City of Brantford Wastewater System

Brantford Wastewater Treatment Plant

2022 Annual Performance Report

ECA #1860-9Q7LK9

Date: March 31, 2023

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1. Background

This report has been prepared in accordance with the terms and requirements set out in the City of Brantford's Ministry of the Environment, Conservation and Parks (MECP) Environmental Compliance Approval (ECA) #1860-9Q7LK9 issued on November 4, 2014 for the Brantford Wastewater Treatment Plant (WWTP). It covers the period from January 1 to December 31, 2022.

2. Description of Wastewater System

The WWTP is located at 385 Mohawk Street, Brantford, Ontario and is a Class IV conventional activated sludge facility that services a population of 104,688 residents, receiving a mixture of residential, industrial, commercial and institutional wastewater.

Raw sewage enters the plant via 2 trunk sewers and passes through influent channels into a two celled wet well with isolation sluice gates within the Raw Sewage Pumping Station. Four dry pit submersible pumps discharge raw sewage through recently installed magnetic flow meters to the top floor of the Preliminary Treatment Building. The Preliminary Treatment Building consists of two mechanically raked bar screens and one bypass screening channel. Two vortex grit removal systems allow for the removal of grit before flowing by gravity to Process Module 1 (PM #1) and Process Module 2 (PM #2). The screenings and grit are conveyed to dumpsters which are hauled to the landfill for disposal.

PM #1 consists of four circular primary clarifiers, two three-pass rectangular fine bubble aeration tanks and six circular secondary clarifiers. PM #2 consists of two rectangular primary clarifiers, two three-pass rectangular fine bubble aeration tanks and two circular secondary clarifiers. Air is delivered to the aeration systems by two 300HP turbo blowers, one 200HP turbo blower and one 300HP centrifugal blower. Ferric chloride is added near the end of the aeration basins for phosphorus precipitation. Secondary effluent from each PM flows through a Parshall flume with an ultrasonic flow measuring device before combining and entering a chlorine contact chamber for disinfection with Sodium Hypochlorite. De-chlorination with Sodium Bisulfite is completed downstream of the chlorine contact chamber before being discharged to the Grand River.

Waste activated sludge and primary sludge are co-thickened in the primary clarifiers before being pumped to two primary anaerobic digesters. Digested sludge overflows to a secondary digester for decanting before being pumped to three biosolids storage tanks prior to land application. The biosolids storage tanks are also equipped with decanting capability.

3. Monitoring Data

3.1. Flow Measurement

Both the raw sewage and effluent wastewater flow are measured by continuous on-line flow meters. The existing raw sewage flow meters located in the PTB do not accurately measure the actual flow into the plant. As of April 2022, magnetic (MAG) flow meters were installed in the two forcemains between the RSPS and the PTB. For the purpose of this report the influent MAG meters were used to determine the raw loadings while the Parshall flumes were used to determine the final loadings.

3.2. Raw Sewage Concentrations and Loadings

Raw sewage concentrations and loadings for each month of 2022 are summarized in Table 1.

Table 1 - Summary of Monthly Average Raw Sewage Concentrations and Loadings

Month	Average Daily Flows m^3/d	TSS mg/L	TSS kg/d	BOD_5 mg/L	BOD_5 kg/d	TP mg/L	TP kg/d	TKN mg/L	TKN kg/d
January	33953	231	7830	195.4	6634	4.1	138	33.8	1148
February	37102	219	8107	185.5	6882	3.1	114	28.2	1045
March	41260	222	9139	178.25	7355	3.6	148	29.9	1235
April	42487	180	7658	152	6181	3.7	157	33.3	1416
May	40653	218	8871	168.8	6862	4.2	172	30.9	1258
June	37434	265	9920	201.5	7543	4.3	161	33.6	1257
July	35309	303	10699	219	7732	4.4	154	35.8	1262
August	33948	291	9865	270.8	9186	5.1	171	42.1	1429
September	32621	341	11107	273.75	8933	6.8	221	50.5	1646
October	33029	273	9017	232.4	7677	6.4	213	53.3	1760
November	34083	252	8589	224.25	7591	5.1	175	40.1	1365
December	32345	236	7617	194.75	6714	4.9	160	40.9	1323
Average	36185	252	9035	208	7441	4.6	165	38	1345

3.3. Final Effluent Concentrations and Loadings

The final effluent concentrations and loadings are compared to the ECA objectives and limits to determine compliance. The City has also committed to meeting more stringent voluntary targets established through the Grand River Water Management Plan (WMP). If all municipal WWTPs discharging into the Grand River achieve the voluntary targets, water quality in the Grand River will be greatly improved.

Through the WMP, the Watershed-wide Wastewater Optimization Program (WWOP) was established, which the City is a partner in with other municipalities that discharge to the Grand River. The WWOP partners utilize optimization principles to make best use of municipal resources with a goal of achieving improved performance. The program also provides support to its municipal partners through technical assistance.

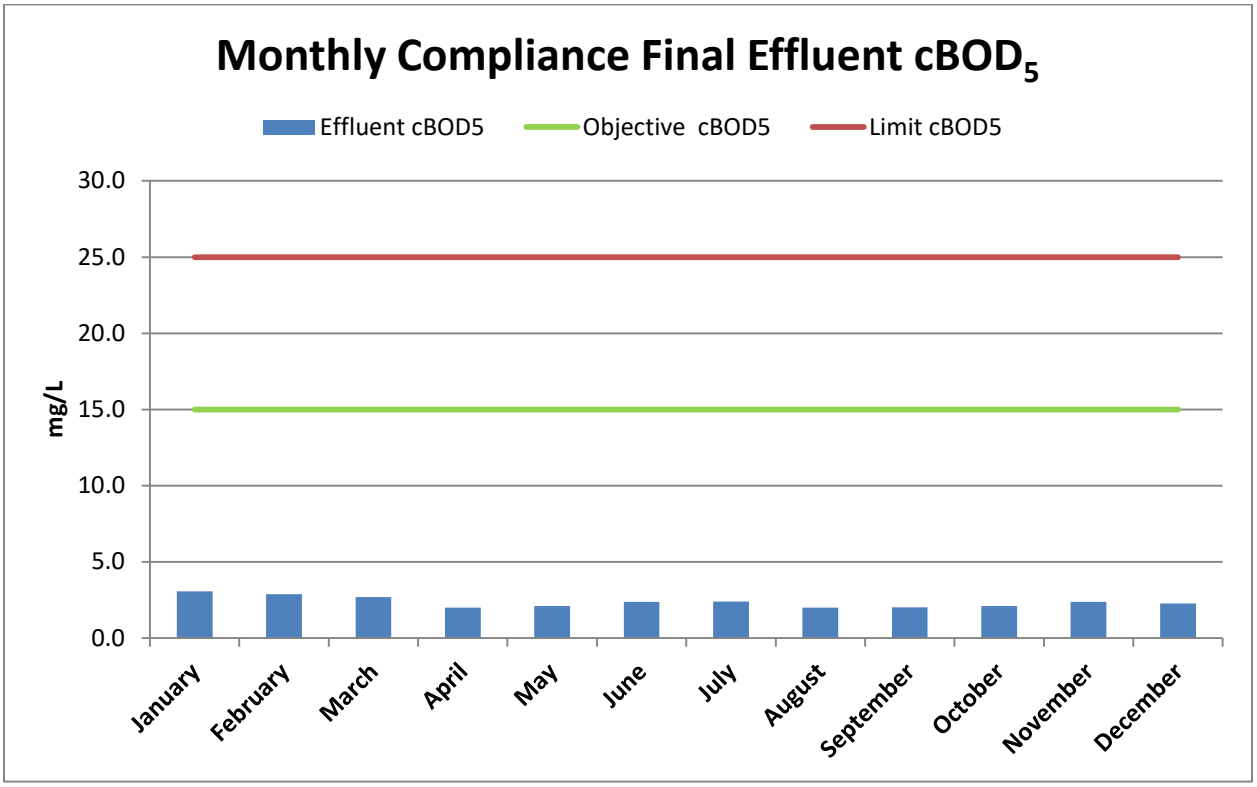
Required sampling parameters are summarized for each month of 2022 in Table 2.

Table 2 - Summary of Monthly Average Final Effluent Concentrations and Loadings

	TSS mg/L	TSS Loading kg/d	cBOD5 mg/L	cBOD5 Loading kg/d	TP mg/L	TP Loading kg/d	Total Ammonia Nitrogen mg/L	Calculated Unionized Ammonia mg/L	E. Coli (Geometric Mean Density) CFU/100mL	Total Chlorine Residual mg/L	Sodium Bisulfite Residual mg/L	pH No Units	Temp. Degrees Celsius
Objective	15		15		0.8					0			
Limit	25	2045	25	2045	1	81.8			200	0.02		6.00-9.5	
January	6.8	231	3.1	105	0.20	7	0.17	0.0017	30.9	0	1.7	7.42-7.77	10.3
February	4.3	158	2.9	107	0.20	7	0.21	0.0013	19.2	0	1.4	7.27-7.72	9.8
March	6.5	268	2.7	111	0.21	9	0.15	0.0007	28.6	0	1.6	7.31-7.66	10.7
April	5.0	189	2.0	76	0.21	8	0.37	0.0021	2.3	0	1.7	7.27-7.65	13.7
May	4.6	163	2.1	75	0.23	8	0.11	0.0011	9.6	0	2.6	7.21-7.93	17.3
June	4.8	154	2.4	77	0.35	11	0.16	0.0011	3.2	0	2.2	7.18-7.39	20.2
July	6.3	185	2.4	71	0.36	11	0.12	0.0013	40.3	0	2.2	7.08-7.80	22.1
August	5.8	166	2.0	57	0.22	6	0.10	0.0013	24.5	0	2.9	7.10-7.60	22.5
September	6.5	178	2.0	55	0.38	10	0.15	0.0015	20.9	0	2.5	7.06-7.60	21.2
October	6.0	163	2.1	57	0.26	7	0.08	0.0010	15.3	0	2.9	7.19-7.70	17.5
November	7.3	204	2.4	67	0.23	7	0.10	0.0017	8.6	0	2.9	7.18-8.10	16.2
December	5.3	150	2.3	65	0.22	6	0.39	0.0007	22.6	0	2.4	6.89-7.42	12.3
Average	5.7	184.1	2.4	77	0.25	8.6	0.18	0.0013	18.7	0	2.2	6.89-8.10	16.2

As identified in Table 2, all parameters with ECA limits and objectives were in compliance. The Total Residual Chlorine objective of 0.00 mg/L was achieved in all months. The detection limit for the HACH low-range pocket Colorimeter II (used at the WWTP) is from 0.02 to 2.00 mg/L for total and free chlorine. Therefore consistently measuring any values below the low range value of 0.02 mg/L is difficult. Operations staff measures the sodium bisulfite residual in the same final effluent sample. The presence of sodium bisulfite indicates the absence of total chlorine in the final effluent. For all 12 months, there was a sodium bisulfite residual present to ensure adequate removal of any total residual chlorine in the final effluent (Table 2).

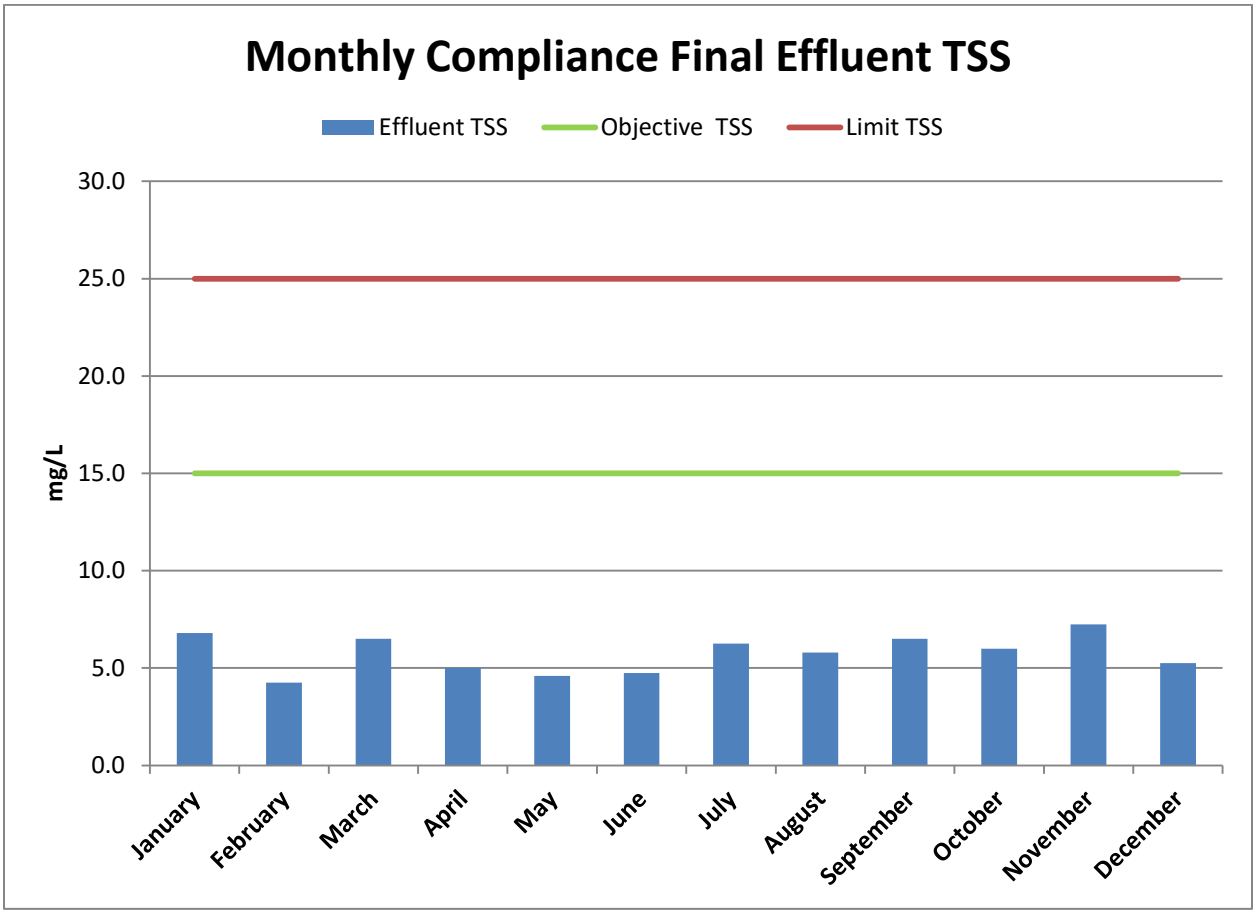
Figure 1 - Monthly Average Final Effluent cBOD5



Comments:

- Figure 1 is a trend of the monthly average final effluent $cBOD_5$.
- The monthly average final effluent $cBOD_5$ concentrations met the ECA limit and objective in 2022.
- All monthly average results were less than 5 mg/L.

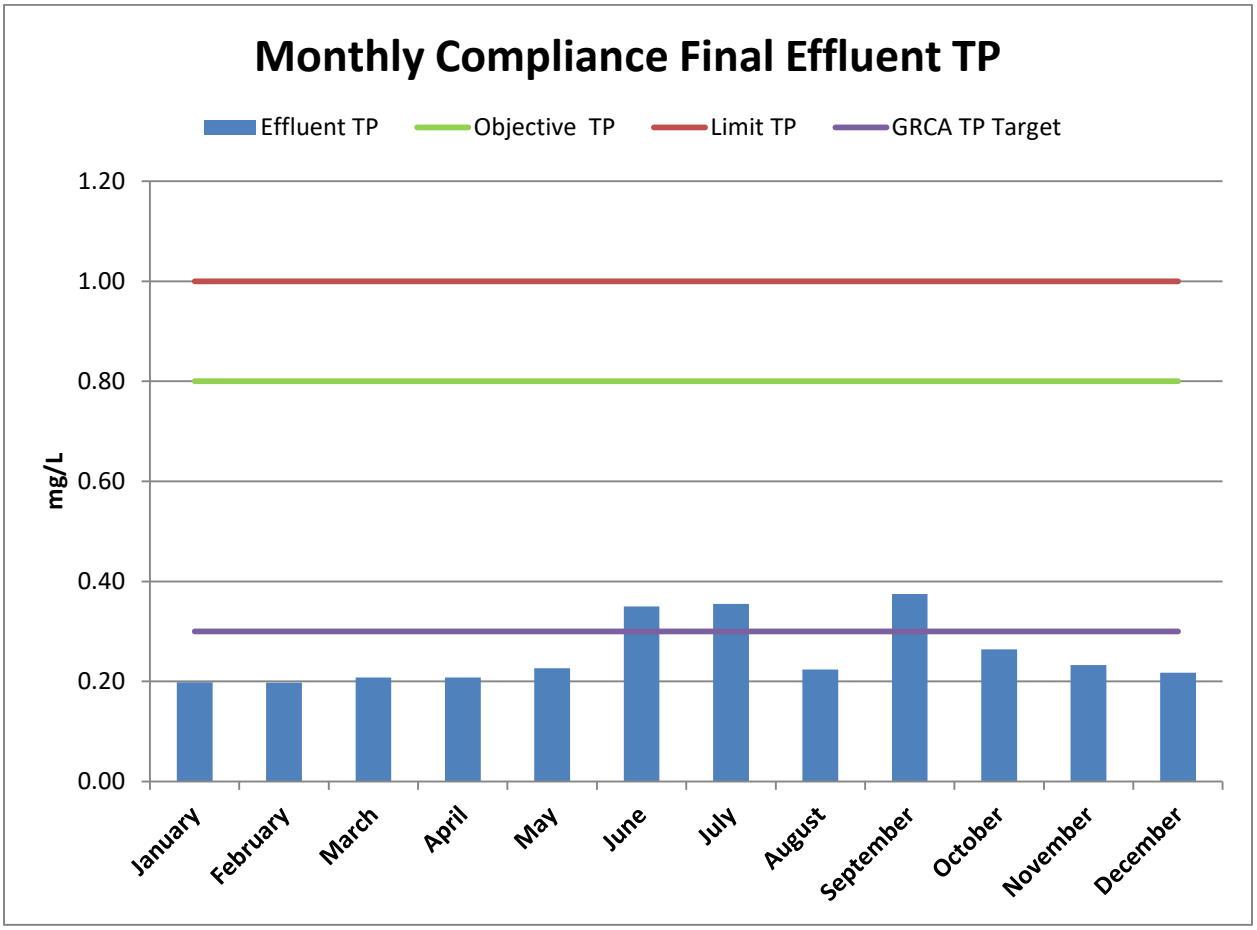
Figure 2 - Monthly Average Final Effluent TSS



Comments:

- Figure 2 is a trend of the monthly average final effluent TSS.
- The monthly average final effluent TSS concentrations met the ECA limit and objective in 2022.
- All monthly average results were less than 10 mg/L.

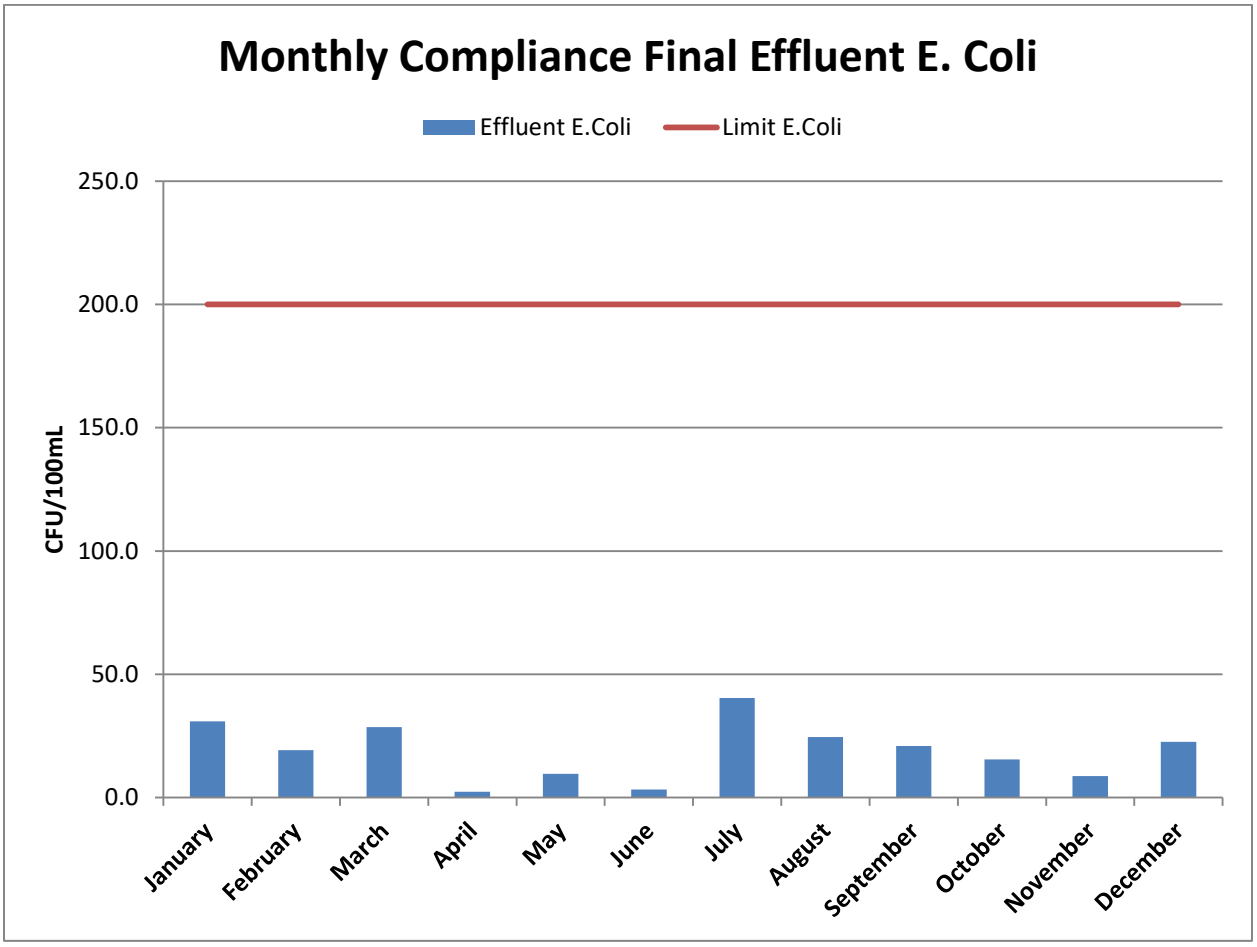
Figure 3 - Monthly Average Final Effluent TP



Comments:

- Figure 3 is a trend of the monthly average final effluent TP.
- The monthly average final effluent TP concentrations met the ECA limit and objective in 2022.
- The monthly average TP concentrations did not achieve the voluntary target of 0.3 mg/L in June, July and September 2022.

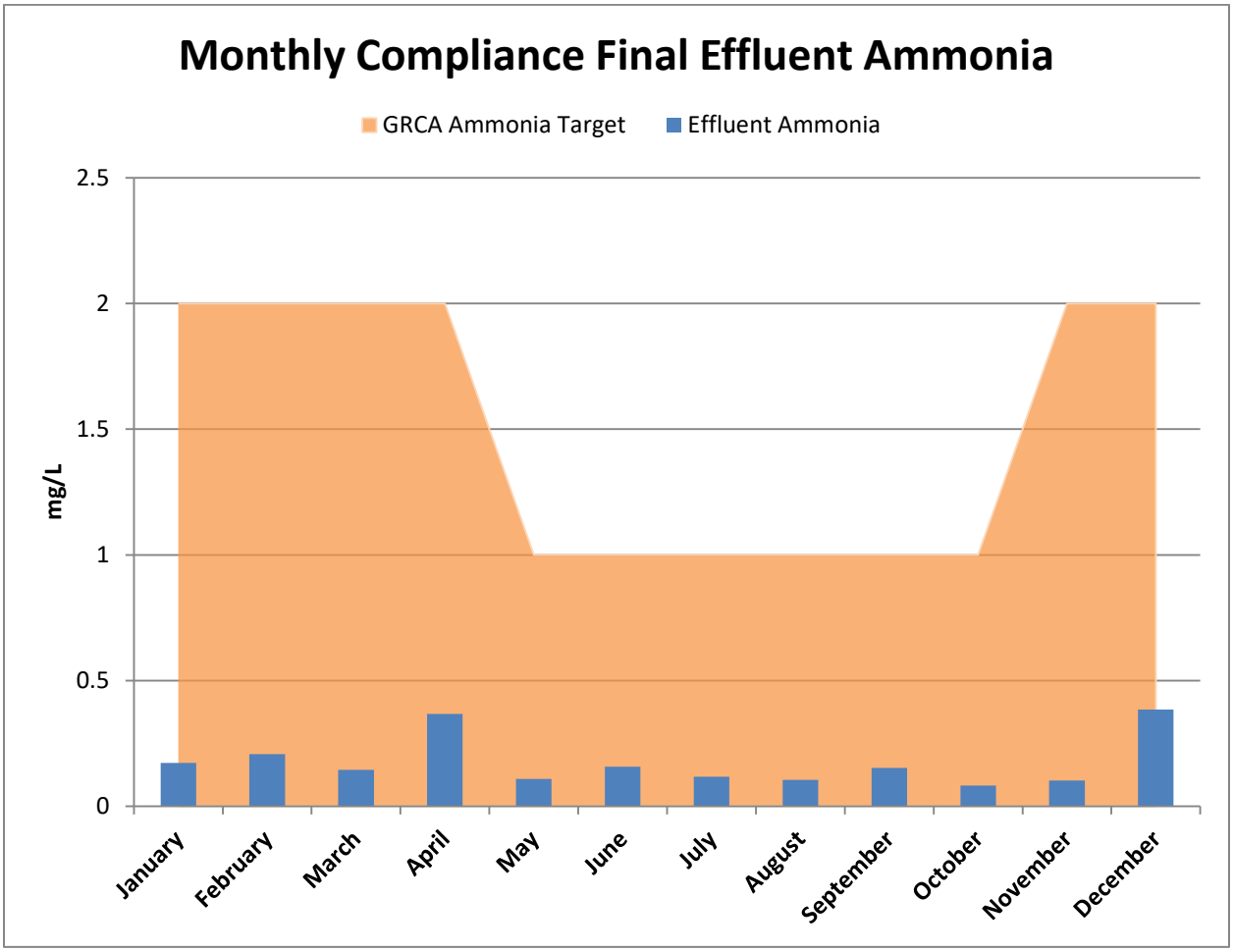
Figure 4 - Monthly Geometric Mean Density for Final Effluent E. Coli



Comments:

- Figure 4 is a trend of the monthly geometric mean density for final effluent E. Coli in CFU / 100 mL.
- The monthly geometric mean density for final effluent E. Coli met the ECA limit in 2022.

Figure 5 - Monthly Average Final Effluent Total Ammonia Nitrogen



Comments:

- Figure 5 is a trend of the monthly average final effluent total ammonia nitrogen (TAN).
- There is no limit or objective identified in the ECA for TAN.
- The monthly average final effluent TAN voluntary targets:
  - 1 mg/L - May to Oct.
  - 2 mg/L – Nov. to Apr.
- The final effluent TAN achieved the voluntary targets in all 12 months of 2022.

The City continues to strive to achieve the best possible performance from the WWTP by employing total mass control as a process control method and the use of other optimization tools. As a result, the plant achieved the voluntary target for TP in 9 of 12 months (did not achieve in June, July and September) but achieved the voluntary target for TAN in all months of 2022.

4. Per Capita Flows and Loadings

The raw sewage per capita flows, loadings and ratios are calculated and compared to typical values to determine if the raw sewage received represents typical wastewater or if it is influenced by other sources in the collection system. Table 3 is a summary of the per capita flows, loadings and ratios for the Brantford WWTP.

Table 3 - Brantford WWTP Per Capita Flows and Loadings

Parameter	2021	2022	Typical
Population	104,688	104,688	--
WWTP Rated Capacity (m^3/d)	81,800	81,800	--
Average Daily Influent Flow (m^3/d)	32,470	36,185	--
Peak Daily influent Flow (m^3/d)	49,137	59,310	--
Annual Average Influent BOD_5 (mg/L)	203.4	208	--
Annual Average Influent TSS (mg/L)	252	252	--
Annual Average Influent TKN (mg/L)	38.7	37.7	--
Annual Average Influent TP (mg/L)	4.8	4.6	--
Per Capita Wastewater Flow (L/person/day)	310	346	294 – 351
Per Capita BOD_5 Loading (g/person/day)	63.1	71	63 – 77
Per Capita TSS Loading (g/person/day)	78.2	86	69 – 93
Per Capita TKN Loading (g/person/day)	12	13	13 – 14
Per Capita TP Loading (g/person/day)	1.5	1.6	1.6 – 2.0
Average Daily Flow as % of Rated Capacity	39.70%	44.24%	--
Max Flow Day / Annual Average Flow	1.51	1.64	2.25 – 3.06
Influent TSS/BOD_5	1.24	1.21	1.01 – 1.25
Influent TKN/BOD_5	0.19	0.18	0.17 – 0.23

All of the calculated per capita flows, loadings and ratios are close to typical values or within the typical ranges. The typical values are the median values for the Grand River Watershed-wide Wastewater Optimization Program (2012 to 2020). Therefore, it can be concluded that the data used for this analysis is representative of typical municipal wastewater in the Grand River watershed.

5. Operational Challenges

As per the ECA, this section's purpose is to provide a summary of significant operational problems encountered and any associated corrective actions that were implemented.

- PM #1 Secondary Clarifiers #1 to #4 – Secondary clarifiers #1 to #4 were originally built when the WWTP was commissioned in 1960. Due to their age and condition, they are almost unusable and left out of service at all times. The City is currently undergoing a condition assessment of all secondary clarifiers followed by specific rehabilitation work. Upon completion of the project, secondary clarifiers #1 to #4 will be able to be placed back in service.
- PM #2 Secondary Clarifier #8 – Secondary clarifier #8 has been out of service since 2019 due to its condition and cannot be placed back into service. This leaves PM #2 with no redundancy for its secondary clarifiers. The City is currently undergoing a condition assessment of all secondary clarifiers followed by specific rehabilitation work. Upon completion of this project, secondary clarifier #8 will be completely replaced which will provide redundancy again.
- PM #2Primary Clarifier #5 Bridge Failure – PM #2 was without primary clarifier #5 due to issues with the travelling bridge mechanism. The travelling bridge performs sludge and scum collection. Once repairs were made, the primary clarifier was returned to service.
- Digester P5 Out of Service – Digester P5 has been out of service since spring of 2022 for cleaning, condition assessment and repairs as part of an on-going capital program.
- PM #1 Primary Clarifier #1, #2, and #4 Upgrades – As a result of the upgrades to primary clarifiers #1, #2 and #4 during the summer of 2022, no raw sewage could receive primary treatment in PM #1 and had to be routed around through PM #2. The PM #2 primary clarifiers did not perform as well by receiving higher flows which had a negative impact on the effluent quality as the City did not meet the GR WWOP voluntary target for TP. The limit and objective identified in the ECA were still met during this time.

6. Sludge Generation

6.1. Sludge Accountability

A sludge accountability analysis compares the amount of sludge reported to be removed from the plant (the sum of raw sludge pumped to the digesters and effluent TSS) to the amount of sludge projected to be produced by the plant (the sum of solids removed in the primary clarifiers, BOD_5 converted to solids in the aeration basins and the chemical added for phosphorus removal) to determine if monitoring data is truly representative and accurate. If the difference between the projected and reported masses is within +/- 15%, then the reported

data is likely accurate. Table 4 is a summary of the sludge accountability analysis for the Brantford WWTP.

Table 4 - Summary of Sludge Accountability

Parameter	Reported Sludge (kg/d)	Parameter	Projected Sludge (kg/d)	Accountability
Intentional Wasting	8529.0	**Primary Sludge**	5460.2	13.5%
Unintentional Wasting	208.1	**Biological Sludge**	3776.9	
Total Reported Sludge	8737.1	**Chemical Sludge**	867.3	
		Total Projected Sludge	10104.5	

The sludge accountability analysis closed within +/-15%, which means that the data is accurate and representative.

6.2. Sludge Removal

Digested sludge (biosolids) produced at the Brantford WWTP is pumped to three on-site storage tanks prior to removal for liquid land application. Table 5 is a monthly summary of the biosolids removed for land application in 2021 compared to 2022.

Table 5 - Summary of Monthly Biosolids Removal

Month	2021 m^3	2022 m^3	% Change
January	0	0	
February	0	0	
March	0	0	
April	2,314.20	5,282.90	
May	4,893.10	9,358.40	
June	1,579.20	0.00	
July	3,926.50	6,861.30	
August	12,135.70	1,583.60	
September	5,881.90	6,761.30	
October	0	11,045.00	
November	13,213.90	10,999.30	
December	0	0	
Total	43,944.5	51,891.8	18.1%

The total volume of sludge removed in 2022 was 51,891.8 m^3 which represented an increase of 18.1% over 2021. Due to an issue with the recently installed plug valves, Operations staff were unable to effectively decant through part of 2022. These valves were replaced knife gate valves in January 2023 and now permit effective decanting of the biosolids storage tanks. The City is anticipating that the biosolids removed in 2023 will be similar to the volumes removed in 2021.

6.3. Biosolids Analytical Data

The analytical data for the anaerobic biosolids is summarized in Table 6 (total solids, nutrients and pathogens) and in Table 7 (metals).

Table 6 - Summary of Total Solids, Nutrients and Pathogens for Anaerobic Biosolids

Month	TS (%)	TKN (mg/kg)	NH_3-N (mg/kg)	NO_3-N (mg/kg)	TP (mg/kg)	K (mg/kg)	E. Coli (CFU/g)
January	2.83	80,764	31,919	1.43	34,187	3,036	93,525
February	2.58	82,532	33,600	1.56	33,286	3,770	267,250
March	2.46	86,525	33,168	1.63	32,560	5,679	155,200
April	2.33	93,428	32,435	1.81	36,417	4,638	153,925
May	2.28	89,057	40,731	1.79	33,185	4,001	53,320
June	2.40	85,396	36,453	2.31	33,554	3,521	58,350
July	2.28	81,704	28,994	1.76	32,182	2,973	81,475
August	3.20	65,686	24,033	1.49	23,718	1,847	28,140
September	2.48	72,796	28,273	1.62	30,378	2,843	24,525
October	2.15	105,261	39,953	2.28	47,686	4,448	73,950
November	2.60	79,088	28,174	1.54	30,155	2,869	60,800
December	2.43	84,886	36,823	2.56	29,157	3,795	35,600
Average	2.50	83,927	32,880	1.82	33,039	3,618	90,505

Table 7 - Summary of Regulated Metals for Anaerobic Biosolids

Month	As (mg/kg)	Cd (mg/kg)	Co (mg/kg)	Cr (mg/kg)	Cu (mg/kg)	Hg (mg/kg)	Mo (mg/kg)	Ni (mg/kg)	Pb (mg/kg)	Se (mg/kg)	Zn (mg/kg)
CM1	1.7	0.34	3.4	28	17	0.11	0.94	4.2	11	0.34	42
CM2	170	34	340	2,800	1,700	11	94	420	1,100	34	4,200
Jan.	4.3	0.87	5.4	69.7	715.3	3.57	12.02	19.7	31.3	4.16	693.5
Feb.	1.9	0.58	4.4	72.0	656.7	3.89	13.11	19.6	24.9	1.56	640.1
Mar.	17.8	8.79	19.5	128.5	732.7	3.22	25.05	96.7	32.1	17.75	758.3
Apr.	3.3	0.79	5.6	81.3	783.6	3.39	12.36	23.4	24.6	4.18	692.3
May	2.9	0.45	5.4	82.0	720.0	4.48	11.36	19.8	22.1	2.84	656.0
Jun.	3.5	0.63	5.1	83.8	742.3	3.26	12.81	20.5	22.2	4.37	733.8
Jul.	2.7	0.52	4.8	89.2	826.1	1.35	14.69	23.4	21.4	4.49	831.5
Aug.	2.1	0.47	3.8	68.8	595.3	1.93	12.06	17.2	21.2	9.75	647.6
Sep.	3.9	0.82	5.0	94.0	861.4	4.04	18.39	22.6	36.9	20.49	945.4
Oct.	13.6	2.56	7.9	146.3	1223.7	5.70	33.44	34.5	60.6	41.01	1440.0
Nov.	7.7	1.00	7.4	97.7	777.5	3.85	21.72	25.4	28.7	7.71	1156.4
Dec.	6.7	0.61	6.3	94.7	772.5	3.37	19.68	24.0	26.7	6.75	894.8
Avg.	5.9	1.5	6.7	92.3	783.9	3.5	17.2	28.9	29.4	10.4	840.8

Metal Concentrations for the anaerobic sludge were converted from mg/L to mg/kg (as per the regulations) to compare with the limits in the Nutrient Management Act, O. Reg. 267/03 Section 98 Table 1 “Standards for Regulated Metals in Materials Applied to Land that are Sewage Biosolids.” The metals met the CM2 limit in all months in 2022 except for Selenium in October which had one weekly sample exceed the CM2 limit. This was due to an excessively low total solids (TS) concentration.

6.4. Biosolids Land Application Sites

The following table summarizes the application sites that the City’s contracted biosolids hauler (Enviroland Services Inc.) utilized for biosolids haulage in 2022 for the Brantford WWTP. All biosolids is hauled to certified agricultural land by Enviroland (registered as a biosolids handling company through the Ministry of the Environment, Conservation and Parks #7937-AMQNUB). Table 8 is a summary of the conditioning sites used for biosolids from the Brantford WWTP.

Table 8 - Summary of Conditioning Sites Used for Brantford WWTP Biosolids

Site #	Volume Applied (m^3)	Site #	Volume Applied (m^3)
22861	0.0	24717	4,113.6
24206	8,856.7	24721	1,685.7
24559	4,009.9	24790	0.0
24665	6,578.2	24931	9,358.4
24691	0.0	24932	11,933.3
Brantford Landfill	0.00	25120	3,650.3
24641	1,705.7	Total	51,891.80

7. Septage Receiving

The following section provides a summary of the daily volumes and analytical data for the septage received at the Brantford WWTP.

7.1. Septage Volumes

Volume of septage received at the facility in 2022 totaled 8,589 m^3 which is similar to the volume received in 2021 (8,352 m^3). The volumes received are summarized per quarter in Table 9.

7.2. Analytical Data

Table 9 is a summary of the average volumes received and the analytical data for the quarterly septage sampling conducted at the facility.

Table 9 - Summary of Quarterly Septage Volumes Received and Sampling Analysis

Quarter	Average Daily Volume Received (m^3/d)	Total Volume Received (m^3)	% of WWTP Flows	BOD_5 (mg/L)	TSS (mg/L)	TP (mg/L)	TKN (mg/L)
Q1 (January – March)	13.09	1,165	0.03%	1,480	8,660	197.00	428
Q2 (April – June)	31.66	2,850	0.08%	2,910	3,550	87.70	888
Q3 (July – September)	25.83	2,351	0.08%	418	1,240	23.40	218
Q4 (October – December)	24.44	2,224	0.07%	4,340	24,300	151.00	764
Annual	23.76	8,589	0.07%	2,287	9,438	114.78	574.50

8. Maintenance

The following section provides an overview of some of the major maintenance activities and capital upgrades carried out at the facility in 2022.

8.1. Summary of Major Maintenance Activities

- Replacement of the grit classifier in the preliminary treatment building;
- Replacement of the mixers for the Biosolids storage tanks;
- Completed treatment plant wide process and security alarm system upgrades;
- Completed digester, chemical and primary clarification Programmable Logic Controller (PLC) upgrades;

8.2. Summary of Completed Capital Upgrades

- Replacement of WWTP influent flow metering;
- Preliminary treatment building bypass and automation;
- Assessment of the Wastewater Operations Maintenance program;

8.3. Summary of Capital Projects in Progress:

- Cleanout, inspection and repairs to the anaerobic digesters;
- Upgrades to PM #1 primary clarifiers (#1 to #4);
- Secondary clarifier condition assessment and rehabilitation;
- Class EA and Upgrades to the Empey St. WWPS.

- Design of a new UV disinfection system; and
- Replacement of the WWTP process boilers.

9. Calibrations

This section provides a summary of calibrations performed on all effluent monitoring equipment. All calibration reports are included in this report as Appendix A.

9.1. Influent and Effluent Flow Meters

Calibration tests were performed on September 12th, 2022 for the final effluent meters (PM #1 and PM #2). Both meters are operating to within +/- 15% error. The old Influent Flow Meters were removed during the construction to install the new influent magnetic (MAG) flow meterw.

10. Complaints

As per the ECA this section is to provide a summary of any complaints received and any steps taken to address the complaint. There were no complaints reported to the City regarding the WWTP in 2022.

11. Bypass, Spills, and Abnormal Discharge Events

As per the ECA this section is to provide a summary of all by-pass, spill or abnormal discharge events. The WWTP did not experience any bypasses, spills or abnormal discharge events in 2022.

12. Bypasses Due to Grand River High Water Levels

As per the ECA this section is to provide a summary of all bypasses due to high water level events in the Grand River and an update on the implementation plan for provision of effluent pumping to eliminate such bypasses. There were no bypass events due to high water levels in the Grand River from the WWTP.

A study investigating the feasibility of an effluent pumping station was completed in 2020. Based on the feasibility study, the City is planning on initiating an Environmental Assessment in 2022 with the design to commence in 2023 for an effluent pumping station.

13. Notice of Modifications to Sewage Works

The following is an update to two (2) outstanding modifications initiated under the ECA's Limited Operational Flexibility in 2020, including the following:

- Upgrades to the PM #1 primary clarifiers (sludge and scum collectors, pumping and piping modifications, etc.). Construction started in Q4 2021 and completed in Q4 2022.

14. Other Information

No additional information was requested by the District Manager.

Appendix A – Flow Meter Calibration Records

Figure 6 - PM #1 Effluent Flow Meter Calibration Certificate

FRANKLIN EMPIRE

CALIBRATION REPORT

TAG NO.: Plant 1 (old plant)
REPORT NO.: Brant 22
DATE: 12-Sep-22

SITE:	Brantford WWTP	DATE:	12-Sep-22
PROCESS AREA:	Effluent Flow		
INSTR. TAG:	Plant 1 (old plant)	TECHNICIAN:	Mike Humphries
MANUFACTURER:	Milltronics		
MODEL:	Multiranger plus	REPORT NO.:	Brant 22
SERIAL No.:			
INSTR. RANGE:	0 - 1209 m3/d		

PRIMARY DEVICE:	36" Parshall Flume	
MAX FLOW:	1209	m^3/day
MAX HEAD:	75.28	cm
CONSTANT:	1886	
EXPONENT:	1.566	

Output:	mA	Flow
Zero:	4	0.00
Max:	20	1209.0

P1 = 2
P2 = 5
P3 = 103.6
P4 = 75.28
P5 = 30
P6 = 2
P7 = 2
P80 = 11
P83 = 71
P83 = 6:19

OCM Flow Table

Head Applied (cm)	Head Displayed (cm)	Error (%)	Calculated Flow (m^3/day)	Flow Displayed (m^3/day)	Error (%)	Calculated mA Output	Measured mA Output	Error (%)
0.00	0.00	0.00	0.00	0.00	0.00	4.00	3.92	-2.04
25.00	25.43	1.69	215	221	2.61	6.85	6.73	-1.74
50.00	50.43	0.85	637	645	1.29	12.43	12.14	-2.39
65.00	65.43	0.66	961	971	1.04	16.71	16.28	-2.66

Totalizer As Found	m^3
Totalizer As Left	m^3
Zero As Found	100.4 cm
Zero As Left	100.4 cm
Change in Zero	0.0 cm

Comments

AS FOUND: PASS AS LEFT: PASS CERTIFIED BY: Mike Humphries

Figure 7 - PM #2 Effluent Flow Meter Calibration Certificate

FRANKLIN EMPIRE

CALIBRATION REPORT

TAG NO.: Plant 2 (new plant)
REPORT NO.: Brant 22
DATE: 12-Sep-22

SITE:	Brantford WWTP	DATE:	12-Sep-22
PROCESS AREA:	Effluent Flow		
INSTR. TAG:	Plant 2 (new plant)	TECHNICIAN:	Mike Humphries
MANUFACTURER:	Milltronics		
MODEL:	Multiranger plus	REPORT NO.:	Brant 22
SERIAL No.:			
INSTR. RANGE:	0 - 1209 m3/d		

PRIMARY DEVICE:	36" Parshall Flume	
MAX FLOW:	1209	m^3/day
MAX HEAD:	75.28	cm
CONSTANT:	1886	
EXPONENT:	1.566	

Output:	mA	Flow
Zero:	4	0.00
Max:	20	1209.0

P1 = 2
P2 = 5
P3 = 103.6
P4 = 75.28
P5 = 30
P6 = 2
P7 = 2
P80 = 11
P83 = 71
P83 = 6:19

OCM Flow Table

Head Applied (cm)	Head Displayed (cm)	Error (%)	Calculated Flow (m^3/day)	Flow Displayed (m^3/day)	Error (%)	Calculated mA Output	Measured mA Output	Error (%)
0.00	0.00	0.00	0.00	0.00	0.00	4.00	3.94	-1.52
25.00	25.17	0.68	215	218	1.31	6.85	6.78	-0.99
50.00	49.87	-0.26	637	634	-0.47	12.43	12.16	-2.22
65.00	64.95	-0.08	961	959	-0.17	16.71	16.36	-2.16

Totalizer As Found		m^3
Totalizer As Left		m^3
Zero As Found	103.6	cm
Zero As Left	103.6	cm
Change in Zero	0.0	cm

Comments

AS FOUND: PASS AS LEFT: PASS CERTIFIED BY: Mike Humphries