Fenelon Falls

Water Pollution Control Plant

Works # 110001612

Annual Wastewater Performance Report

Prepared For: The City of Kawartha Lakes

Reporting Period of January 1st – December 31st, 2022

Issued: March 23, 2023

Revision: 0

Operating Authorities:

Kawartha Lakes

OCWA

ONTARIO CLEAN WATER AGENCY
AGENCE ONTARIENNE DES EAUX

2022 Performance Report for the Fenelon Falls Water Pollution Control Plant

In 2022, the Fenelon Falls Water Pollution Control Plant (WPCP) operated under Amended Environmental Compliance Approval (ECA) No. 3688-BW3RGB issued on January 15th, 2021. Condition 11.4 of this ECA states, *"The Owner shall prepare performance reports on a calendar year basis and submit to the District Manager by March 31 of the calendar year following the period being reported upon. The reports shall contain, but shall not be limited to, the following information pertaining to the reporting period:*

a) *a summary and interpretation of all Influent monitoring data, and a review of the historical trend of the sewage characteristics and flow rates;*

b) *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;*

c) *a summary of all operating issues encountered and corrective actions taken;*

d) *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;*

e) *a summary of any effluent quality assurance or control measures undertaken;*

f) *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;*

g) *a summary of efforts made to achieve the design objectives in this Approval, including an assessment of the issues and recommendations for pro-active 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;*

h) *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;*

i) a summary of any complaints received and any steps taken to address the complaints;

j) 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;

k) 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 modification.

l) *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.*

m) a summary of any deviation from the monitoring schedule and reasons for the current reporting year and a schedule for the next reporting year.

The above information is incorporated in the following report format and submitted to the District Manager of the Peterborough District Office of the Ministry of the Environment, Conservation and Parks as per the requirements of ECA No. 3688-BW3RGB.

During the period of 2022, the Ontario Clean Water Agency (OCWA) operated the Fenelon Falls WPCP, Francis Street Pumping Station (SPS), Colborne Street SPS and Ellice Street SPS on behalf of the Corporation of the City of Kawartha Lakes. OCWA's goals have remained consistent during this period and remain consistent with the following priorities:

- provide quality assurance, safety and environmental compliance of facility operations;
- assist our clients in achieving compliance;
- provide advice on up-to-date technology in Operations and Maintenance service delivery.

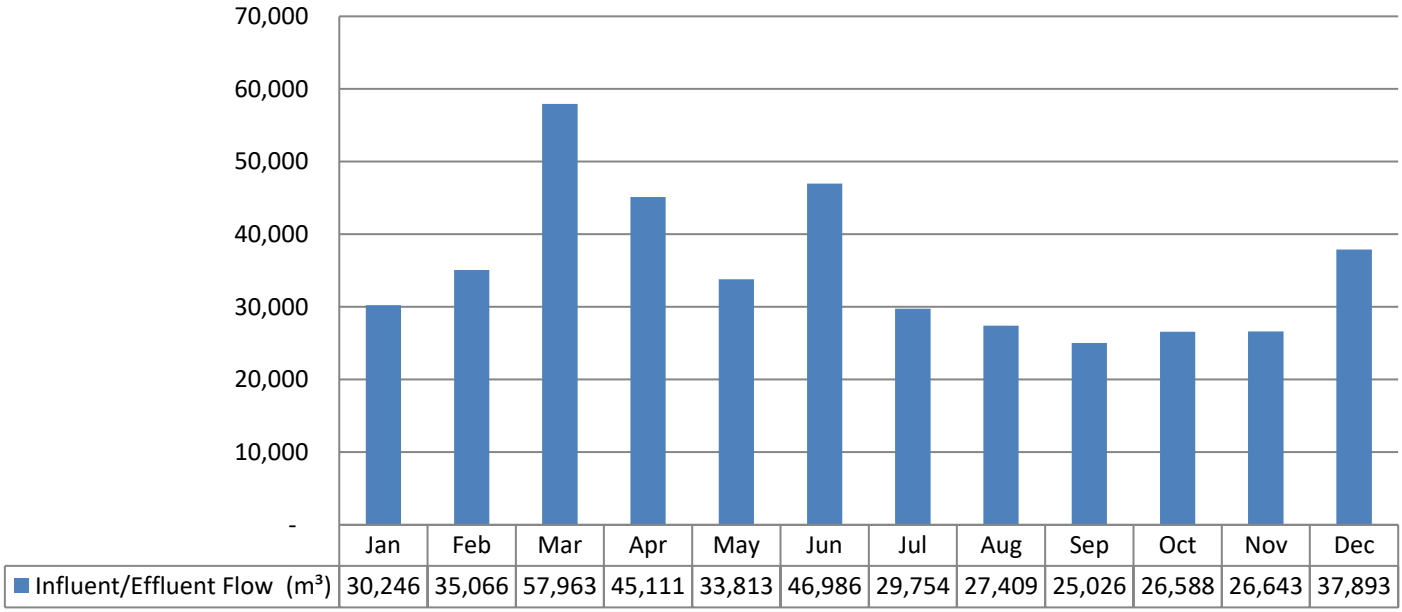
This report will show that the Ontario Clean Water Agency has made every attempt to achieve its goals through its operational performance. This performance was enhanced through the use of an electronic process data collection database, an electronic maintenance and work order database, an electronic operational excellence database, a training program focused on providing the right skills to staff - also captured and tracked by the use of an electronic database and a multi-skilled, flexible workforce.

a) Environmental Compliance Approval (ECA) No. 3688-BW3RGB requires a summary and interpretation of all Influent monitoring data, and a review of the historical trend of the sewage characteristics and flow rates;

The Fenelon Falls WPCP has a Rated Capacity of 1,800m³/day. Flows are continuously measured through the plant effluent flow meter located upstream of the sand filters. The influent and effluent streams are considered not significantly different in flow rates and quantities so the effluent flow measurements are also used for influent flow measurements. ECA No. 3688-BW3RGB requires everything practicable be undertaken to operate the STP so that the annual average daily influent is within the Rated Capacity. The 2022 annual average daily influent flow was 1,157.53 m³/day or 64% of the Rated Capacity.

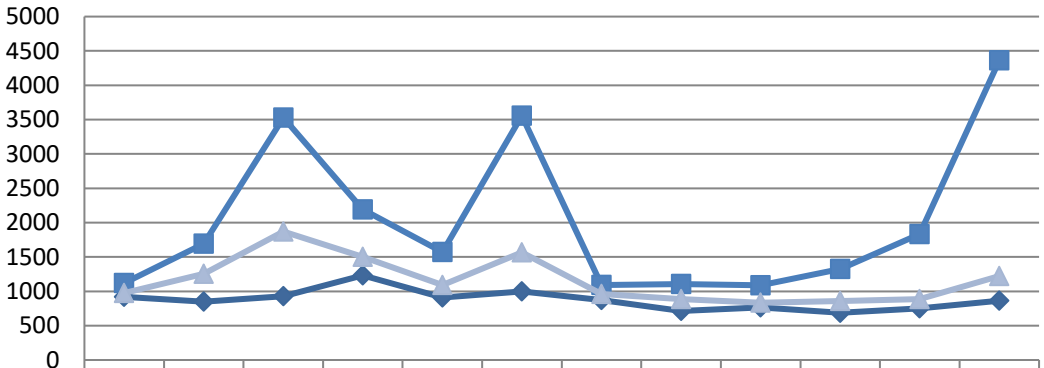
The total influent/effluent flow in 2022 was 422,498 m³.

Graph 1: 2022 Influent/Effluent Flow Monthly Totals



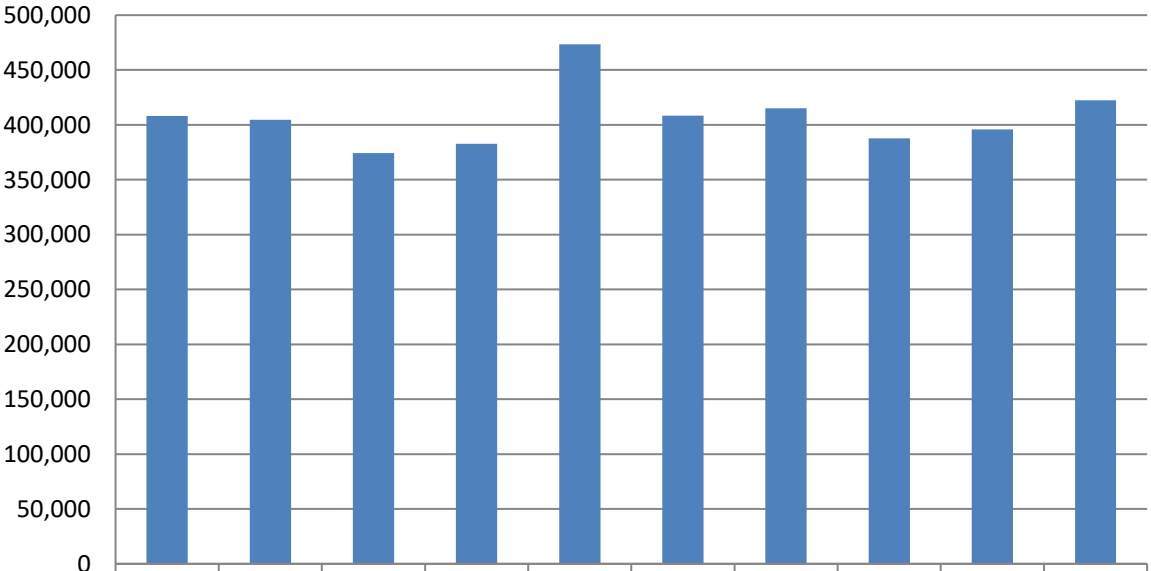
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Influent/Effluent Flow (m³)	30,246	35,066	57,963	45,111	33,813	46,986	29,754	27,409	25,026	26,588	26,643	37,893

Graph 2: Influent/Effluent Daily Minimum, Maximum and Average Flows



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Min (m^3/day)	920	849	929	1232	908	996	874	715	765	688	752	863
Max (m^3/day)	1119	1693	3526	2192	1573	3555	1090	1106	1088	1324	1830	4360
Avg(m^3/day)	976	1252	1870	1504	1091	1566	960	884	834	858	888	1222

Graph 3: Historical Influent/Effluent Flows from 2013 to 2022



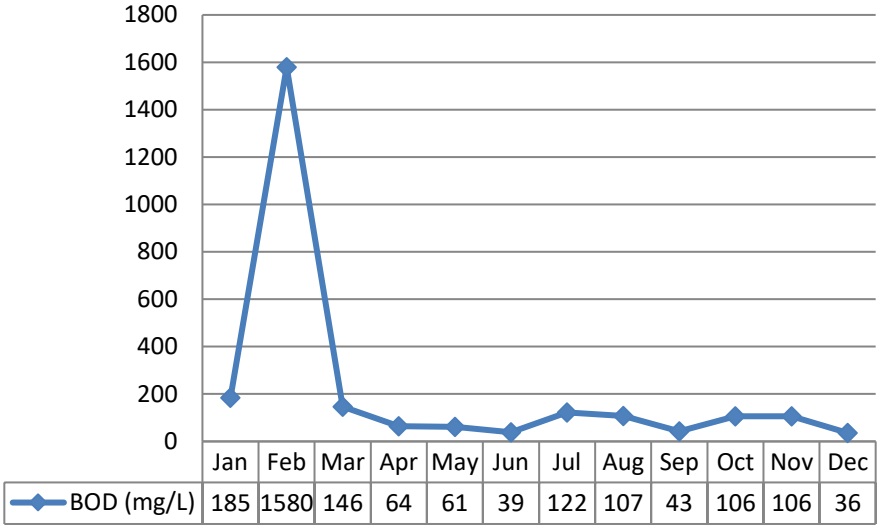
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Influent/Effluent Flow (m^3)	408,263	404,553	374,327	382,636	473,489	408,287	415,037	387,815	395,861	422,498

Influent Monitoring - Sewage Characteristics

Biochemical Oxygen Demand (BOD5)

ECA No. 3688-BW3RGB requires at least one composite sample be collected and analyzed monthly for Biochemical Oxygen Demand (BOD5). The Biochemical Oxygen Demand (BOD5) monthly average results ranged from 36 mg/L to 1,580 mg/L.

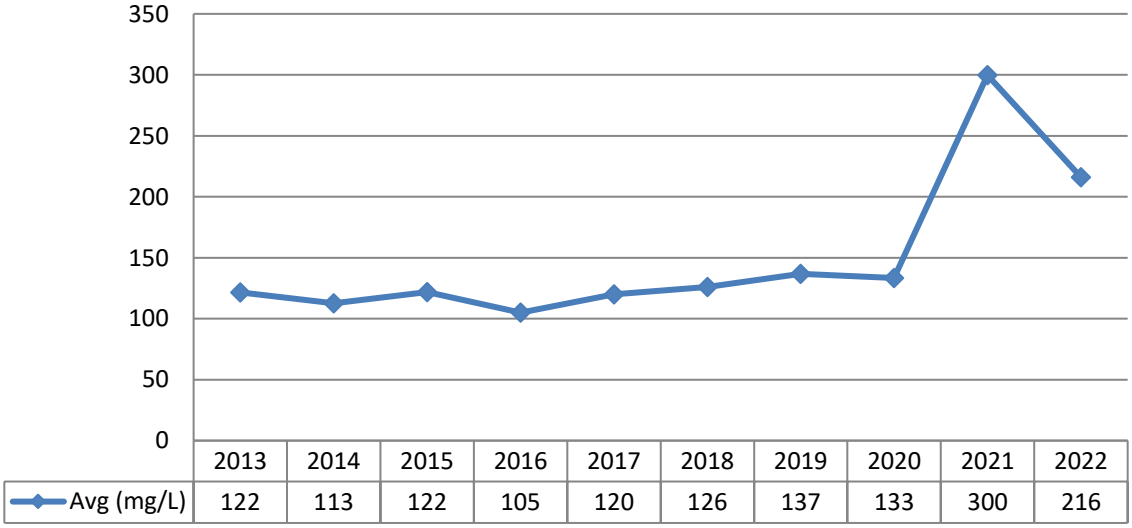
Graph 4: 2022 Monthly BOD5 Influent Concentration Comparisons



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
BOD (mg/L)	185	1580	146	64	61	39	122	107	43	106	106	36

Biochemical Oxygen Demand Historical Trends

Graph 5: Historical Influent Biochemical Oxygen Demand Concentration Comparisons



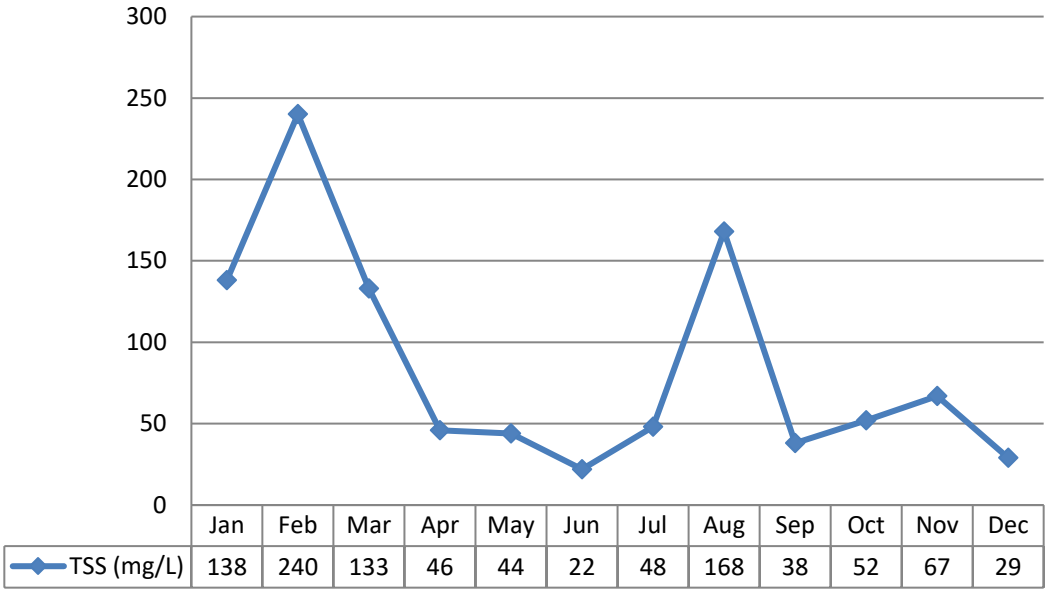
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Avg (mg/L)	122	113	122	105	120	126	137	133	300	216

The Biochemical Oxygen Demand (BOD5) annual average has been relatively consistent for the past ten years but has experienced an increase in 2021 and 2022.

Total Suspended Solids

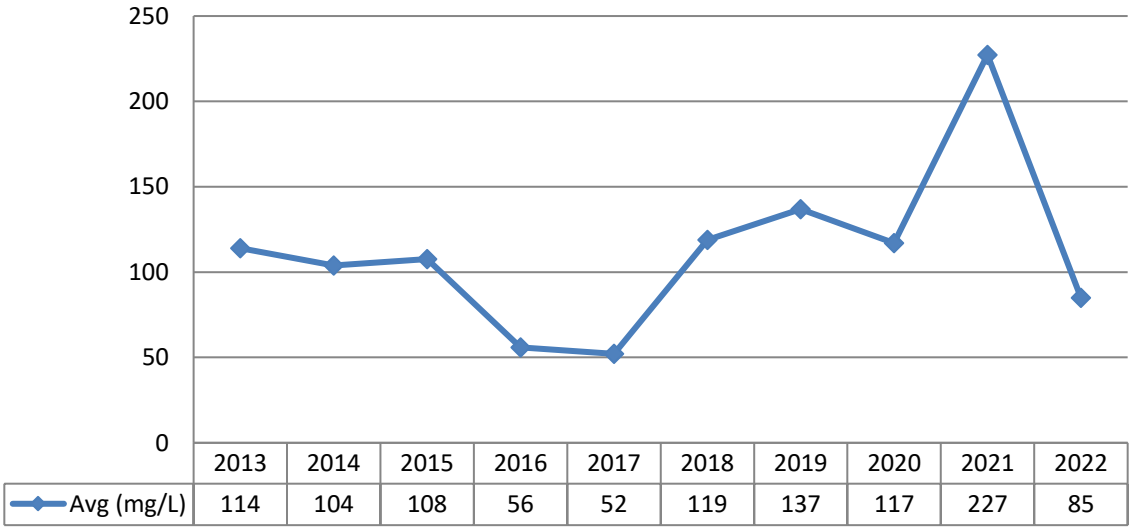
ECA No. 3688-BW3RGB requires at least one composite sample be collected and analyzed monthly for Total Suspended Solids. The monthly results ranged from 22mg/L to 240mg/L.

Graph 6: 2022 Monthly Total Suspended Solids Influent Concentration Comparisons



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
TSS (mg/L)	138	240	133	46	44	22	48	168	38	52	67	29

Graph 7: Historical Influent Total Suspended Solids Concentration Comparisons



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Avg (mg/L)	114	104	108	56	52	119	137	117	227	85

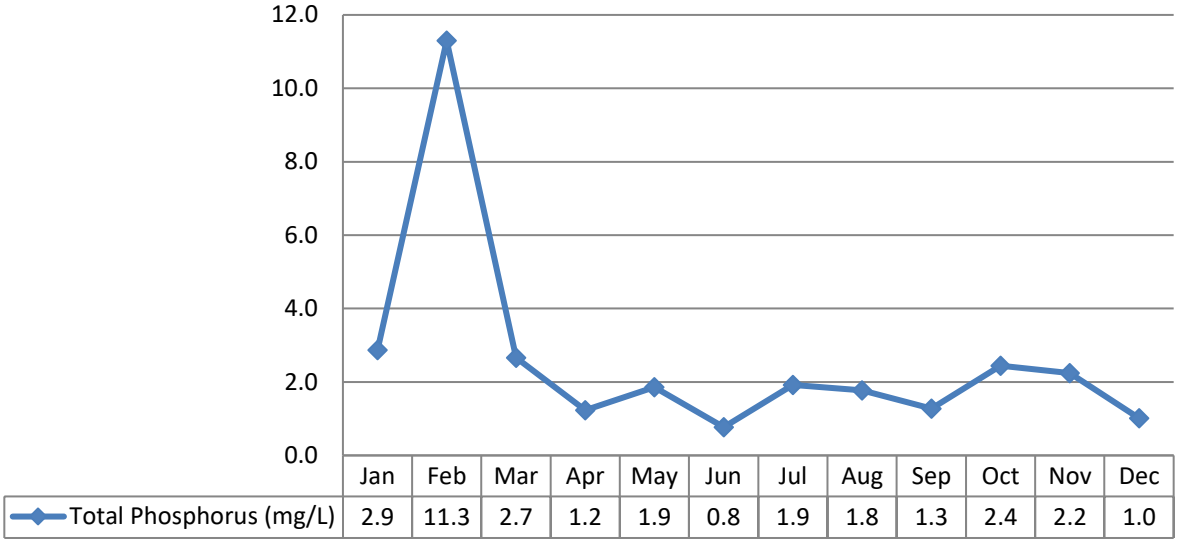
Total Suspended Solids Historical Review

The Total Suspended Solids annual average has been between 52mg/L and 227mg/L showing a slight decrease in 2016 -2017, an increase in 2021 and a decrease in 2022.

Total Phosphorus

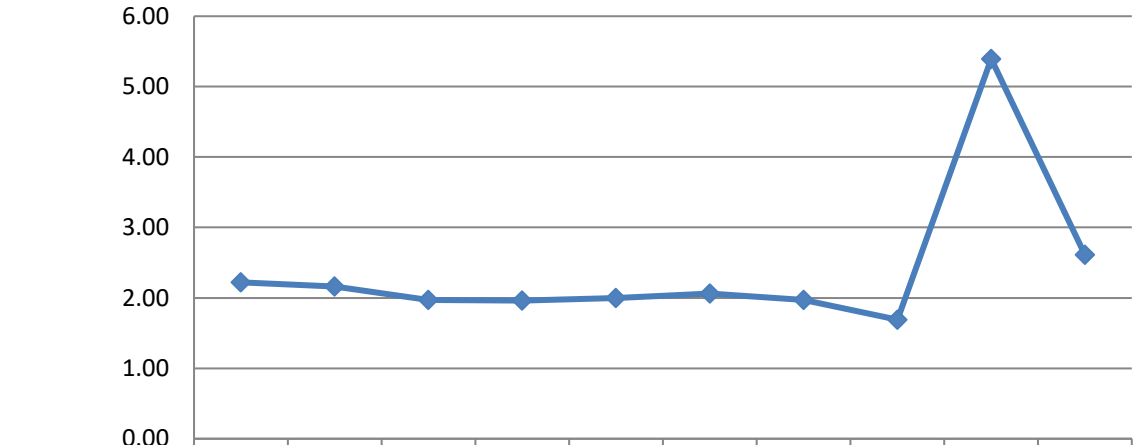
ECA No. 3688-BW3RGB requires at least one composite sample be collected and analyzed monthly for Total Phosphorus. The monthly results ranged from 1mg/L to 11.3mg/L.

Graph 8: 2022 Monthly Total Phosphorus Influent Concentration Comparisons



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Total Phosphorus (mg/L)	2.9	11.3	2.7	1.2	1.9	0.8	1.9	1.8	1.3	2.4	2.2	1.0

Graph 9: Historical Influent Total Phosphorus Concentration Comparisons



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Avg (mg/L)	2.22	2.16	1.97	1.96	2.00	2.06	1.97	1.69	5.39	2.61

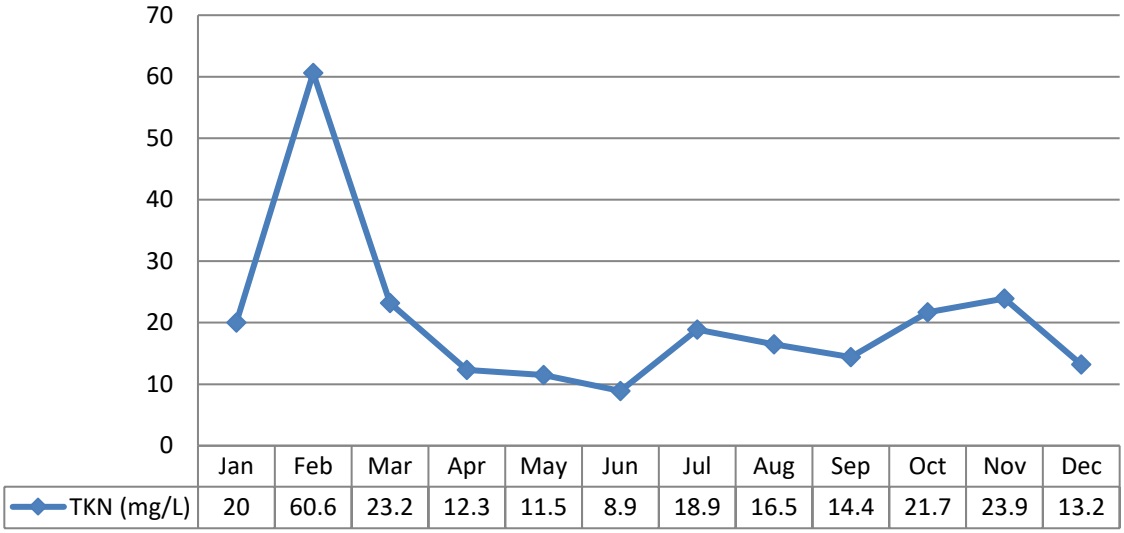
Total Phosphorus Historical Trends

The Total Phosphorus annual average in the raw has trended downward since 2012 decreasing from 2.59 mg/L to 1.69mg/L; however, experienced an increase in 2021 while 2022 concentration showed a decrease.

Total Kjeldahl Nitrogen (TKN)

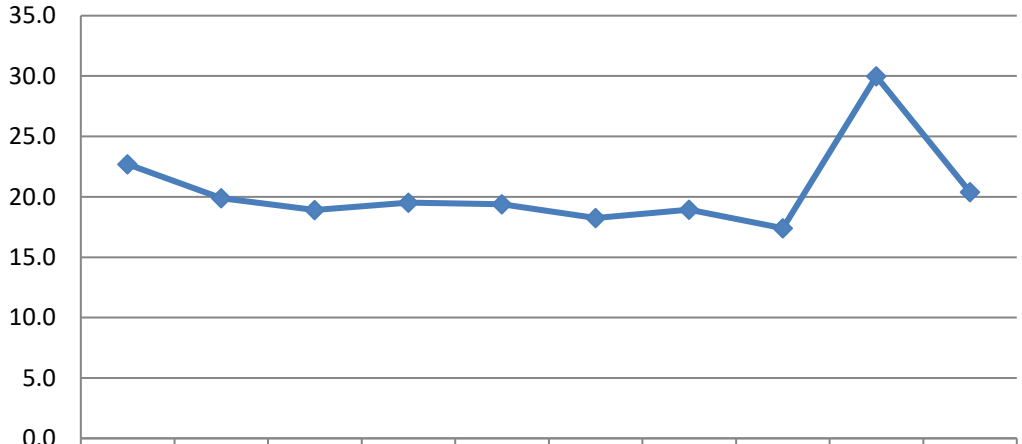
ECA No. 3688-BW3RGB requires at least one composite sample be collected and analyzed monthly for Total Kjeldahl Nitrogen. The monthly Total Kjeldahl Nitrogen results ranged from 11.5mg/L to 60.6mg/L.

Graph 10: 2022 Monthly Total Kjeldahl Nitrogen Influent Concentration Comparisons



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
TKN (mg/L)	20	60.6	23.2	12.3	11.5	8.9	18.9	16.5	14.4	21.7	23.9	13.2

Graph 11: Historical Influent Total Kjeldahl Nitrogen Concentration Comparisons



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Avg (mg/L)	22.7	19.9	18.9	19.5	19.4	18.3	18.9	17.4	30.0	20.4

Total Kjeldahl Nitrogen Historical Review

The Total Kjeldahl Nitrogen annual average was fairly consistent with a decreasing trend from above 22.7mg/L to a low of 17.4 mg/L in 2020; however, experienced an increase in 2021 while 2022 concentrations returned to historical levels.

Refer to Appendix I for Performance Assessment Report which summarizes Influent (raw) BOD5, TSS, TP, and TKN Results.

b. Environmental Compliance Approval (ECA) No. 3688-BW3RGB requires 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.

The Final Effluent Monitoring Data for 2022 is summarized below and compared to ECA No. 3688-BW3RGB.

Flows are continuous measured through the plant effluent flow meter. The influent and effluent streams are considered not significantly different in flow rates and quantities so the effluent flow measurements are also used for influent flow measurements.

The total influent/effluent flow in 2022 was 422,498m³. The effluent flow summary and interpretation are included in a. above with the influent flow summary and interpretation.

Carbonaceous Biochemical Oxygen Demand (CBOD5) and Total Suspended Solids (TSS)

ECA No. 3688-BW3RGB has an annual average concentration limit of 25mg/L for CBOD5 and TSS. The annual average results for 2022 are presented in the following table.

Table 1. CBOD5 and Suspended Solids 2022 Effluent Concentration Results Comparison to Limit

Effluent Parameter	Annual Average Limit (mg/L)	Annual Average (mg/L)	Compliant Y/N
CBOD5	25	8.7	Y
Total Suspended Solids	25	17.3	Y

ECA No. 3688-BW3RGB has an annual average concentration objective of 15 mg/L for CBOD5 and TSS. The annual average results for 2022 are presented in the following table.

Table 2. CBOD5 and Suspended Solids 2022 Effluent Concentration Results Comparison to Objectives

Effluent Parameter	Annual Average Objective (mg/L)	Annual Average (mg/L)	Objective Met Y/N
CBOD5	15	8.7	Y

Effluent Parameter	Annual Average Objective (mg/L)	Annual Average (mg/L)	Objective Met Y/N
Total Suspended Solids	15	17.3	N

The objective for TSS was not met in 2022. The plant operated outside of normal conditions from January to May because both Waste Activate Sludge (WAS)/Return Activated Sludge (RAS) pumps failed within a week of each other early in January. Replacements pumps were ordered but delivery was delayed due to the pandemic so the pumps were not received until May 2022. Operations outside of normal conditions information is included in item j of this report.

ECA No. 3688-BW3RGB has an annual average daily effluent loading limit of 45.0 kg/day for CBOD5 and TSS. The annual average daily loading results for 2022 are presented in the following table.

Table 3. CBOD5 and Suspended Solids 2022 Effluent Loading Results Comparison to Limits

Effluent Parameter	Annual Average Daily Loading Limit (mg/L)	Annual Average Daily Loading (mg/L)	Compliant Y/N
CBOD5	45	10.1	Y
Total Suspended Solids	45	20.2	Y

Total Phosphorus (TP)

ECA No. 3688-BW3RGB has a monthly average concentration limit of 0.5 mg/L for Total Phosphorus. The monthly average results for 2022 were calculated as required. The plant operated outside of normal conditions from January – May 2022 due to the failure of both WAS/RAS pumps. Additionally, emergency partial bypassing of the sand filters due to weather occurred March 19 – 25 and June 12 – 13, 2022. Bypass and operations outside of normal conditions information is included in item j of this report. These events impacted the Total Phosphorus results and the ECA limit of 0.5mg/L was exceeded for January. Reports to MECP are included in Appendix V. Results are presented in the following table.

Table 4. Total Phosphorous 2022 Monthly Average Concentration Comparison to Limit

Month	Monthly Average Limit (mg/L)	Effluent Monthly Average (mg/L)	Compliant Y/N
January	0.5	0.70	N
February	0.5	0.25	Y
March	0.5	0.37	Y
April	0.5	0.17	Y
May	0.5	0.20	Y
June	0.5	0.10	Y
July	0.5	0.07	Y
August	0.5	0.08	Y
September	0.5	0.06	Y
October	0.5	0.08	Y
November	0.5	0.06	Y
December	0.5	0.06	Y

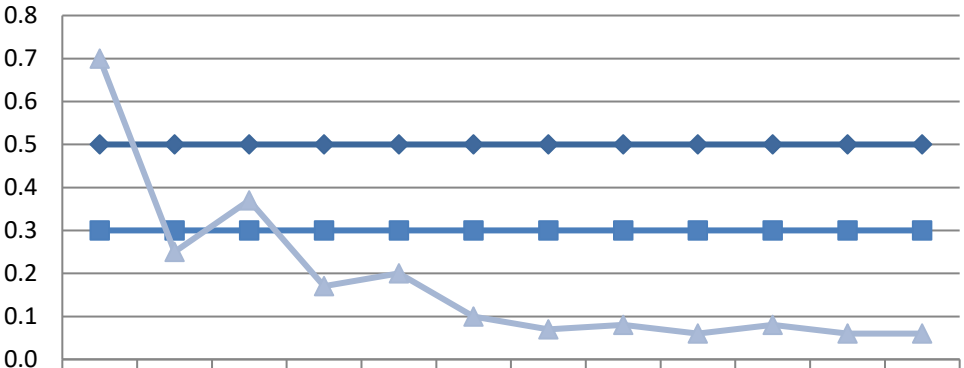
ECA No. 3688-BW3RGB has a monthly average concentration objective of 0.3 mg/L for Total Phosphorus. The monthly average results for 2022 were calculated as required and are presented in the following table.

Table 5. Total Phosphorous 2022 Monthly Average Concentrations Comparison to Objective

Month	Monthly Average Objective (mg/L)	Effluent Monthly Average (mg/L)	Objective Met Y/N
January	0.3	0.70	N
February	0.3	0.25	Y
March	0.3	0.37	N
April	0.3	0.17	Y
May	0.3	0.20	Y
June	0.3	0.10	Y
July	0.3	0.07	Y
August	0.3	0.08	Y
September	0.3	0.06	Y
October	0.3	0.08	Y
November	0.3	0.06	Y
December	0.3	0.06	Y

The Total Phosphorus average for January and March did not meet the Objective. As previously noted, the plant was operating outside of normal conditions January to May and experienced an emergency partial bypass of the sand filters on March 19 - 25, 2022 due to weather which impacted the TP results. Bypass and operations outside of normal conditions information is included in item j of this report.

Graph 12: 2022 Monthly Final Effluent Total Phosphorus Concentration Comparisons



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Limit (mg/L)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Objective (mg/L)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Avg (mg/L)	0.70	0.25	0.37	0.17	0.20	0.10	0.07	0.08	0.06	0.08	0.06	0.06

ECA No. 3688-BW3RGB has a monthly average daily loading limit of 0.9 kg/d for Total Phosphorus. The monthly average results for 2022 were calculated as required for each approval and are presented in the following table.

Table 6. Total Phosphorous 2022 Monthly Average Daily Loading Comparison to Limit

Month	Monthly Average Daily Loading Limit (kg/d)	Effluent Monthly Average Daily Loading (kg/d)	Compliant Y/N
January	0.9	0.68	Y
February	0.9	0.31	Y
March	0.9	0.69	Y
April	0.9	0.26	Y
May	0.9	0.22	Y
June	0.9	0.16	Y
July	0.9	0.07	Y
August	0.9	0.07	Y
September	0.9	0.05	Y

Month	Monthly Average Daily Loading Limit (kg/d)	Effluent Monthly Average Daily Loading (kg/d)	Compliant Y/N
October	0.9	0.07	Y
November	0.9	0.05	Y
December	0.9	0.07	Y

Total Ammonia Nitrogen (TAN)

ECA No. 3688-BW3RGB has monthly Total Ammonia Nitrogen (TAN) concentration limits a based on seasonal periods within the annual year. The following table compares monthly results to the limits for seasonal concentrations. The plant operated outside of normal conditions from January – May 2022 due to the failure of both WAS/RAS pumps. Additionally, emergency partial bypassing of the sand filters due to weather occurred March 19 – 25 and June 12 – 13, 2022. These events impacted the TAN results and the ECA limits were exceeded for January, February, March and April. Bypass and operations outside of normal conditions information is included in item j of this report. Reports to MECP are included in Appendix V.

Table 7. Total Ammonia Nitrogen 2022 Monthly Average Concentration Comparison to Limits

Month	Monthly Average Concentration Limit (mg/L)	Effluent Monthly Average (mg/L)	Compliant Y/N
January	7.0	8.49	N
February	7.0	7.78	N
March	7.0	8.12	N
April	3.5	6.71	N
May	3.5	<1.21	Y
June	3.5	<0.26	Y
July	3.5	<0.10	Y
August	3.5	<0.10	Y
September	3.5	<0.10	Y
October	3.5	<0.10	Y
November	7.0	<0.23	Y
December	7.0	<0.26	Y

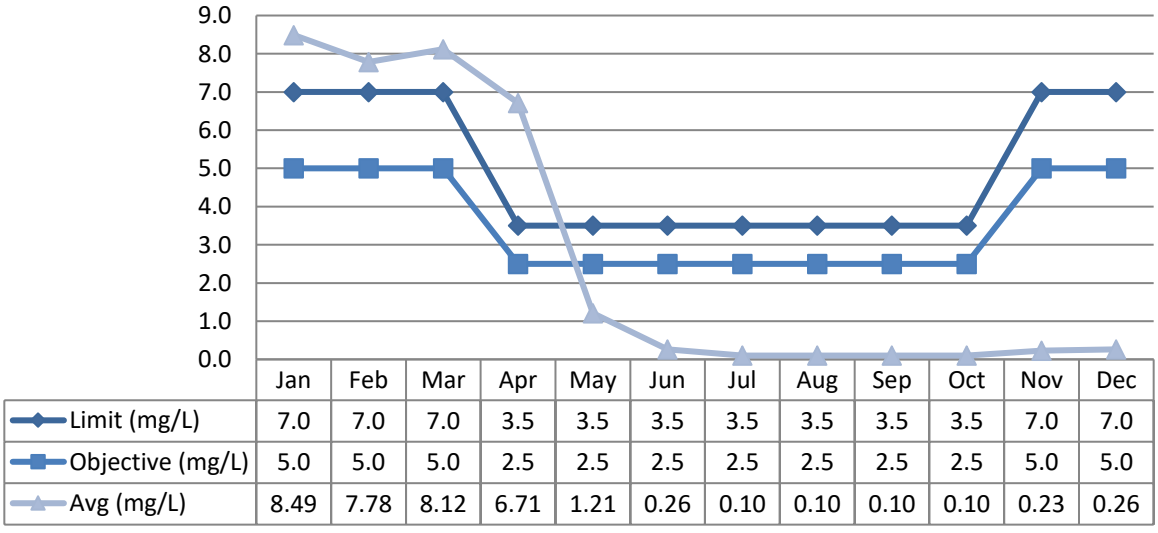
Total Ammonia Nitrogen (TAN) concentration objectives are calculated monthly based on seasonal periods within the annual year for ECA No. 3688-BW3RGB. The following

table compares all results to the objectives for seasonal concentrations. As previously noted, the plant was operating outside of normal conditions January to May and experienced an emergency partial bypass of the sand filters on March 19 - 25, 2022 due to weather which impacted the TAN results. Bypass and operations outside of normal conditions information is included in item j of this report.

Table 8. Total Ammonia Nitrogen 2022 Monthly Average Concentration Comparison to Objectives

Month	Monthly Average Concentration Objective (mg/L)	Effluent Monthly Average (mg/L)	Objective Met Y/N
January	5.0	8.49	N
February	5.0	7.78	N
March	5.0	8.12	N
April	2.5	6.71	N
May	2.5	<1.21	Y
June	2.5	<0.26	Y
July	2.5	<0.10	Y
August	2.5	<0.10	Y
September	2.5	<0.10	Y
October	2.5	<0.10	Y
November	5.0	<0.23	Y
December	5.0	<0.26	Y

Graph 13: 2022 Monthly Final Effluent Total Ammonia Nitrogen Concentration Comparisons



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Limit (mg/L)	7.0	7.0	7.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5	7.0	7.0
Objective (mg/L)	5.0	5.0	5.0	2.5	2.5	2.5	2.5	2.5	2.5	2.5	5.0	5.0
Avg (mg/L)	8.49	7.78	8.12	6.71	1.21	0.26	0.10	0.10	0.10	0.10	0.23	0.26

Total Ammonia Nitrogen (TAN) monthly average daily loading limits are calculated based on seasonal periods within the annual year for ECA No. 3688-BW3RGB. The following table compares all results to the limits for monthly average daily loading results. As previously noted, the plant was operating outside of normal conditions January to May and experienced an emergency partial bypass of the sand filters on March 19 - 25, 2022 due to weather which impacted the TAN results. Bypass and operations outside of normal conditions information is included in item j of this report. Reports to MECP are included in Appendix V.

Table 9. Total Ammonia Nitrogen 2022 Monthly Average Daily Loading Results Comparison to Limits

Month	Monthly Average Daily Loading Limit (kg/d)	Effluent Monthly Average Daily Loading (kg/d)	Compliant Y/N
January	12.6	8.28	Y
February	12.6	9.74	Y
March	12.6	15.18	N
April	6.3	10.09	N
May	6.3	<1.32	Y
June	6.3	<0.40	Y
July	6.3	<0.10	Y
August	6.3	<0.09	Y
September	6.3	<0.15	Y
October	6.3	<0.09	Y
November	12.6	<0.20	Y
December	12.6	<0.32	Y

E. Coli

ECA No. 3688-BW3RGB has a compliance monthly geometric mean density limit of 200 cfu/100mL. Many wastewater treatment facilities must test for and report results using a 'Geometric Mean' (average) of all the test results obtained during a specific reporting period. The geometric mean calculation is different than a normal arithmetic mean (average) calculation and is considered to be a more accurate calculation. A geometric mean, unlike an arithmetic mean, tends to dampen the effect of very high or low values which might bias the mean if a straight average (arithmetic mean) were calculated.

The following provides monthly geometric mean density values of E. Coli in effluent for each month in 2022.

Table 10. E.coli 2022 Results Comparison to Limit

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthly Geometric Mean Density of E. Coli (org/100mL)	20	25	53	3	2	2	2	2	2	3	2	2
Compliant with Limit of 200 cfu/100 mL (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

ECA No. 3688-BW3RGB has a monthly geometric mean E. Coli objective of 150 cfu/100mL. The following provides monthly geometric mean density values of E. Coli in effluent for each month in 2022 compared to the objective.

Table 11: E.coli 2022 Results Comparison to Objective

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthly Geometric Mean Density of E. Coli (org/100mL)	20	25	53	3	2	2	2	2	2	3	2	2
Met Objective of 150 cfu/100 mL (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

pH

ECA No. 3688-BW3RGB has a pH compliance limit within the range of 6.0 to 9.5, inclusive, for every single sample result. One pH reading in 2022 was outside the compliance limits. On August 22, 2022, a final effluent pH of 5.92 was recorded. This was reported to MECP Peterborough District Office (see Appendix V). The Aluminum Sulphate dosing rate was decreased in order to help raise the pH. A summary of effluent pH measurements recorded in 2022 is provided in Appendix I.

Table 12: pH 2022 Results Comparison to Limit

Limit 6.0 – 9.5	ECA No. 3688-BW3RGB Every Single Sample Result
	Compliant Y/N
Results range: 5.92 – 7.76	N

ECA No. 3688-BW3RGB has a pH objective within the range of 6.0 to 9.5, inclusive, for every single sample result.

Table 13: pH 2022 Results Comparison to Objective

Objective 6.5 – 9.0	ECA No. 3688-BW3RGB Every Single Sample Result
	Objective Met Y/N
Results range: 5.92 – 7.76	N

Field pH results were below the lower objective of 6.5 as follows:

February 7	6.33
February 10	6.46
February 11	6.43
February 14	6.32
August 10	6.23
August 11	6.27
August 12	6.32
August 15	6.19
August 16	6.10
August 17	6.04
August 19	6.30
August 22	5.92
August 23	6.11
August 25	6.06
August 26	6.02
September 6	6.37

Un-Ionized Ammonia

The concentration of un-ionized ammonia is calculated using the TAN concentration, field pH and field temperature using the methodology stipulated in “Ontario’s Provincial

Water Quality Objectives" dated July 1994, as amended. Un-ionized ammonia results are provided in Appendix I.

The results in the preceding tables show the limits for concentrations and loadings of the final effluent CBOD5 and Total Suspended Solids were met. CBOD5 objective was also met however the Total Suspended Solids concentration objective was not. The monthly Total Phosphorus limit was exceeded in January but met for the remainder of the year, while the objective was not met for January and March. The monthly Total Phosphorus loadings limit was met. Total Ammonia Nitrogen monthly concentration limits and objectives were exceeded from January to April and the monthly loadings limits were exceeded for March and April. The loss of both WAS/RAS pumps from January to May impacted the plant's ability to treat the wastewater, particularly the Total Ammonia Nitrogen. Information regarding the operational challenges during this period is included in section c below.

E. Coli results met the limits and objectives of ECA No. 3688-BW3RGB. One result for field pH was below the lower limit required by ECA No. 3688-BW3RGB and 16 field pH results were below the lower objective of 6.5 as noted earlier in this report.

Refer to Appendix I for Performance Assessment Report and Summaries of Effluent CBOD5, TSS, TP, TAN, TKN, E. Coli, and pH Results. Also included in Appendix I are the un-ionized ammonia results for 2022.

c. a summary of all operating issues encountered and corrective actions taken;

The following table describes all operating problems encountered during the reporting period and the corrective actions taken.

Table 14: Summary of Operating Issues

Date	Challenges	Corrective Actions
January – May 2022	Both WAS/RAS pumps failed in January. Due to the pandemic's impact on supply of materials, replacements pumps did not arrive until May. Winter weather conditions impacted ability to waste/return with external pumps.	Process monitored, daily composite samples collected, external pump utilized in clarifier to act as a return/water pump – cold temperatures hindered use of this pump.
Mar 19 – 25, 2022	Warm temperatures and snow melt caused high flows – secondary treatment and disinfection provided; however, sand filters hydraulically overloaded and required partial bypassing.	Flows, process monitored throughout event – samples collected and analyzed as per ECA requirements – plant was already operating outside of normal conditions as noted above. Notifications made to MOH and SAC. Detention tank utilized.

Date	Challenges	Corrective Actions
Jun 12 – 13, 2022	Heavy rain/storm event resulted in high flows – secondary treatment and disinfection provided; however, sand filters hydraulically overloaded and required partial bypassing.	Flows, process monitored throughout event – samples collected and analyzed as per ECA requirements. Detention tank utilized, additional staff called in to assist, additional hauling by licensed sewage hauler from Ellice St SPS to plant. Notifications made to MOH and SAC.
Jun 12, 2022	Heavy rain/storm event caused high flows resulting in raw sewage overflow at Colborne St. SPS.	Monitored flows, detention tank utilized, additional staff called in to assist, additional hauling by licensed sewage hauler from Ellice St SPS to plant to help reduce volume. Notifications made to MOH and SAC.
Dec 31 2022 – Jan 6, 2023	Unseasonably warm temperatures, heavy rain/storm events after significant snowfall accumulation resulted in high flows – secondary treatment and disinfection provided; however, sand filters hydraulically overloaded and required partial bypassing.	Flows, process monitored throughout event – samples collected and analyzed as per ECA requirements. Detention tank utilized, additional staff called in to assist. Notifications made to MOH and SAC.

d. 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;

OCWA uses a Work Maintenance System (WMS) to schedule normal maintenance activities and track repairs. WMS is a maintenance tracking system that can generate work orders as well as give summaries of completed and scheduled work. During the year, the operating authority at the facility generates scheduled work orders on a weekly, monthly and annual basis. The service work is recorded in the work order history. This ensures routine and preventive maintenance is carried out and assets are maintained to manufacturer's and/or industry standards. Emergency and capital repair maintenance is completed and added to the system.

Refer to Appendix II for work order and maintenance summary.

e. a summary of any effluent quality assurance or control measures undertaken;

Effluent quality assurance is maintained in several ways. Laboratory samples are sent to accredited laboratory (SGS Lakefield) for analysis of all effluent parameters. Sampling calendars issued to the operator denote frequency of sampling and these calendars are submitted to the Process Compliance Technician at the end of each month. Raw and effluent samples are collected as per ECA No. 3688-BW3RGB and the results are reviewed on a regular basis to ensure compliance with the site's objectives and limits.

Effluent control measures include in-house sampling and testing for operational parameters such as pH, temperature, phosphorus, dissolved oxygen, 30 minute settling and Mixed Liquor Suspended Solids (MLSS). In-house testing provides real time results which are then evaluated to determine if process changes are necessary to enhance operational performance. All in-house sampling and analysis are performed by certified operations staff utilizing approved methods and protocols for sampling, analysis and recording as specified in the Ministry's Procedure F-10-1, "Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works", the Ministry's publication, "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" and the publication, "Standard Methods for the Examination of Water and Wastewater".

Work orders are scheduled through our asset maintenance management system to ensure preventative and corrective maintenance is completed and recorded by operations staff. A summary is attached as Appendix II. Flow meters are calibrated annually and the 2022 calibration report is provided in Appendix III.

OCWA conducts internal audits of facilities and develops Action Plans to ensure deficiencies are identified and corrected. OCWA has developed comprehensive manuals detailing operations, maintenance, instrumentation and emergency procedures. To ensure facilities are operated in compliance with applicable legal requirements, facility staff has access to a network of compliance and support professionals at the hub, region and corporate level.

Continuous phosphorus removal is achieved with the dosing of aluminum sulphate. A summary of its use and dosing rates for 2022 is provided in the following table.

Table 15: Coagulant Use and Dosing 2022

Month	Aluminum Sulphate (kg)	Aluminum Sulphate Average Dosage (mg/L)
January	1946.40	51.20

Month	Aluminum Sulphate (kg)	Aluminum Sulphate Average Dosage (mg/L)
February	1876.40	57.99
March	1802.70	34.38
April	1930.90	42.75
May	1964.07	59.36
June	1836.30	44.21
July	1894.60	63.71
August	2067.20	76.20
September	1989.00	81.08
October	1975.00	75.97
November	1875.60	72.58
December	1904.50	56.50

f. 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;

Refer to Appendix III for 2022 calibration reports.

g. a summary of efforts made to achieve the design objectives in this Approval, including an assessment of the issues and recommendations for pro-active 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;

Continuous efforts were made to meet the Effluent Objectives in 2022:

1. Development of the sampling plan which meets or exceeds the minimum sample requirements as required in the ECA;
2. Visual Inspection of the entire process while performing rounds including visual inspection of effluent to ensure it did not contain oil or other substance in amounts sufficient to create a visible film or sheen

on the surface of the receiving waters, and which was essentially free of any floating material;

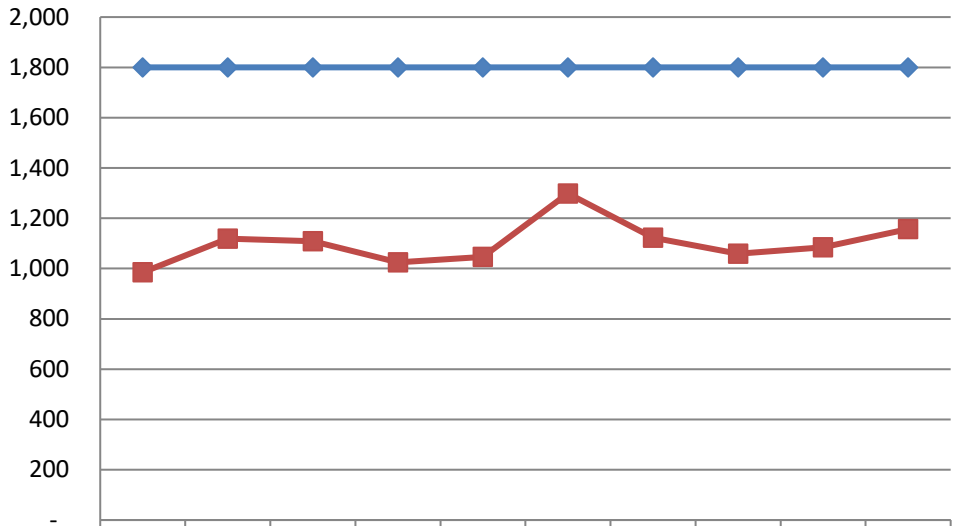
3. Influent monitoring;
4. Ensuring that chemicals are being dosed as required;
5. Calibration of lab equipment;
6. Annual calibration of flow meters;
7. Oxidation ditch increased DO monitoring;
8. Ensure UV is providing disinfection, both banks on regardless of flow rates;
9. Performing preventative maintenance activities in accordance with work order schedules;
10. Performing in-house lab tests;
11. Monitoring treatment processes by performing regular laboratory analysis and reviewing of lab results;
12. Biosolids monitoring

Effluent design objectives were met 100% of the time for CBOD and E. Coli. Total Suspended Solids did not meet the design objective for the annual average concentration of 15mg/L due to the loss of the WAS/RAS pumps from January to May 2022. Total Phosphorus monthly concentration design objective was met 83.3% in 2022 and pH objective was met 93.9% in 2022. Total Ammonia Nitrogen monthly concentration design objectives were met 66.7% in 2022. The loss of the WAS/RAS pumps from January to May greatly impacted the plant's ability to treat Total Ammonia Nitrogen. The plant operated outside of normal conditions from January to May without WAS/RAS pumps and sampling was undertaken as required by ECA No. 3688-BW3RGB. Three partial sand filter bypasses that occurred in March, June and December were sampled as required by ECA No. 3688-BW3RGB. One overflow occurred at the Colborne St. SPS in March and was sampled as required by ECA No. 3688-BW3RGB. Details of the bypasses and sampling results are included under Condition j.

The ECA states the plant has a Rated Capacity of 1,800m³/day. The Rated Capacity means the Average Daily Flow for which the plant is approved to treat. The Average Daily Flow is determined by the cumulative total sewage flow into the plant during a calendar year, which is then divided by the number of days during which sewage flowed into the plant. The annual average daily influent flow for 2022 is 1,157.53m³/day or 64% of the Rated Capacity.

The following graph shows the plant has been operating within the Rated Capacity for the past ten years.

Graph 14: Average Sewage Flow and Rated Capacity Comparisons



	2012	2013	2014	2015	2016	2017	2018	2020	2021	2022
Rated Capacity m^3/day	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
Average Sewage Flow (m^3/day)	985	1,119	1,108	1,025	1,046	1,299	1,122	1,060	1,084	1,158

h. 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;

Attached is Appendix IV: Sludge/Biosolids Summary that contains quantities of organics, inorganics, e-coli and volumes of Biosolids/sludge generated for the reporting period - which was a total of 2,439.6m^3. This is an increase from 2021 when 1,978.6m^3 of biosolids were hauled. The anticipated volume for the next reporting period is not expected to be appreciably different from this reporting period.

Biosolids from the Fenelon Falls WPCP were hauled, stored and land applied by Shepherds Environmental in 2022 and will be again in 2023. The Biosolids are hauled to fields with a valid NASM Plan (NASM Plan 23771) or to A710160 Shepherds Environmental Storage Structure.

i. a summary of any complaints received and any steps taken to address the complaints

Table 16: Complaints Received Summary for 2022

None received by OCWA

j. 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;

The following table summarizes all Bypasses, Overflows and other situations outside of Normal Operating Conditions and spills and abnormal discharge events that occurred in 2021. The Operations Event Forms and sampling results for these events are provided in Appendix V. All were reported to MOH, MECP and the City.

Table 17: 2022 Summary of Events as per Condition 11.4.j

Date 2022	**Type of Event**	**Total Volume (m^3)**	**Disinfect (Y/N)**	**Samples Collected (Y/N)**	**Reason**
January – May 2022	Outside of Normal Conditions	-	Y	Y	WAS/RAS pumps failed. Replacement pumps not available until May 2022
Mar 19 – 25, 2022	Partial Sand Filter Bypass	1,718	Y	Y	Wet weather event
June 12 – 13, 2022	Partial Sand Filter Bypass	525	Y	Y	Wet weather event
June 12, 2022	Colborne St. SPS Overflow	1,620	N	Y	Wet weather event
Dec 31, 2022 – Jan 6,	Partial Sand Filter Bypass	3,381	Y	Y	Wet weather event

ECA No. 3688-BW3RGB requires submission of quarterly summary reports of any Bypass Events and Overflows Events. Copies of these reports are provided in Appendix V

k. 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 modification.

No Notice of Modifications was submitted in 2022 to the District Manager as a result of Schedule B, Section 1.

l. 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.

The City of Kawartha Lakes has commenced a Master Servicing plan including an analysis of all facilities for capacity and condition. Through the reconstruction and urbanization program, sanitary sewer mains have been replaced within the collection system minimizing infiltration and installing storm sewer infrastructure for property owners to connect any private roof leaders, sump pumps etc, where feasible.

Roads that have been/scheduled to be reconstructed are:
Wychwood Crescent (Ellice Street to School)
Colborne Street (Water St. to Bond St.)
Murray Street (Green St. to West St.)
Ellice Street (Murray St to Wychwood Cres) – proposed construction
Elliot Street (Murray Street to Lindsay Street) – proposed construction

Sanitary sewer flushing is conducted on an annual basis (3 years of dead ends/trouble areas and 4th year is full system flush). During this program, any manholes with infiltration issues have been identified and repairs completed. Below is a summary of operational activities that have been completed beginning in 2019.

Manhole Rehabilitation

2019
20 John St. – Replaced 18” moduloc plus new frame and cover
9 Green St. W – Replaced 18” moduloc plus new frame and cover
174 Ellice St. – Replaced 14” moduloc plus new frame and cover
24 Elgin St. – Replaced 30” moduloc plus new frame and cover

2021
Francis St. @ Janlisda Dr – Pressure grouting (Infiltration at SE wall at MH joint)

Murray St. @ Green St. – Pressure grouting (water boiling from bottom trough/pipe, under ladder)
Ellice St (1st manhole South of Wychwood) – Pressure grouting (Infiltration around inlet pipe)
123 Murray St. – Pressure grouting (around manhole lid)
70 West St. N Dead End – Pressure grouting (around 4" lateral)
North St. @ Veteran's Way – Pressure grouting (cracks in sewer lateral downstream of manhole)
61 Bond St. – Replaced 2" moduloc plus new frame and cover
Bond St. at Market St. – Replace frame and cover
Unit 11 Louisa St. – Lateral benching
50 Kennedy Dr. – Replaced 21 1/2" moduloc, reset existing frame and cover
21 Albert St. – Replaced 12" moduloc plus new frame and cover
130 Queen St. – Manhole had been paved over, removed asphalt, raised and replaced 16" moduloc and new frame and cover
150 Queen St. – Manhole had been paved over, removed asphalt and raised
John St. @ Louisa St. – Replaced 12" moduloc, 1 ladder rung and new frame and cover

2022
Bond st. @ Kennedy St. – Pressure grouting (infiltration from top of benching)
Bond St. @ Home Furniture – Pressure grouting (infiltration to manhole via 2 pinhole leaks in concrete)
16 West St. S – Pressure grouting (infiltration from pinhole leak in concrete at base of manhole)
Helen St. (@ Fenelon Inn) – Replaced 18" moduloc, raise to road grade and replace frame and cover
Helen St. @ King St. – Replaced frame and cover and raise to road grade
56/52 Helen St. – Replace 8" moduloc and replace frame and cover
Helen St. @ West St. N – Replace frame and cover and raise to road grade
Helen St. @ North St. – Replace 20" moduloc and replace frame and cover and raise to road grade
Colborne St. @ Veteran's Way – Replace 12" moduloc and replace frame and cover

Rain Bladder Installs

2020
MH2026 – Queen St.
MH2072 – Murray St.
MH2108 – Murray St.

MH2024 – Ellice St.
MH2167 – Albert St.
MH2027 – Albert St.
MH2068 – John St.
MH2087 – 8 Colborne St.

2021
MH2074 – Lindsay St.
MH2015 – Green St. W
MH2164 – Lindsay St.
MH2026 – Queen St.

2022
MH2071 – Queen St.
MH2027 – Albert St.
MH2015 – Green St. W (had to replace because it fell in)

Other Repairs/Work

2020
76 Bond St. E – lateral replacement
2022
CCTV Infiltration John St. (lead to manhole repair, water valve was also leaking in area)

The estimated budget forecast for 2023 includes:

Collection System Flushing and Closed Circuit Television Video (CCTV) - $100,000
Manhole repairs - $35,000

m. a summary of any deviation from the monitoring schedule and reasons for the current reporting year and a schedule for the next reporting year

ECA No. 3688-BW3RGB Schedule D Monitoring Program describes the requirement for sample collection at the following locations, frequencies and by means of the specified sample type and analyzed for each parameter listed and all results recorded:

Table 18: Influent – Influent sampling point

Parameter	Type of Sample	Minimum Sampling Frequency
BOD_5	24 hour composite	Monthly
Total Suspended Solids	24 hour composite	Monthly
Total Phosphorus	24 hour composite	Monthly

Parameter	Type of Sample	Minimum Sampling Frequency
Total Kjeldahl Nitrogen	24 hour composite	Monthly

Table 19: Final Effluent – Final Effluent Sampling Point

Parameter	Type of Sample	Minimum Sampling Frequency
$CBOD_5$	24 hour composite	Weekly
Total Suspended Solids	24 hour composite	Weekly
Total Phosphorus	24 hour composite	Weekly
Total Ammonia Nitrogen	24 hour composite	Weekly
Total Kjeldahl Nitrogen	24 hour composite	Weekly
Nitrate as Nitrogen	24 hour composite	Weekly
Nitrite as Nitrogen	24 hour composite	Weekly
E. Coli	Grab	Weekly
pH*	Grab/Probe/Analyzer	Weekly
Temperature*	Grab/Probe/Analyzer	Weekly
Un-ionized Ammonia**	As Calculated	Weekly

*pH and temperature of the Final Effluent shall be determined in the field at the time of sampling for Total Ammonia Nitrogen.
** The concentration of un-ionized ammonia shall be calculated using the total ammonia concentration, pH and temperature using the methodology stipulated in ”Ontario’s Provincial Water Quality Objectives” dated July 1994, as amended.

The following tables provide a summary of the number of samples collected each month for those parameters required for analysis.

Table 20: Number of Raw Sewage Parameters Tested in 2022

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
BOD_5	1	1	1	1	1	1	1	1	1	1	1	1
TSS	1	1	1	1	1	1	1	1	1	1	1	1
Total P	1	1	1	1	1	1	1	1	1	1	1	1
TKN	1	1	1	1	1	1	1	1	1	1	1	1

Table 21: Number of Final Effluent Parameters Tested in 2022

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
$cBOD_5$	23	28	31	30	20	7	4	4	5	4	4	5
TSS	23	28	31	30	20	7	4	4	5	4	4	5
Total P	23	28	31	30	20	7	4	4	5	4	4	5
Total Ammonia Nitrogen	23	28	31	30	20	7	4	4	5	4	4	5

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
TKN	23	28	31	30	20	7	4	4	5	4	4	5
Nitrite as N	23	28	31	30	20	7	4	4	5	4	4	5
Nitrate as N	23	28	31	30	20	7	4	4	5	4	4	5
E. Coli	4	4	7	4	4	5	4	4	5	4	4	5
pH	24	28	31	30	24	21	18	19	19	18	15	16
Temp ^{o}C	24	28	31	30	24	21	18	19	19	18	15	16
Unionized Ammonia (calculated)	23	28	31	30	20	7	4	4	5	4	4	5

The required number of influent and final effluent samples were collected at the specified locations and frequencies during the reporting period as per ECA No. 3688-BW3RGB Schedule D. There following are deviations from the scheduled sampling calendar in 2022:

January - May – additional sampling when operating outside of normal conditions and partial sand filter bypassing
June – additional sampling during partial sand filter bypassing

ECA No. 3688-BW3RGB Schedule D prescribes the following sampling requirements for Sludge/Biosolids as shown in the following table.

Table 22: Sludge/Biosolids – holding tank/truck loading bay

Parameter	Type of Sample	Minimum Sampling Frequency
Total Solids	Grab	Quarterly
Total Phosphorus	Grab	Quarterly
Total Ammonia Nitrogen	Grab	Quarterly
Nitrate as Nitrogen	Grab	Quarterly
Metal Scan - Arsenic - Cadmium - Cobalt - Chromium - Copper - Lead - Mercury - Molybdenum - Nickel - Potassium - Selenium - Zinc	Grab	Quarterly

Table 23: Number of Sludge/Biosolids Parameters Tested in 2022

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Total Solids	1	1	1	1	1	1	2	1	1	1	2	1
TP	1	1	1	1	1	1	2	1	1	1	2	1
TAN	1	1	1	1	1	1	2	1	1	1	2	1
Nitrate as Nitrogen	1	1	1	1	1	1	2	1	1	1	2	1
Arsenic	1	1	1	1	1	1	2	1	1	1	2	1
Cadmium	1	1	1	1	1	1	2	1	1	1	2	1
Cobalt	1	1	1	1	1	1	2	1	1	1	2	1
Chromium	1	1	1	1	1	1	2	1	1	1	2	1
Copper	1	1	1	1	1	1	2	1	1	1	2	1
Lead	1	1	1	1	1	1	2	1	1	1	2	1
Mercury	1	1	1	1	1	1	2	1	1	1	2	1
Molyb-denum	1	1	1	1	1	1	2	1	1	1	2	1
Nickel	1	1	1	1	1	1	2	1	1	1	2	1
Potassium	1	1	1	1	1	1	2	1	1	1	2	1
Selenium	1	1	1	1	1	1	2	1	1	1	2	1
Zinc	1	1	1	1	1	1	2	1	1	1	2	1

Sludge/biosolids samples are collected typically once per month when sludge/biosolids are hauled from the facility. This meets the required minimum number samples at the specified location and frequency during the reporting period as required by ECA No. 3688-BW3RGB Schedule D.

The 2023 sample schedule for the Fenelon Falls WPCP is provided in Appendix VII.