Bobcaygeon Wastewater Treatment Plant

Works # 110002498

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
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2022 Performance Report for Bobcaygeon Waste Water Treatment Facility

Amended Environmental Certificate of Approval (ECA) #3028-AEUKDQ Section 11(4) requires the Performance Report to contain the following:

a) a summary and interpretation of all monitoring data and a comparison to the Final Effluent limits outlined in Compliance Limits condition, including an overview of the success and adequacy of the Works;

b) a description of any operating problems encountered and corrective actions taken;

c) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works;

d) a summary of any effluent quality assurance or control measures undertaken in the reporting period;

e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;

f) a description of efforts made and results achieved in meeting the Design Objectives of Condition 6;

g) 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;

h) a summary of any complaints received during the reporting period and any steps taken to address the complaints;

i) a summary of all By-pass, spill or abnormal discharge events;

j) a copy of all Notice of Modifications submitted to the Water Supervisor as a result of Schedule B, Section 1, with a status report on the implementation of each modification;

k) a report summarizing all modifications completed as a result of Schedule B, Section 3; and

l) any other information the Water Supervisor requires from time to time; and

ECA #3028-AEUKDQ Section 6(3) states “The Owner shall make an assessment of the issues and recommendation of pro-active actions if any is required under the following situations and include in the annual report to the Water Supervisor:

a. when any of the design objectives is not achieved consistently; ·
b. when the Annual Average Daily Flow reaches 80% of the Rated Capacity.”

Bobcaygeon Wastewater Treatment Plant – 2022 Performance Report

The following is a report from the records maintained by the Ontario Clean Water Agency for the Bobcaygeon WWTP for the calendar year 2022:

(a,f) Overall, the plant process ran well in 2022. The following tables summarize the monthly effluent quality results in comparison to the effluent limits, Condition 7 of Certificate of Approval #3028-AEUKDQ (issued April 10, 2017).

Attached as **Appendix I** is a copy of the 2022 Performance Assessment Report (PAR) and loading calculations for the Bobcaygeon WWTP, for the facility's combined final effluent. The PAR contains: a tabulation of all monthly average raw sewage and final effluent sample results obtained during the reporting period, a tabulation of average daily flows, and monthly volumes for the reporting period, and a tabulation of calculated total loading of BOD/CBOD^5, suspended solids, total phosphorus, and ammonia + ammonium as N concentrations in the final effluent.

The Bobcaygeon WWTP has a Rated Capacity of 3,055 m³/day and a Peak Capacity of 10, 440 m³/day. The total final effluent flow was 834,579.00 m^3 and the average daily flow was 2,286.52 m^3/day which is 76.07% of the rated capacity.

A sanitary sewer flow monitoring study was completed by Civica in 2015 and identified several areas where excess I&I flow is coming into the collection system (i.e. Infiltration – joints, cracks, manhole covers, etc., sump pumps, storm drain tie-ins, etc). By isolating and addressing/maintaining the main areas of concern, the number of high flow events and the flow peaking factor to the WWTP will be reduced, which will have a positive impact on the current plant process and will defer future plant expansion/major capital upgrades and the associated costs. Furthermore, CCTV inspections were completed along with the sanitary sewer flushing of the entire collection system in 2022. The findings of the CCTV inspections is being reviewed with recommendations for repairs for any deficiencies identified, and will inform future rehabilitation projects.

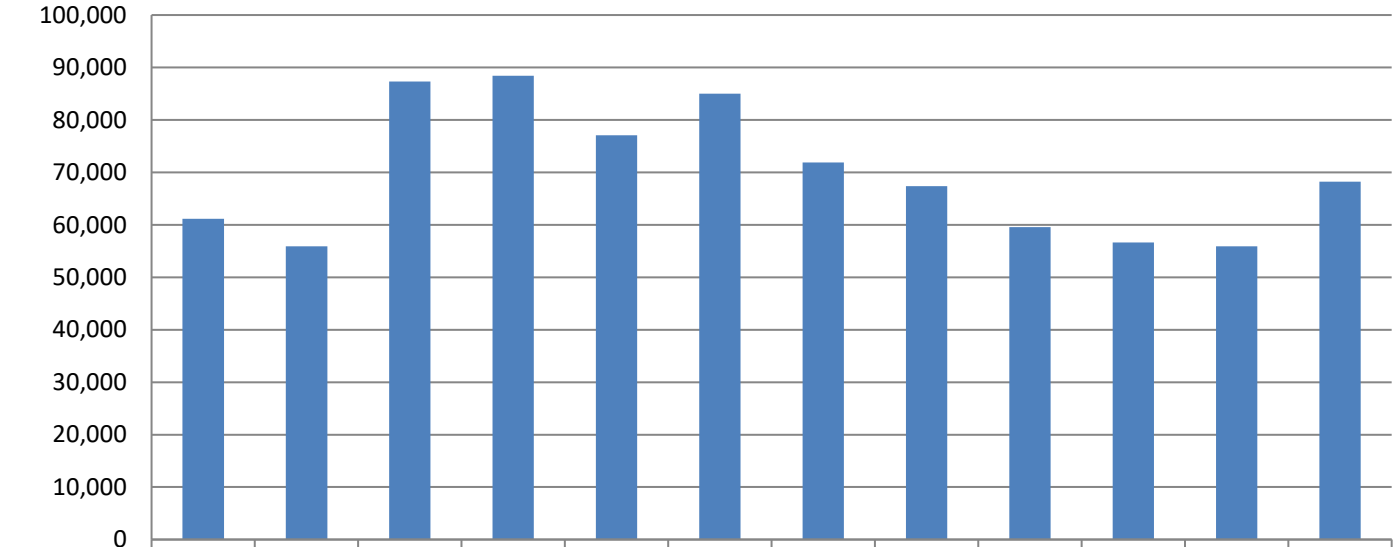
OCWA initiated a Facility Optimization Program (FOP) in 2017 for the Bobcaygeon WWTP. Through the FOP, a comprehensive review of plant performance was conducted. This report provides details of the program and key findings through review of background information, plant treatment performance and capacity evaluation to establish opportunities for improved plant operations. To evaluate the impact of inflow and infiltration (I&I) on the influent flows to the plant, the historical flow data was analyzed**.** Over a 36-month period, the average influent flow to the facility increased by 50% and the average flow exceeded the rated design capacity of 3,055 m^3/d in 2017 by 5%. The influent concentrations became more dilute on average over the 36-month period. The increased flows and decreased organic loading is an indicator of significant I&I into the collection system.

Precipitation data from 2017 from the Environment Canada website for the weather station nearest to Bobcaygeon (Peterborough, ON) was analyzed to determine if there was a correlation between higher precipitation and higher flows to the plant.

The correlation between the periods of high influent flow and high precipitation amounts is strong, particularly in the spring season. A peak in the precipitation trend is immediately followed by a peak in the influent flow to the plant.

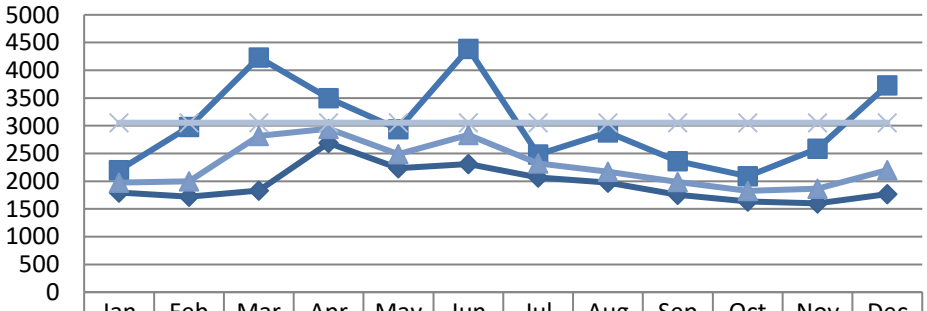
OCWA will continue ongoing efforts to work in partnership with the City of Kawartha Lakes to reduce I&I to reduce the flows to the wastewater treatment plant.

Graph 1: 2022 Final Effluent Flow Monthly Totals



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Flow (m^3)	61,175	55,922	87,330	88,408	77,081	85,032	71,886	67,407	59,542	56,621	55,933	68,242

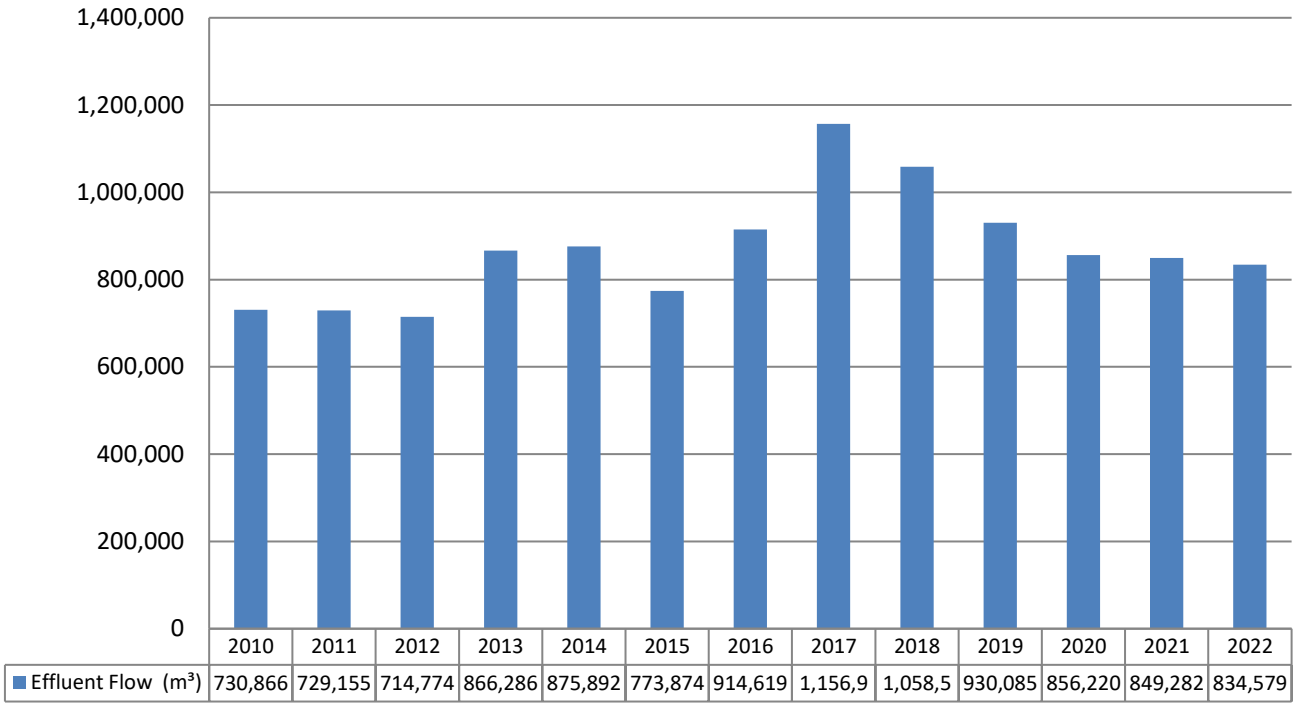
Graph 2: 2022 Final Effluent Daily Minimum, Maximum and Average Flows



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Min (m^3/day)	1797	1719	1833	2690	2236	2309	2070	1978	1758	1637	1601	1766
Max (m^3/day)	2198	2979	4234	3498	2937	4389	2484	2881	2362	2090	2589	3732
Avg(m^3/day)	1973	1997	2817	2947	2486	2834	2319	2174	1985	1826	1864	2201
Rated Capacity (m^3/day)	3055	3055	3055	3055	3055	3055	3055	3055	3055	3055	3055	3055

There may be instances where effluent flow exceeded the Rated Capacity on a monthly basis. However, Rated Capacity is calculated as an annual average daily flow rate, which was met in 2022.

Graph 3: Historical Effluent Flows from 2010 to 2022



ECA #3028-AEUKDQ (issued April 10, 2017) Condition 9(3) 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 1: Minimum Sampling Requirements

Influent Sampling Point

Parameters	Sample Type	Frequency
BOD5	Composite	Monthly
Total Suspended Solids	Composite	Monthly
Total Phosphorus	Composite	Monthly
Total Kjeldahl Nitrogen	Composite	Monthly

Final Effluent Sampling Point

Parameters	Sample Type	Frequency
CBOD5	Composite	Weekly
Total Suspended Solids	Composite	Weekly
Total Phosphorus	Composite	Weekly
Total Ammonia Nitrogen	Composite	Weekly
E. coli	Grab	Weekly
pH	Grab	Weekly
Temperature	Grab	Weekly
Acute Lethality to Rainbow Trout and Daphnia magna	Grab	Quarterly

Effluent Parameter Summary

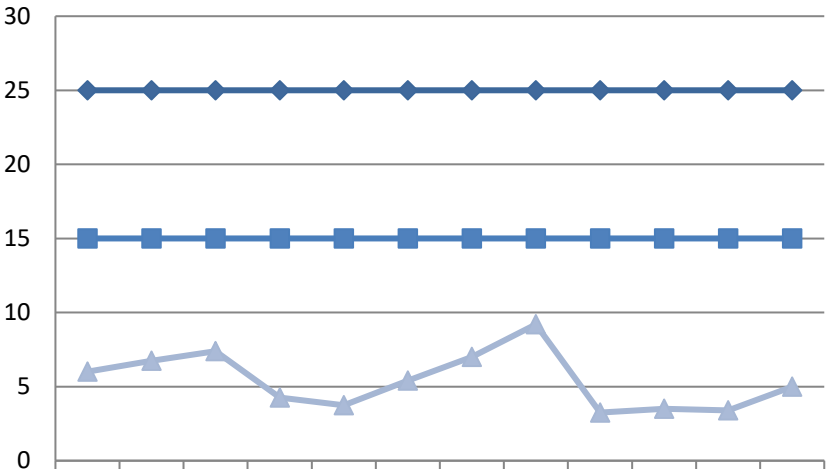
Carbonaceous Biochemical Oxygen Demand (CBOD5)

ECA #3028-AEUKDQ sets the CBOD5 monthly average concentration limit at 25.0 mg/L and the monthly average waste loading at 76.4 kg/day. The monthly CBOD5 average concentration results and monthly average waste loading results were in compliance with the limits and objectives outlined in ECA 3028-AEUKDQ in every month in 2022.

CBOD5 Monthly Average Concentration

The monthly CBOD5 monthly average concentration limit and monthly concentration objective were met each month in 2022

Graph 4: 2022 Monthly CBOD5 Final Effluent Concentration Comparisons



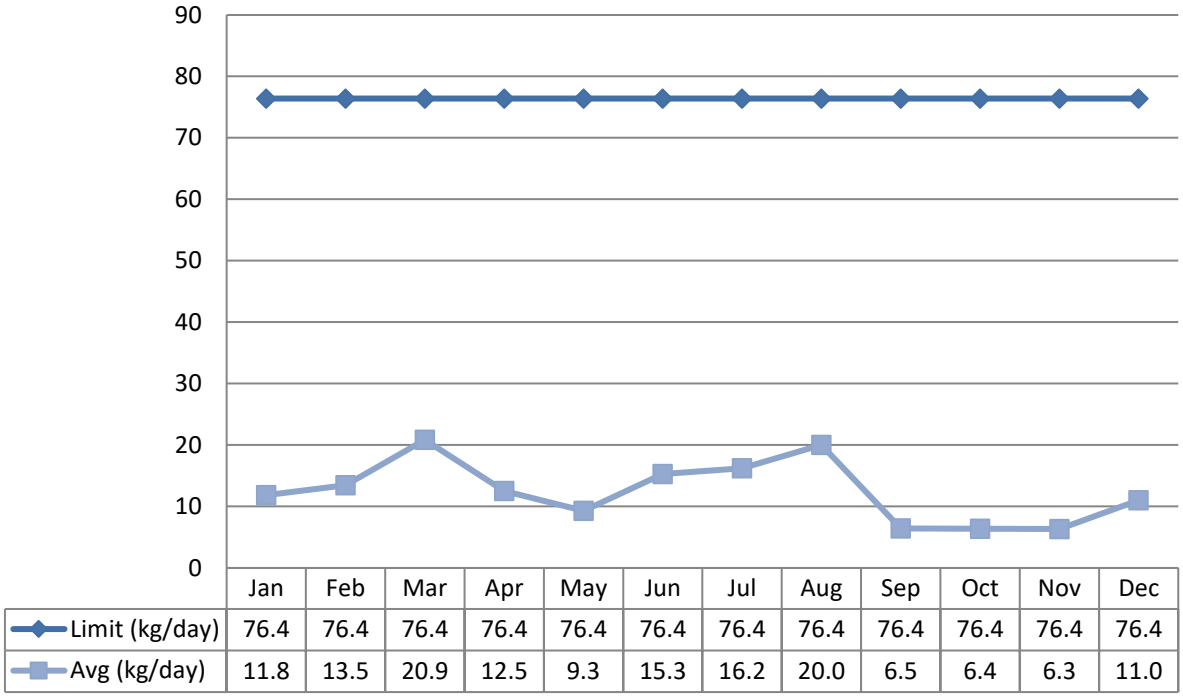
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Limit (mg/L)	25	25	25	25	25	25	25	25	25	25	25	25
Objective (mg/L)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Avg (mg/L)	6.0	6.8	7.4	4.3	3.8	5.4	7.0	9.2	3.3	3.5	3.4	5.0

The Bobcaygeon WPCP was able to consistently meet the Effluent Objectives and Limits for CBOD throughout 2022.

CBOD5 Monthly Average Waste Loading

The monthly CBOD5 monthly average waste loading limit was met each month in 2022.

Graph 5: 2022 Monthly Final Effluent CBOD5 Average Waste Loading Comparisons



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Limit (kg/day)	76.4	76.4	76.4	76.4	76.4	76.4	76.4	76.4	76.4	76.4	76.4	76.4
Avg (kg/day)	11.8	13.5	20.9	12.5	9.3	15.3	16.2	20.0	6.5	6.4	6.3	11.0

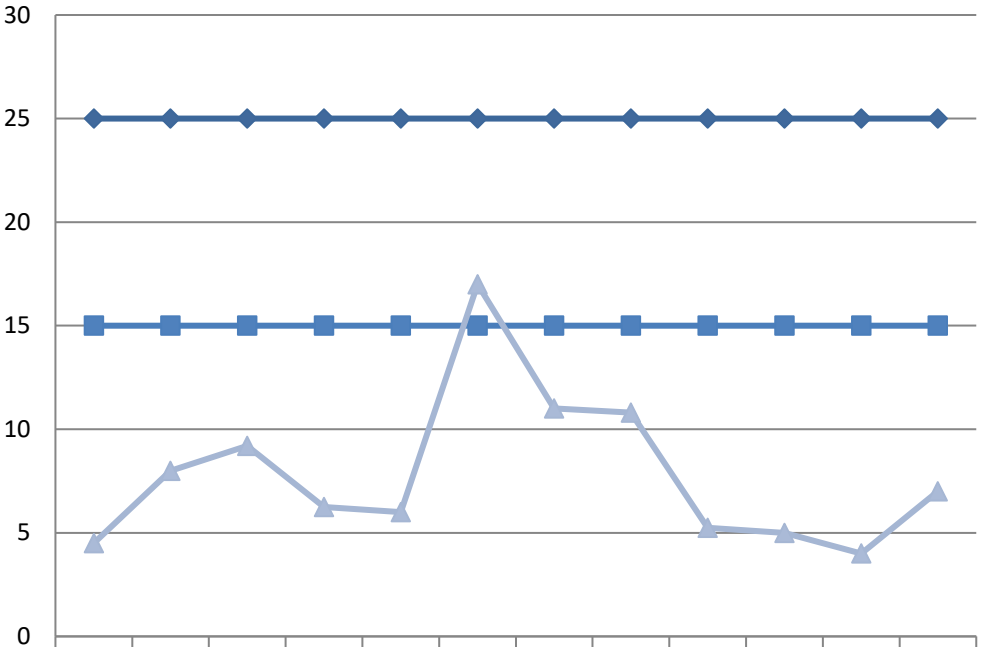
Total Suspended Solids (TSS)

ECA #3028-AEUKDQ sets the TSS annual monthly concentration limit at 25.0 mg/L and the monthly average waste loading at 76.4 kg/day. The monthly Total Suspended Solids average concentration results and monthly average waste loading results throughout 2022 were in compliance with the limits and objectives outlined in ECA 3028-AEUKDQ.

Total Suspended Solids Monthly Average Concentration

The monthly Total Suspended Solids monthly average concentration limit was met each month in 2022. The monthly concentration objective was exceeded in only one month in 2022 due to high flows.

Graph 6: 2022 Monthly TSS Final Effluent Concentration Comparisons

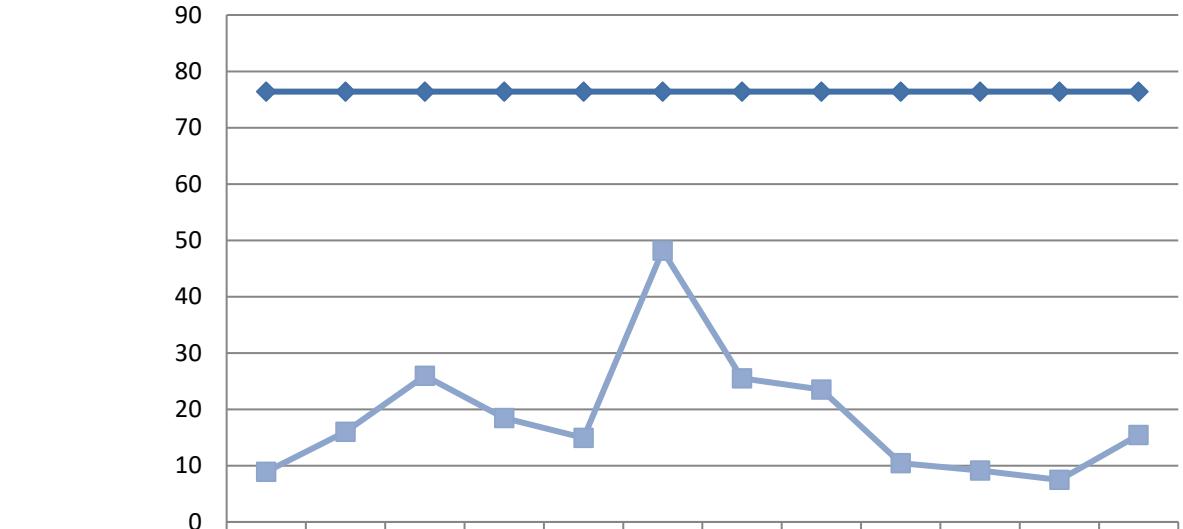


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Limit (mg/L)	25	25	25	25	25	25	25	25	25	25	25	25
Objective (mg/L)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Avg (mg/L)	4.5	8.0	9.2	6.3	6.0	17.0	11.0	10.8	5.3	5.0	4.0	7.0

Total Suspended Solids Monthly Average Waste Loading Limits

The monthly Total Suspended Solids monthly average waste loading limit was met each month in 2022.

Graph 7: 2022 Monthly Final Effluent TSS Average Waste Loading Comparisons



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Limit (kg/day)	76.4	76.4	76.4	76.4	76.4	76.4	76.4	76.4	76.4	76.4	76.4	76.4
Avg (kg/day)	8.9	16.0	25.9	18.4	14.9	48.2	25.5	23.5	10.4	9.1	7.5	15.4

Total Phosphorus (TP)

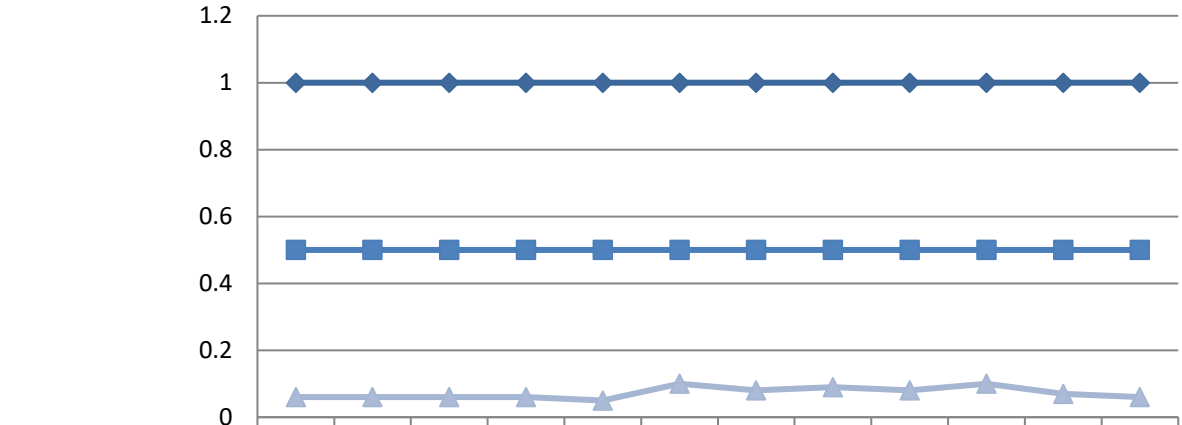
ECA #3028-AEUKDQ sets the TP annual monthly concentration limit at 1.0 mg/L and the monthly average waste loading at 1.3 kg/day. The monthly Total Phosphorus average concentration results and monthly average waste loading results throughout 2022 were in compliance with the limits and objectives.

Total Phosphorus (TP)

Total Phosphorus Monthly Average Concentration

The monthly Total Phosphorus monthly average concentration limit and monthly concentration objective were met each month in 2022.

Graph 8: 2022 Monthly Total Phosphorus Final Effluent Concentration Limit Comparisons

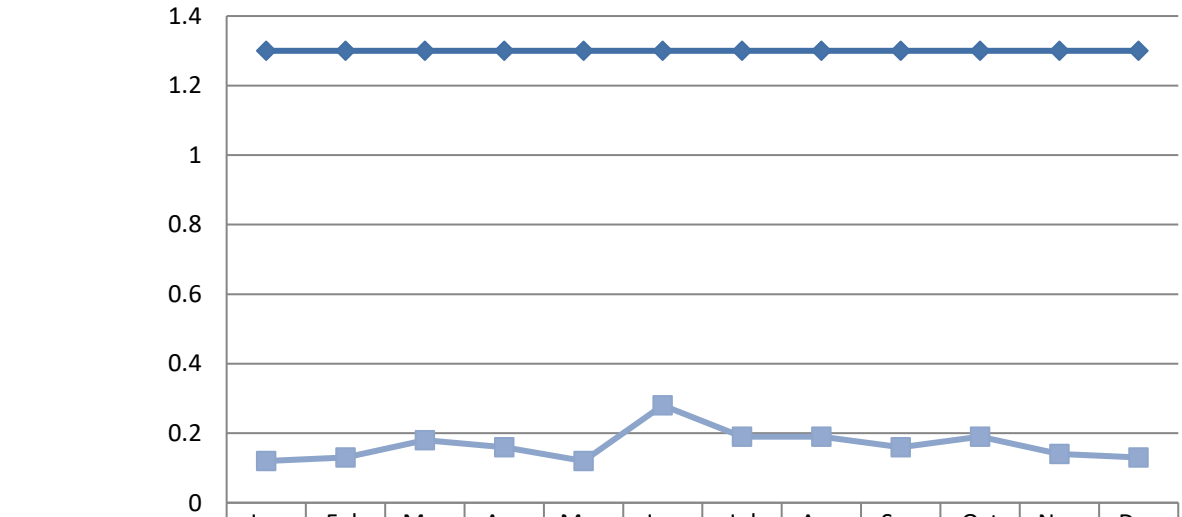


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Limit (mg/L)	1	1	1	1	1	1	1	1	1	1	1	1
Objective (mg/L)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Avg (mg/L)	0.06	0.06	0.06	0.06	0.05	0.10	0.08	0.09	0.08	0.10	0.07	0.06

Total Phosphorus Monthly Average Waste Loading Limits

The monthly Total Phosphorus monthly average waste loading limit was met each month in 2022.

Graph 9: 2022 Monthly Final Effluent Total Phosphorus Average Waste Loading Comparisons

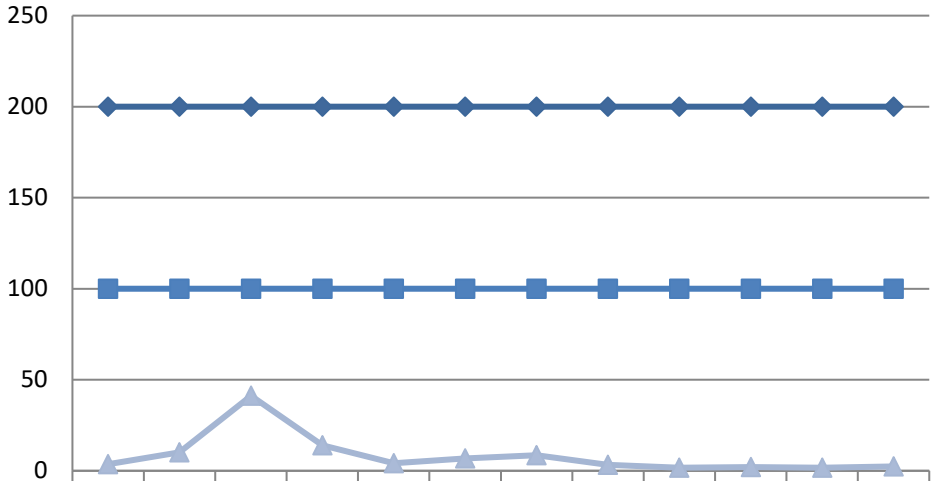


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Limit (kg/day)	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Avg (kg/day)	0.12	0.13	0.18	0.16	0.12	0.28	0.19	0.19	0.16	0.19	0.14	0.13

E. coli

ECA #3028-AEUKDQ sets the monthly geometric mean density of E. coli at 200 cfu/100mL and the monthly geomean limit was met each month in 2022. There was one instance of an individual E.coli sample returning with a result of No Data: Overgrown with E.coli (NDOGEC) on July 12, 2022.

Graph 10: 2022 Monthly E. Coli Final Effluent Geometric Mean Comparisons

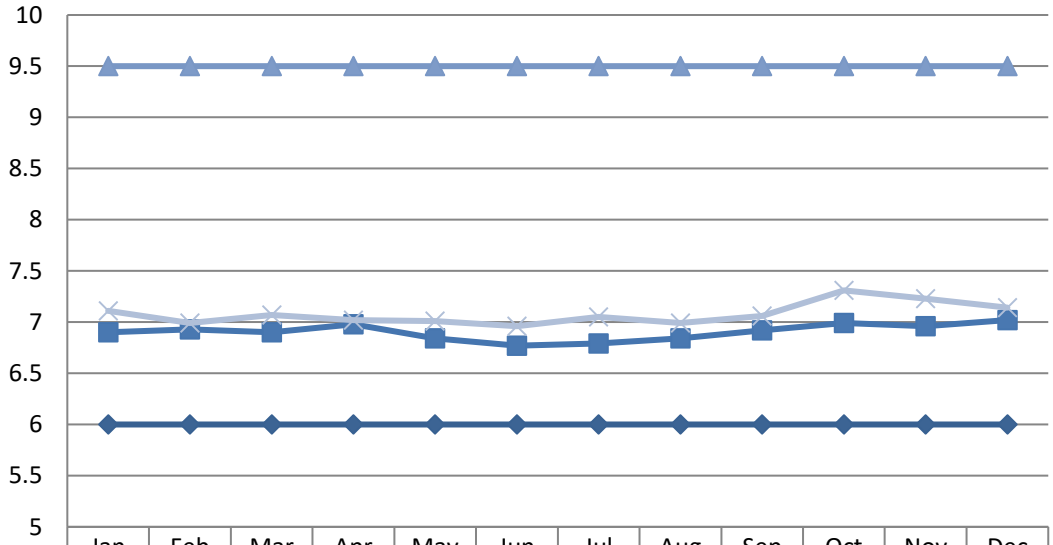


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Limit (mg/L)	200	200	200	200	200	200	200	200	200	200	200	200
Objective (mg/L)	100	100	100	100	100	100	100	100	100	100	100	100
Geomean (cfu/100mL)	3.56	10.04	41.18	14.00	4.18	6.86	8.54	3.23	1.68	2.00	1.74	2.38

pH

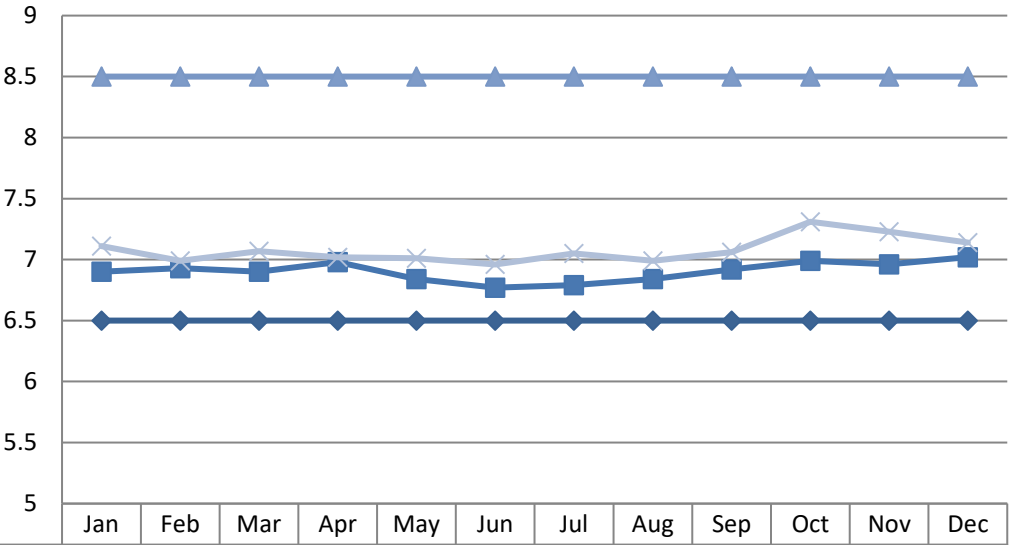
ECA #3028-AEUKDQ has a pH compliance limit within the range of 6.0 to 9.5, inclusive, at all times. The pH of the final effluent ranged from 6.77 – 7.31 throughout 2022 which is within the ECA compliance limit at all times.

Graph 11: 2022 Monthly pH Final Effluent Concentration Limit Comparisons



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Min Limit	6	6	6	6	6	6	6	6	6	6	6	6
Min Result	6.90	6.93	6.90	6.98	6.84	6.77	6.79	6.84	6.92	6.99	6.96	7.02
Max Limit	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5
Max Result	7.11	6.99	7.07	7.02	7.01	6.96	7.05	6.99	7.06	7.31	7.23	7.14

Graph 12: 2022 Monthly pH Final Effluent Concentration Objectives Comparisons



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Min Objective	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
Min Result	6.90	6.93	6.90	6.98	6.84	6.77	6.79	6.84	6.92	6.99	6.96	7.02
Max Objective	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
Max Result	7.11	6.99	7.07	7.02	7.01	6.96	7.05	6.99	7.06	7.31	7.23	7.14

<u>Acute Lethality to Rainbow Trout and Daphnia Magna</u>

Quarterly effluent samples are collected for analysis for acute lethality to rainbow trout and Daphnia magna and a summary of the results are provided in **Appendix II: Acute Lethality**

Summary. Samples were collected on January 26, May 3, August 17 and November 2, 2022. All of the 2022 samples resulted in a 0% mortality rate for both Rainbow Trout and Daphnia magna.

(b) The 2011 Ministry of the Environment, Conservation and Parks Compliance Inspection Report identified odour issues as a concern with the Bobcaygeon WWTP. A requirement of the Inspection Report was to develop an action plan implementing odour control options as detailed by Cambium Environmental in their report "Mitigation of Odours Bobcaygeon Water Pollution Control Plant" dated October 18, 2010. The action plan included the preferred option and a timeline for installing the odour mitigation equipment. A pilot study using photoionization was implemented at the Bobcaygeon WWTP in 2013 and the results indicated that this method was not able to sufficiently achieve the desired results.

Operational measures currently in place to reduce odour complaints from nearby residents are:

- Operational staff continue to monitor wind direction
- Potential odour producing maintenance activities continue to be minimized during unfavorable wind direction (if at all possible)
- Potential odour causing activities are scheduled to reduce the impact on local residents as much as possible.
- Purchased and installed odour control units on digester decant wet well and for use when filling sludge trucks.

Table 2: Bobcaygeon WWTP Operational Challenges

Month	Challenges	Corrective Actions
January	UV Faults	Assess UV intensity, sample if solids overflowing, waste solids, clean UV sensors.
	Aeration Blower 3 – VFD Issue	Clean connections on display, Reboot drive by cycling power.
	Decant Pumps Freezing	Thaw and remove ice from both decant pumps. Issue caused by cold weather.
	Train 1 WAS Pump Freezing	Suspend wasting until valve thaws. Issue caused by cold weather.
February	UV Faults	Determined 7.5 HP Return Activated Sludge (RAS) pump currently installed is providing too high of a minimum flow causing UV Faults. Replace 7.5HP pump with 5 HP pump to reduce minimum RAS flow.
March	High flows	Seasonal high flows due to weather.
	UV Faults	Multiple UV faults as a result of high flows. Assess UV intensity, sample if solids overflowing, waste solids, clean UV sensors

Month	Challenges	Corrective Actions
April	High Flows	Seasonal high flows due to high rains.
June	High Flows	High flows due to high rains
	UV Faults	Multiple UV faults as a result of high flows. Assess UV intensity, sample if solids overflowing, waste solids, clean UV sensors
	SPS 4, Pump 1 Fault	Replaced pump impeller
	Aeration Blower 3 VFD Faulting	VFD Controller sent to manufacturer for repair and reinstalled
	Decant Pumps Failure - Worn	Replace both pumps with new
July	Aeration Blower 1 – Running Poorly	Intake boot ripped, replaced. Aligned pulleys and replaced exhaust check valve. Rotors damaged.
	Low DO	Low DO caused by aeration blower issues.
	UV Faults	Issues with aeration blowers and low DO causing cloudy effluent. Assess UV intensity, sample if solids overflowing, waste solids, clean UV sensors
August	UV Faults	Multiple UV faults as a result of high flows. Assess UV intensity, sample if solids overflowing, waste solids, clean UV sensors
	Low DO	Blower frequency increased to increase output per Blower manufacturer
September	UV Faults	Assess UV intensity, sample if solids overflowing, waste solids, clean UV sensors
December	High Flows	High flows due to melt/rains over holidays.

(c) OCWA uses a Work Maintenance System (WMS) 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 III: Maintenance Summary** for details of equipment upgrades, repairs and service performed in 2022.

(d) Effluent quality assurance is maintained in several ways. Laboratory samples are sent to an accredited laboratory (SGS Canada Inc. - Lakefield) for analysis of all effluent parameters. Sampling calendars issued to the operator which denote frequency of sampling. Calendars are used as a tracking mechanism throughout the month to ensure all required samples are collected. These calendars are submitted to the Process Compliance Technician at the end of each month for review. Raw and effluent samples are collected as per the Amended

Environmental Compliance Approval and the results are reviewed on a regular basis to ensure compliance with the site's objectives and limits.

Work orders illustrating all scheduled and preventative maintenance to be completed are issued to the operator and/or mechanic. OCWA conducts internal audits of the facility and develops Action Plans to ensure deficiencies are identified.

Continuous phosphorus removal is achieved with the dosing of aluminum sulfate.

Table 3: 2022 Summary of Aluminum Sulfate Usage and Dosage

Month	Aluminum Sulfate (kg)	Aluminum Sulfate Dosage (mg/L)
January	2407.21	39.42
February	2194.20	39.27
March	3364.40	38.54
April	3255.46	36.83
May	2715.18	35.18
June	3028.80	35.73
July	2642.77	36.78
August	2942.36	43.53
September	2461.48	41.25
October	2238.86	39.58
November	2240.94	39.93
December	2708.29	39.83

(e) Calibrations on effluent monitoring equipment were performed by Franklin Empire on August 25, 2022 for equipment located at the Bobcaygeon Wastewater Treatment Plant. Please see **Appendix IV: Calibration Report.**

Records of maintenance carried out on effluent monitoring equipment can be found in **Appendix III: Maintenance Summary.**

(f) OCWA uses a number of best efforts to achieve the Effluent Objectives. Effluent quality assurance and control measures include in-house sampling and testing for operational parameters such as suspended solids, pH, phosphorus, dissolved oxygen, etc. In-house testing provides real time results which are then used to enhance process and operational performance. OCWA also collects raw sewage and effluent samples as per the ECA and reviews these results on a regular basis to ensure compliance with the ECA objectives and limits.

OCWA uses a computerized maintenance management system which generates work orders to ensure maintenance of equipment is proactively performed. In addition, OCWA provides regular status reports to the Owner which includes operational data, equipment inventory, financial statements, maintenance activities and capital improvement recommendations.

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 have access to a network of operational compliance and support experts at the cluster, region and corporate level.

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

- Sampling effluent as per the ECA.
- Visual Inspection of the effluent while performing rounds.
- Influent monitoring.
- Ensuring that chemicals are being dosed.
- Calibration of lab equipment.
- Annual calibration of the flow meters.
- Performing preventative maintenance activities in accordance with work order schedules.
- Performing in-house lab tests on days that data is collected.
- Monitoring treatment processes by performing regular laboratory analysis and review of lab results.
- Sludge monitoring of primary clarifiers & adjustments to pumping volume based on tank levels to reduce solids carryover to the secondary clarifiers.
- Visual review of microbiological activity of activated sludge to ensure appropriate F/M ratio.

Carbonaceous Biochemical Oxygen Demand (CBOD5)

ECA #3028-AEUKDQ sets the CBOD5 monthly average concentration objective at 15.0 mg/L.

Table 4: 2022 Monthly CBOD5 Final Effluent Concentration Objective Comparisons

Monthly Average	Average Concentration (mg/L)	Concentration Objective Target (mg/L)	Objective Achieved
January	6.00	15.0	Yes
February	6.75	15.0	Yes
March	7.40	15.0	Yes
April	4.25	15.0	Yes
May	3.75	15.0	Yes
June	5.40	15.0	Yes
July	7.00	15.0	Yes
August	9.20	15.0	Yes
September	3.25	15.0	Yes
October	3.50	15.0	Yes
November	3.40	15.0	Yes
December	5.00	15.0	Yes

Total Suspended Solids (TSS)

ECA #3028-AEUKDQ sets the TSS monthly average concentration objective at 15.0 mg/L.

Table 5: 2022 Monthly TSS Final Effluent Concentration Objective Comparisons

Month	Average Concentration (mg/L)	Concentration Objective Target (mg/L)	Objective Achieved
January	4.50	15.0	Yes
February	8.00	15.0	Yes
March	9.20	15.0	Yes
April	6.25	15.0	Yes
May	6.00	15.0	Yes
June	17.00	15.0	No
July	11.00	15.0	Yes
August	10.80	15.0	Yes
September	5.25	15.0	Yes
October	5.00	15.0	Yes
November	4.00	15.0	Yes
December	7.00	15.0	Yes

Total Phosphorus (TP)

ECA #3028-AEUKDQ sets the TP monthly average concentration objective at 0.5 mg/L.

Table 6: 2022 Monthly TP Final Effluent Concentration Objective Comparisons

Month	Average Concentration (mg/L)	Concentration Objective Target (mg/L)	Objective Achieved
January	0.06	0.5	Yes
February	0.06	0.5	Yes
March	0.06	0.5	Yes
April	0.06	0.5	Yes
May	0.05	0.5	Yes
June	0.10	0.5	Yes
July	0.08	0.5	Yes
August	0.09	0.5	Yes
September	0.08	0.5	Yes
October	0.10	0.5	Yes
November	0.07	0.5	Yes
December	0.06	0.5	Yes

E.coli

ECA #3028-AEUKDQ sets the monthly E. coli geometric mean objective at 100 cfu/100mL.

Table 7: 2022 Monthly E. Coli Final Effluent Concentration Objective Comparisons

Month	Geometric Mean (cfu/100mL)	Concentration Objective Target (cfu/100mL)	Objective Achieved
January	3.56	100	Yes
February	10.04	100	Yes
March	41.18	100	Yes
April	14.00	100	Yes
May	4.18	100	Yes
June	6.86	100	Yes
July	8.54	100	Yes
August	3.23	100	Yes
September	1.68	100	Yes
October	2.00	100	Yes
November	1.74	100	Yes
December	2.38	100	Yes

pH

The pH of the effluent was within the ECA design objectives of 6.50 to 8.50, inclusive, at all times. The pH of the effluent ranged from 6.77 – 7.31 throughout 2022.

Table 8: 2022 Monthly pH Final Effluent Concentration Objective Comparisons

Month	Minimum	Maximum	Objective Achieved
January	6.90	7.11	Yes
February	6.93	6.99	Yes
March	6.90	7.07	Yes
April	6.98	7.02	Yes
May	6.84	7.01	Yes
June	6.77	6.96	Yes
July	6.79	7.05	Yes
August	6.84	6.99	Yes
September	6.92	7.06	Yes
October	6.99	7.31	Yes
November	6.96	7.23	Yes
December	7.02	7.14	Yes

Unionized Ammonia

Unionized ammonia has an objective of 0.1mg/L (100 ug/L). Using total ammonia nitrogen, along with field pH and temperature, the following are the results for the monthly calculated

unionized ammonia averages. The final unionized ammonia average was less than the objective each month.

Table 9: 2022 Monthly Unionized Ammonia Final Effluent Concentration Objective Comparisons

Month	Average Concentration (ug/L)	Concentration Objective Target (ug/L)	Objective Achieved
January	5.14	100	Yes
February	9.29	100	Yes
March	5.72	100	Yes
April	12.38	100	Yes
May	22.21	100	Yes
June	24.31	100	Yes
July	44.56	100	Yes
August	31.00	100	Yes
September	17.33	100	Yes
October	0.60	100	Yes
November	0.28	100	Yes
December	1.59	100	Yes

Temperature

The final effluent temperature ranged from 5.0°C to 21.4°C.

Additional Parameters

The parameters listed below are collected as per ECA or regulatory requirements or for process optimization.

Influent Samples

Influent sampling is completed in order to make the necessary process adjustments to stay within the Final Effluent Objectives and limits set in the ECA.

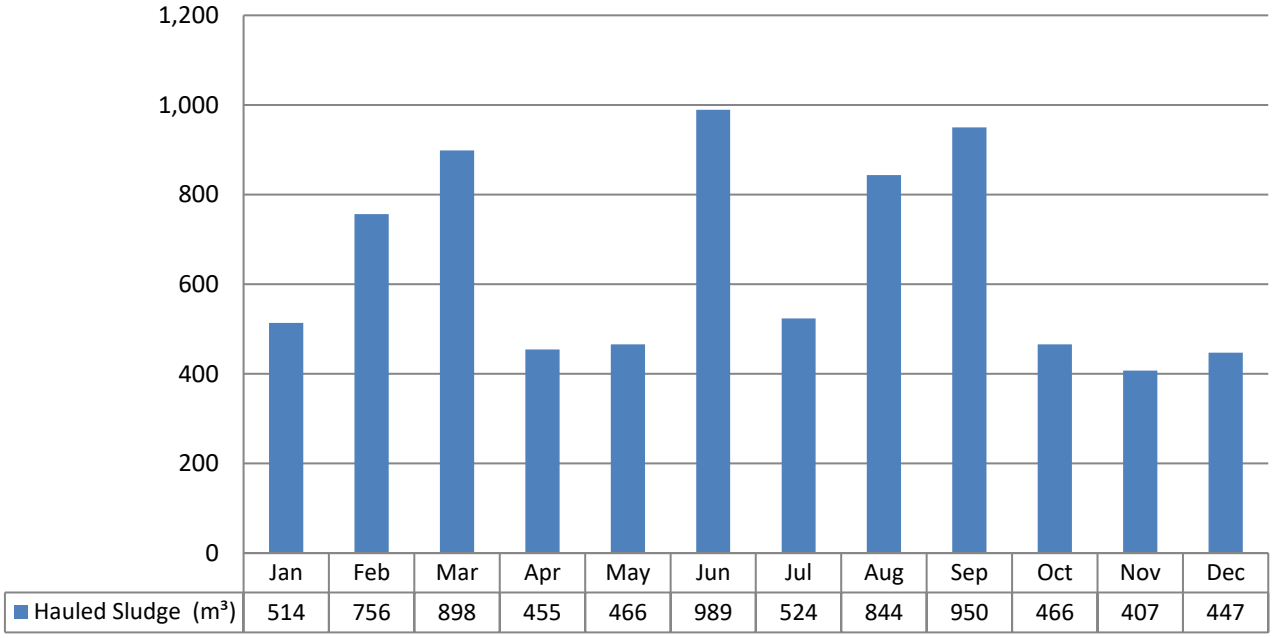
Table 10: 2022 Monthly Influent Sample Result Concentration Averages

Month	Carbonaceous Biochemical Oxygen Demand - CBOD5 (mg/L)	Biochemical Oxygen Demand - BOD5 (mg/L)	Total Suspended Solids – TSS (mg/L)	Total Kjeldahl Nitrogen – TKN (mg/L)	Total Phosphorus – TP (mg/L)
January	189.25	242.75	210.50	25.20	2.80
February	454.40	403.80	362.60	24.08	3.20
March	107.80	114.00	76.60	15.52	1.56
April	112.00	128.75	122.50	9.25	1.32
May	154.50	156.25	145.75	16.25	1.96

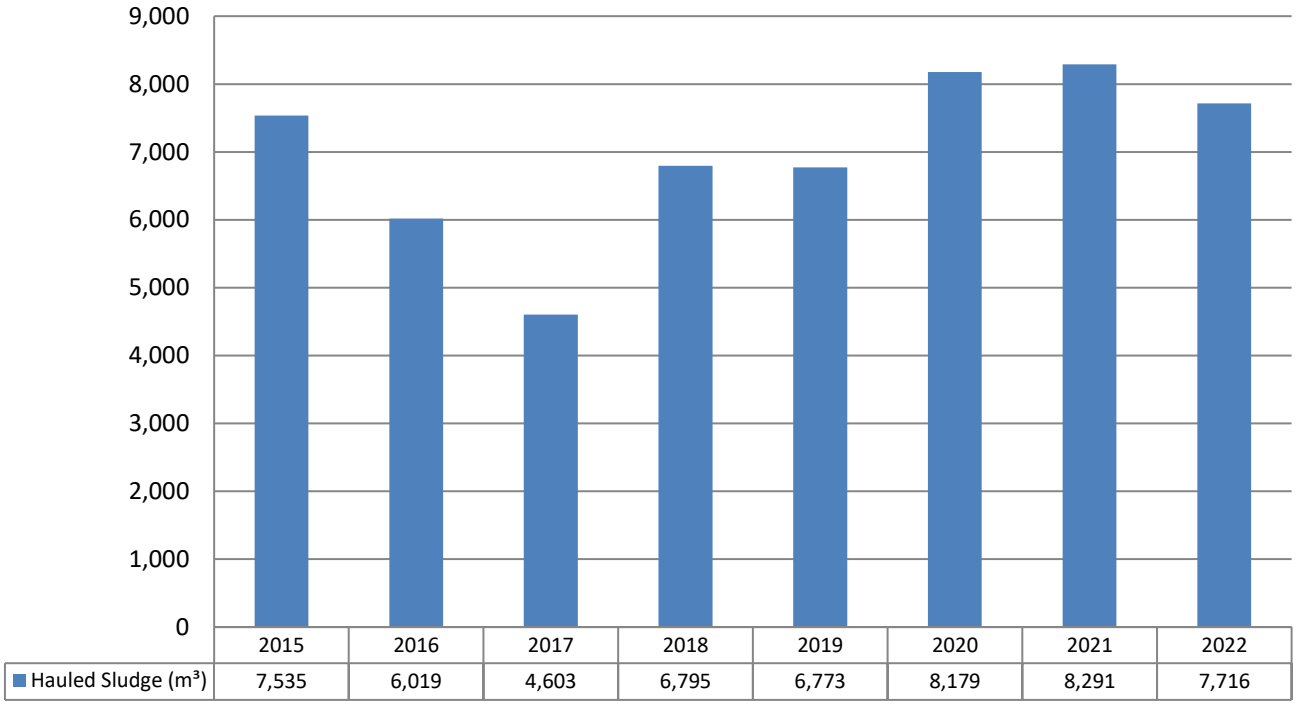
Month	Carbonaceous Biochemical Oxygen Demand - CBOD5 (mg/L)	Biochemical Oxygen Demand - BOD5 (mg/L)	Total Suspended Solids – TSS (mg/L)	Total Kjeldahl Nitrogen – TKN (mg/L)	Total Phosphorus – TP (mg/L)
June	257.40	312.80	186.40	22.54	3.02
July	260.25	324.25	236.50	28.37	3.20
August	474.40	538.80	388.40	28.72	4.22
September	132.75	197.75	157.25	19.00	2.04
October	282.75	277.75	165.75	36.82	3.50
November	293.60	283.60	192.40	26.68	3.24
December	295.25	311.75	207.50	24.22	2.80

(g). The total volume of sludge generated in 2022 was 7,716.24 m^3 which was a 7.0% decrease in the amount of sludge generated in 2021. Shepherd Environmental Services has been contracted to haul, land apply and store the Biosolids on their approved sites and certified holding lagoon during the winter.

Graph 13: 2022 Monthly Sludge Volumes



Graph 14: Historical Sludge Volume Comparisons



The anticipated volume of biosolids for the next reporting period is expected to be appreciably similar to this reporting period and no change is expected from the current sludge handling methods and disposal areas currently utilized.

Refer to **Appendix V**: Biosolids Summary for biosolids sampling results.

(h) Summary of complaints received by City of Kawartha Lakes and the Ontario Clean Water Agency concerning the Bobcaygeon WWTP during 2022 can be found in **Appendix VII: Community Complaints.**

(i) A summary of a By-pass, Spill or Abnormal Discharge Events

Bypasses

There were not any bypasses at the Bobcaygeon WWTP during 2022.

Spills

There were not any spills at the Bobcaygeon WWTP during 2022.

Overflows
There were not any overflows at the Bobcaygeon WWTP or pumping stations in 2022.

Abnormal Discharge Events
There were not any abnormal discharge events at the Bobcaygeon WWTP in 2022.
Refer to **Appendix VI: Bypasses, Overflows, Spills or Abnormal Events** for copies of the quarterly Bypass and Overflow reports, and Notice of Exceedance submitted to the Ministry of the Environment, Conservation and Parks.

(j) There were not any Notices of Modifications to Sewage Works initiated, worked on or completed in 2022.

(k) A summary of all modifications completed as a result of Schedule B, Section 3 are included in **Appendix III: Maintenance Summary**; and

(l) The Water Supervisor has not requested any additional information be included in this report.