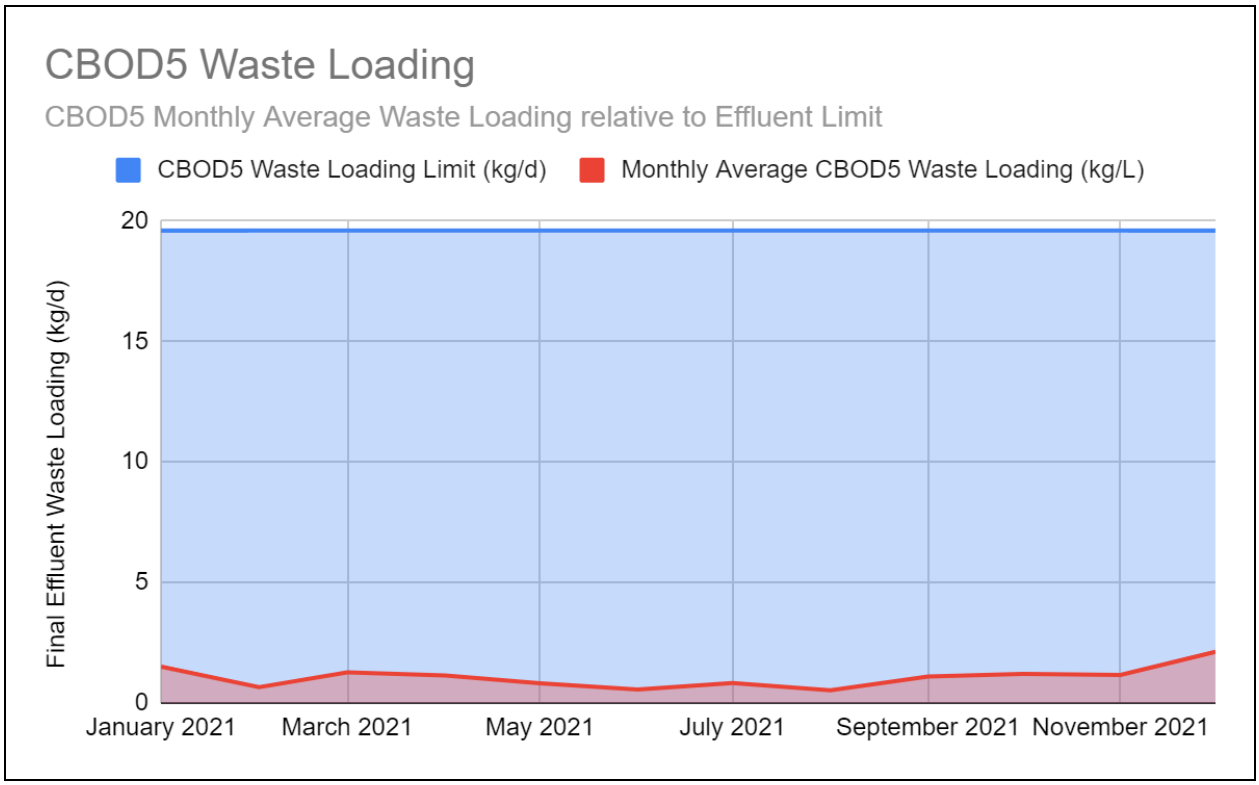


Analysis of Final Effluent Monitoring Dataset

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

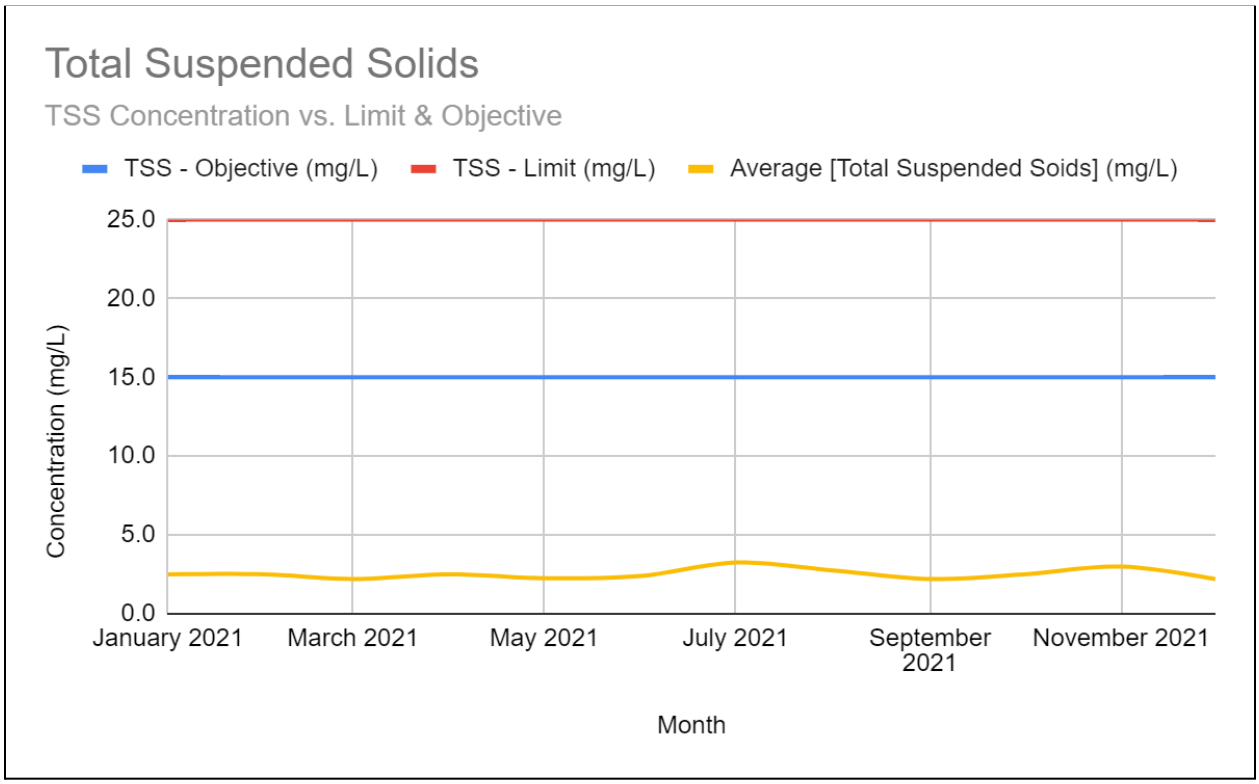
The facility effectively removed an average 98% of BOD throughout the reporting period. The following figure depicts the Monthly Average CBOD Concentrations measured in samples from Final Effluent against the Monthly Average Concentration Limit and Objective. The second figure depicts the Monthly Average Waste Loading against the Waste Loading Limit. As shown in both figures, the facility consistently maintained compliance with the regulatory Limits and Objectives.

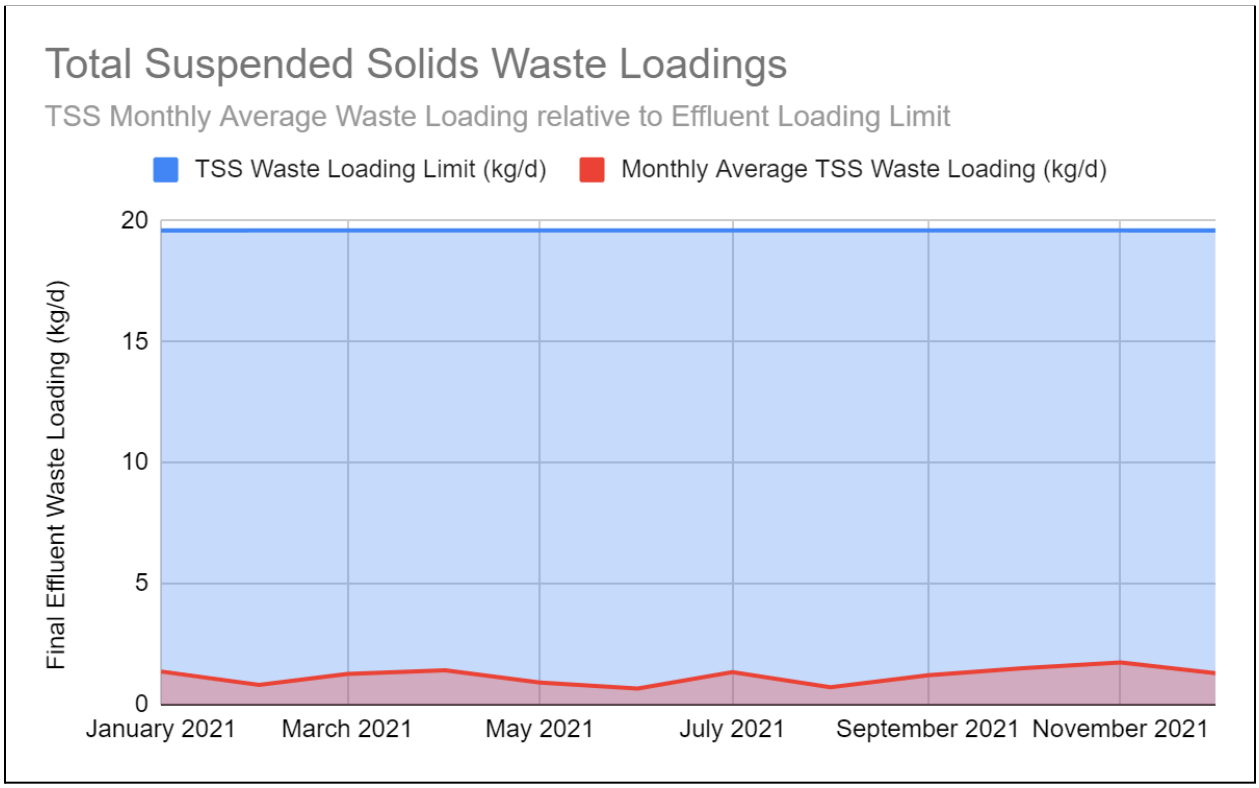

Carbonaceous Biochemical Oxygen Demand
CBOD5 Concentration vs. Limit & Objective
CBOD5 - Objective (mg/L)
CBOD5 - Limit (mg/L)
Average [CBOD5] (mg/L)
Concentration (mg/L)
25.0
20.0
15.0
10.0
5.0
0.0
January 2021
March 2021
May 2021
July 2021
September 2021
November 2021
Month


CBOD5 Waste Loading
CBOD5 Monthly Average Waste Loading relative to Effluent Limit
CBOD5 Waste Loading Limit (kg/d)
Monthly Average CBOD5 Waste Loading (kg/L)
Final Effluent Waste Loading (kg/d)
20
15
10
5
0
January 2021
March 2021
May 2021
July 2021
September 2021
November 2021

Total Suspended Solids (TSS)

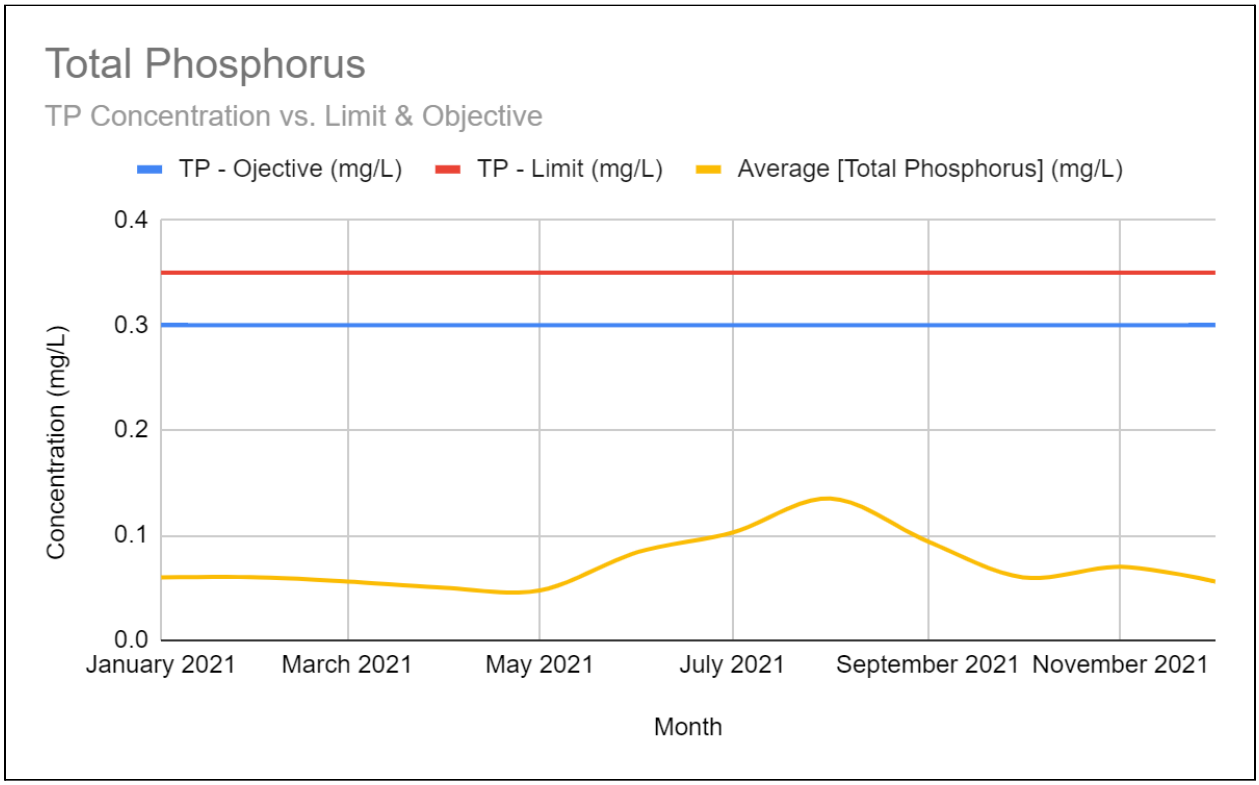
Final Effluent Suspended Solids Monthly Average Concentrations increased as a result of increase in hydraulic flow through the facility during wet weather events. However, apparent in the following Figures, is that while the suspended solids concentrations and corresponding waste loadings increased, the facility still operated efficiently by remaining well below the Effluent Objective. The facility effectively reduced TSS concentrations by 98.33%.

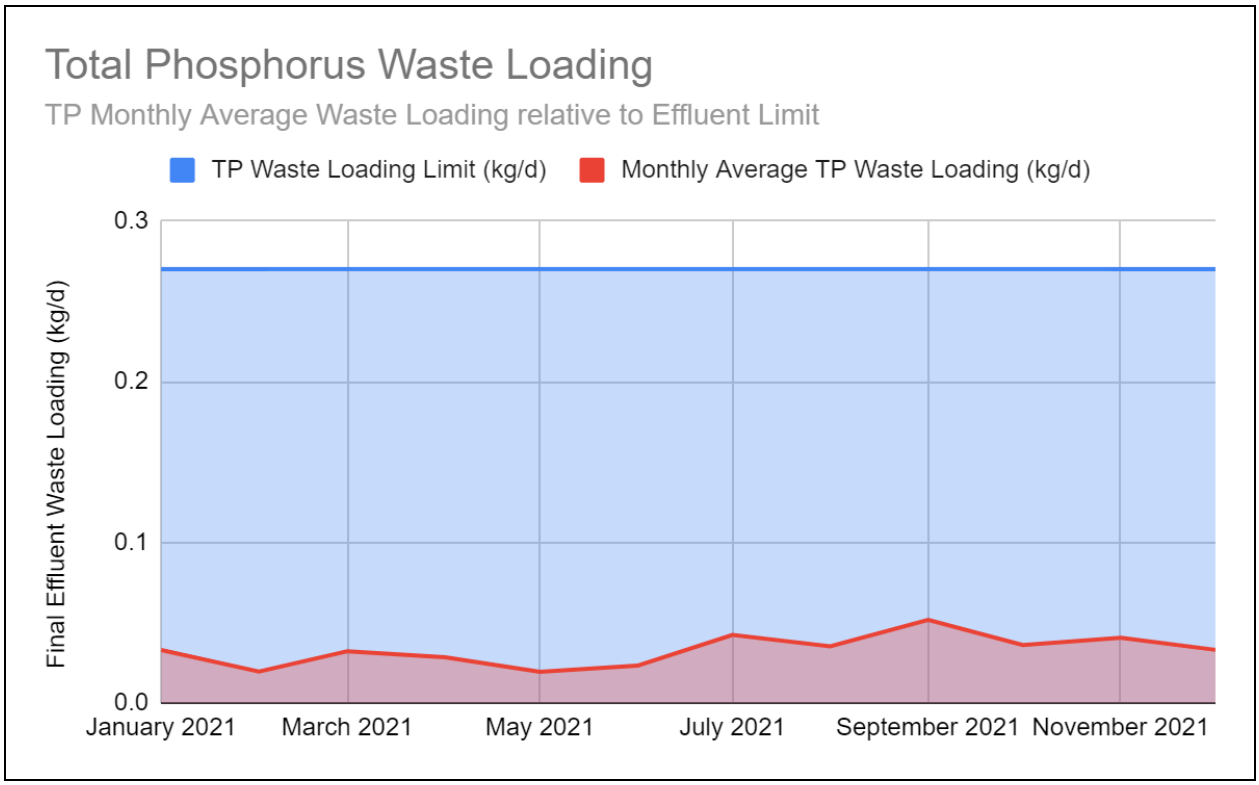




Total Phosphorus (TP)

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 to remain below the Effluent Objective and Limit, even during those months where the facility operated outside of its Rated Capacity. The 2021 annual average coagulant dosage was 45.1 mg/L, while 2020 annual average dosage was 49.7 mg/L. This reduction in chemical dosage can be loosely attributed to chemical pump adjustments made by the Operator to achieve optimum phosphorus removal while optimizing chemical use.

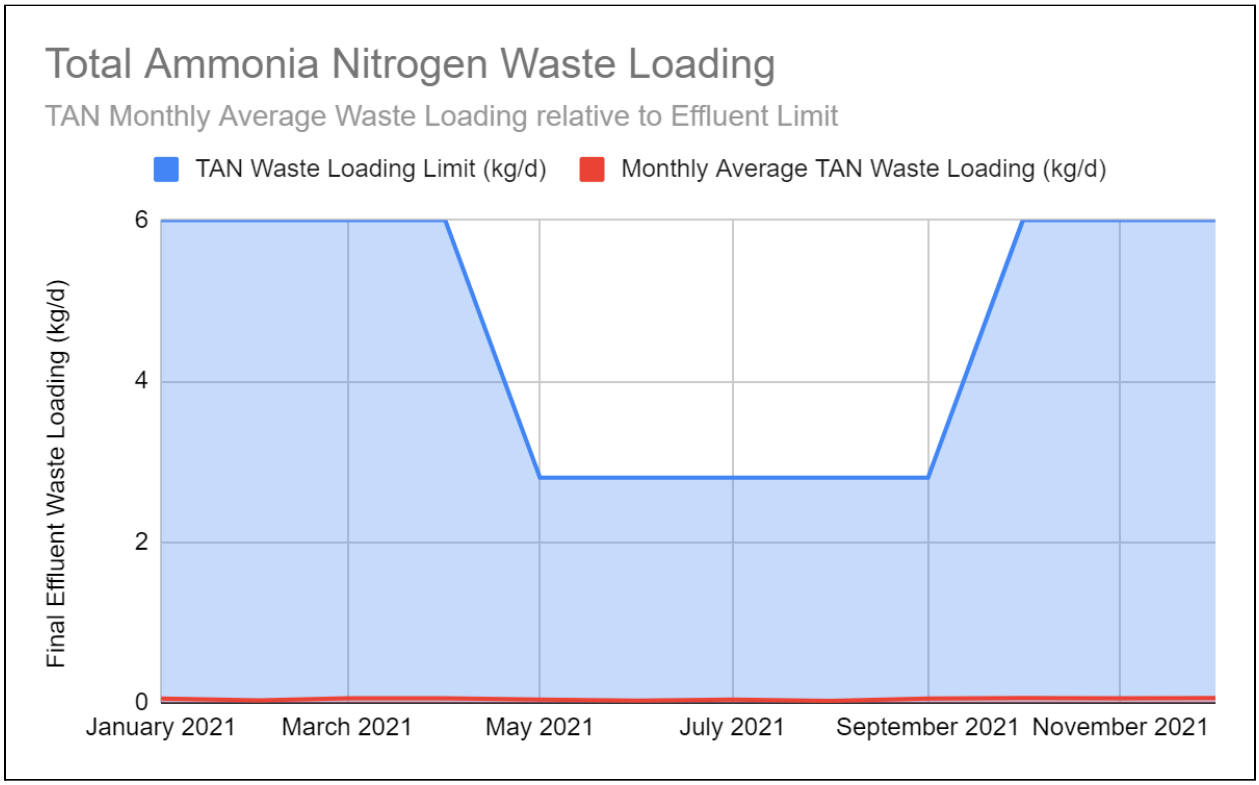

Total Phosphorus
TP Concentration vs. Limit & Objective
TP - Ojective (mg/L)
TP - Limit (mg/L)
Average [Total Phosphorus] (mg/L)
Concentration (mg/L)
0.4
0.3
0.2
0.1
0.0
January 2021
March 2021
May 2021
July 2021
September 2021
November 2021
Month


Total Phosphorus Waste Loading
TP Monthly Average Waste Loading relative to Effluent Limit
TP Waste Loading Limit (kg/d)
Monthly Average TP Waste Loading (kg/d)
Final Effluent Waste Loading (kg/d)
0.3
0.2
0.1
0.0
January 2021
March 2021
May 2021
July 2021
September 2021
November 2021

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

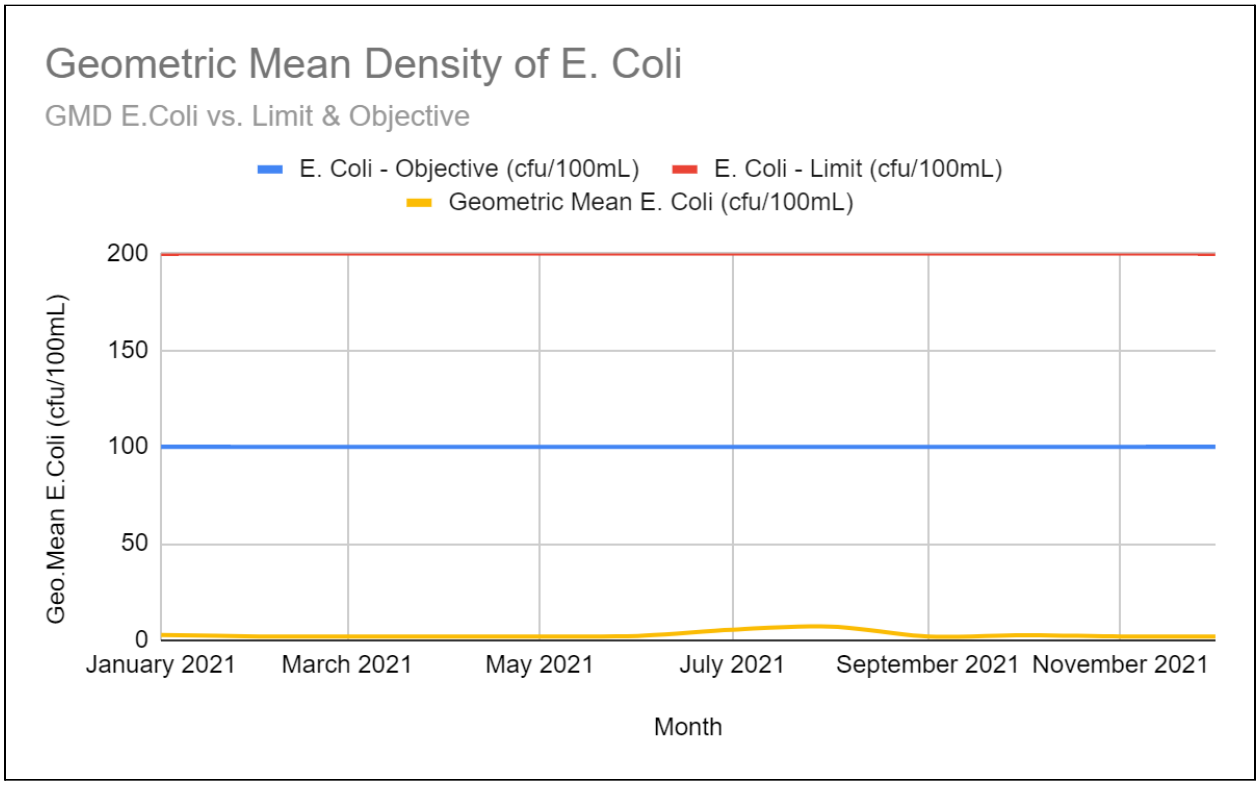
The measure of both Ammonia and Ammonium is called the Total Ammonia Nitrogen (TAN) content.

The neutral, unionized form of ammonia (NH_3) is highly toxic to fish and other aquatic life; Condition 9(5) of the ECA requires the Owner to monitor for this. The yearly average unionized ammonia concentration in the Final Effluent was 0.001mg/L. The facility operated well throughout the entire year to operate such that the Monthly Average TAN Concentrations and Waste Loadings remained well below the Effluent Objective, and Limits.



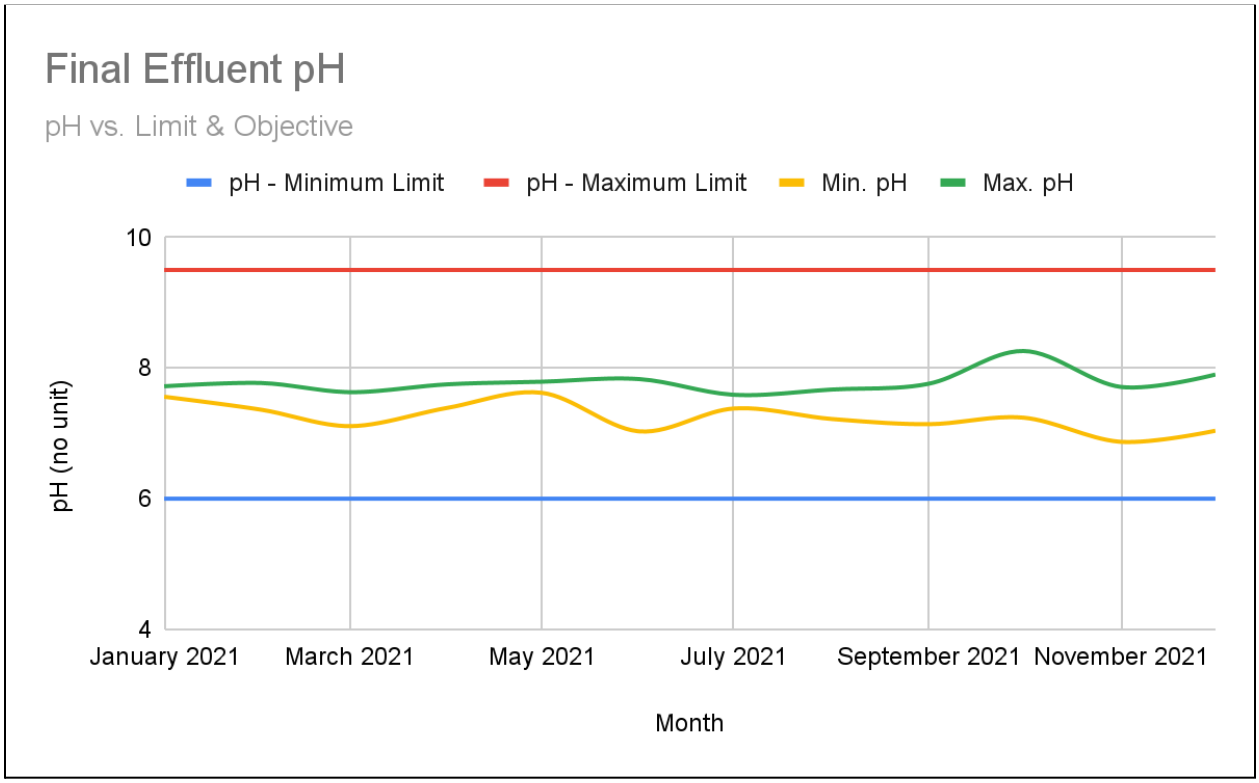
Geometric Mean Density of E. Coli

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



Final Effluent pH

As shown in the following chart, the Final Effluent pH remained within allowable limits established in the CoA. The CoA requires the Owner to collect a grab sample of the Final Effluent on a weekly basis and test for pH. The Operators collected some 179 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(7) of the CoA, this Reporting Period marks the tenth year of annual sampling frequency for Acute Lethality.

The City contracts all Acute Lethality testing to *Aquatox Testing and Consulting Inc*. Results from the sample collected on January 12, 2021 yield 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 12, 2021	
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. A new digital operations and asset management platform was implemented in 2021 providing a more accessible and easier to use workflow for management and staff. Outside of Preventative Maintenance, the following Reactive Maintenance activities were completed by staff, or outside contractors as identified:

- An alum pump failed and a new direct replacement was installed.
- Grinder on the influent grit channel suffered catastrophic failure. A Manually raked bar screen was added in its place temporarily until a replacement was available. Replacement is ongoing.
- New effluent sampler was purchased to replace the aging unit. Installation of this equipment is ongoing.

Biosolids Management Summary

Date Hauled	Volume Hauled	Biosolids Destination
June 25	80	Land Application & Storage - NASM Plan #23928
November 10	120	Land Application - NASM Plan #24243
Total Volume of Sludge generated in 2021 = 200 cu.m.		
Estimated biosolids generation in 2022 - 200 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 Wednesday's. These sample results are manually entered into a spreadsheet and evaluated for compliance with the CoA. 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 pH meter, regularly.

Final Effluent Monitoring Equipment Calibration and Maintenance

Works 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 Mar 2022

Instrument Type
Open Channel

Meter Information

Date of Test:	2021-08-10
Location:	Batawa WWTP
Meter Under Test	Effleunt Flow
Client Tag:	QW00003508
Manufacturer:	Siemens
Model:	OCMIII
Serial Number:	PBD/X8060040XV
Totalizer As Found:	2071039M3
Totalizer As Left:	2071070M3
Acceptable Error:	15%
Programming Parameters:	
Max Flow	148.2LPS
Max Head	0.550M
Primary Device	6" Parshall Flume
Calibration Due:	Aug-22

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	0.000	3.997	0.000	0.075
0.100	10.027	11.260	5.218	0.832	2.665
0.350	72.574	75.350	12.141	1.873	2.583
0.460	111.766	114.260	16.341	1.683	1.708
0.550	148.227	150.600	20.387	1.601	1.920
			Average Error%	1.20	1.79
			Result:	PASS	PASS

Totalizer Test

Sim Flow Rate	148.227	LPS
Start Totalizer	2071053.000	M3
End Totalizer	2071070.000	M3
Volume Simulated	17.000	M3
Time(Seconds)	110.830	
Calculated Totalizer(MUT)	16.428	
Error%	3.482	
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.

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.