CANA WATER POLLUTION CONTROL PLANT

2024 ANNUAL REPORT

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1 EXECUTIVE SUMMARY

Cana Water Pollution Control Plant (WPCP) operates under Ministry of the Environment, Conservation and Parks, Environmental Compliance Approval (ECA) number 4021-9WUKDE. The facility exceeded one of the effluent limits outlined in condition 7 of the above-mentioned ECA during 2024.

The sewage works has a rated capacity of 125 m^3/d, and a maximum day design flow of 200 m^3/d. The average flow through the plant was 57.7 m^3/d, and the maximum daily flow through the plant was 116 m^3/d in 2024.

2 PLANT OVERVIEW

The following is a process overview and description of the treatment steps taken at the Cana WPCP.

2.1 RAW SEWAGE PUMPING STATION

A pre-cast concrete wet well accepts sewage flows from the existing sewer system for the Cana Subdivision. The wet well has two pumps which discharge into the preliminary treatment unit.

2.2 PRELIMINARY TREATMENT UNIT

Preliminary treatment involves the removal of large particles and floating debris such as wood, rags, and plastics from the raw sewage. This is accomplished with a manual bar screen installed inside a splitter box.

2.3 SECONDARY TREATMENT UNIT

The sewage flows through the splitter box and bar screen, it then discharges into the two Sequencing Batch Reactors (SBR). Each reactor is essentially an activated sludge process with aeration and settling taking place in the same tank. The decanted effluent from the SBR is then stabilized in a Post Equalization Tank. The sludge that settles out in the SBR is then pumped directly to the Digester.

2.4 POST EQUALIZATION TANK

The Post Equalization Tank collects the decanted water from the Sequencing Batch Reactors and discharges to the tertiary filter system.

2.5 CHEMICAL DOSING SYSTEMS

Phosphorus removal is accomplished using Aluminum Sulfate, which is injected directly into the splitter box during pump cycles.

2.6 TERTIARY FILTRATION UNIT

The discharge of the post equalization tanks goes into a continuous backwash up-flow sand filter to polish the water before going through the ultraviolet disinfection system. Filtrate then passes through one of the two Ultraviolet (UV) disinfection units.

2.7 UV DISINFECTION

The filtrate then passes through one of the two UV disinfection units. Each unit can handle the maximum flow of 200 m^3/day.

2.8 OUTFALL

The treated effluent from the plant is discharged into a 27.9 m long pipe into an existing creek which flows into Colonel By Lake.

2.9 BUILDING AND CONTROL ROOM

There is one building that houses the tertiary filtration unit, chemical dosing systems, blowers, and all associated electrical equipment.

2.10 DIGESTER UNIT

The waste sludge generated from the SBRs is pumped into the digester for stabilization and storage. The digester supernatant is returned to the influent manhole, and the sludge is hauled as required to Ravensview WPCP in the City of Kingston for further treatment.

2.11 STANDBY EQUIPMENT

A diesel generator on the property of the Cana WPCP provides backup electrical supply in case of power outages. This generator is directly connected to both the Cana Water and Cana Wastewater facilities and is capable of fully powering both systems in the event of a power outage.

3 MONITORING DATA

All required samples were collected and sent to a third-party laboratory for testing. The semiannual upstream surface water monitoring sample could not be collected in October due to a lack of flow in the existing water course. The downstream sample was collected in October, and both the upstream and downstream samples were collected in April and the results are shown in Tables 5 and 6.

Monthly plant flows can be found in Table 10. Flows into all of the WPCP's being operated by Utilities Kingston were low through 2024. These low flows most likely are a result of the very low amounts of rainfall through the end of the summer and fall. Efforts were made to remove illegal connections in 2020, this resulted in a noticeable improvement in the flows into the plant. Annual average flow data for the past six years is in Table 9. Data over the past several years indicate that an unknown input into the system has been increasing flows during rain events, this could be a result of infiltration in the collection system, or illegal sump pump, or roof leader connections. In another effort to reduce these elevated flows during rain events, letters describing the increased flows the plant is experiencing, the problems associated with those increased flows, and the bylaw requirements for residents were delivered to all houses connected to the system in October 2024.

Raw influent laboratory results (Table 2) were monitored throughout the year and were used to help make operational decisions throughout the year.

The ECA number 4021-9WUKDE lists the limits and objectives for the concentrations of certain effluent parameters, this is shown in Table 1. The effluent objectives listed in this table are the concentrations Utilities Kingston is expected to be below. The effluent concentration limits listed in the table are the concentrations Utilities Kingston are required to be below. There was one occurrence where the Cana WPCP exceeded one of the limits set out in the ECA in 2024. In December, the monthly average Total Suspended Solids (TSS) was 0.11 mg/L, this exceeded the limit of 0.10 mg/L. Staff were able to respond and resolve the exceedance quickly, and the plant effluent is back to being well below all effluent limits. Monthly average effluent concentrations for all required sampling parameters are listed in Tables 3 and 4. There were several months when the Total Suspended Solids (TSS), and Total Phosphorous (TP) concentrations exceeded the objectives set out for the plant. All other effluent parameters with objectives set out in the ECA maintained monthly average concentrations below the objectives. Staff regularly perform in-house laboratory sampling to optimize the treatment process, and continue to work to maintain limits and objectives for effluent concentrations.

4 OPERATION

Staff continue to optimize the plant process to ensure continuous and reliable operations at the Cana WPCP. The raw sewage pumping station is regularly cleaned out to reduce the loading to the plant and improve the effluent quality. As discussed above, efforts to reduce illegal sump pump connections in 2020 reduced the peak flows dramatically. In response to the recent increase to flows in 2024, staff review Closed-Circuit Television (CCTV) footage of the pipes andcompleted spot checks to investigate the source(s).

A load of sludge from the Ravensview WPCP was used to seed the SBR's in early 2024 with healthy biomass to help improve the treatment process. This resulted in noticeable improvement in final effluent quality.

In December a plugged pump led to chemical dosing issues at the WPCP. The pump was pulled, the debris plugging the pump was removed, and the pump was put back into service. The chemical dosing issues associated with the plugged pump is inferred to be what led to the plant exceeding the monthly average effluent limit for TSS in December. As noted above, staff were able to return biomass levels to normal and effluent quality was returned relatively quickly.

5 BIOSOLIDS MANAGEMENT

There were 6 loads, totaling 68,500 m^3 in volume, of sludge collected and brought to Ravensview WPCP. The sludge was discharged at the septage facility. A similar amount of sludge is anticipated to be generated and transported to Ravensview in 2025.

6 MAINTENANCE

Staff continue to use a preventative maintenance program in accordance with manufacturer's recommendations.

Additional Maintenance completed this year:

- Routine equipment maintenance took place throughout the plant.
- The compressor was rebuilt.
- The UV disinfection system had multiple parts replaced including the Sensor, bulbs, and a control board.

7 CAPITAL WORKS

There was no capital work required for the plant this year.

8 EQUIPMENT CALIBRATIONS

All of the treatment facility flow meters are calibrated annually by third party contractors. Calibration records are available upon request.

9 COMPLAINTS

In the 2024 reporting year, the Cana WPCP received no official complaints regarding the facility or treatment process.

10 BYPASS SUMMARY

There were no bypass events in the system this year. However, it should be noted that bypass discharges have a high bacteria count due to the lack of disinfection. $CBOD_5$, TP, and TSS results are typical raw sewage influent levels. When bypasses occur, best efforts are made to capture the debris contained in any discharges to the lake. After each bypass event, shoreline inspections near

discharge points are done to monitor any debris that may come ashore, and clean-up is done if debris is found.

For further information about this report or any questions regarding accessibility, contact Tim Bourne at tbourne@utilitieskingston.com or call 613-546-1181 Ext 2190.

11 EFFLUENT OBJECTIVES AND LIMITS

Table 1 – Effluent Objectives and Limits

Effluent Parameter	Objective	Limits
CBOD5	5.00 mg/L (Monthly Average)	10.00 mg/L (Monthly Average)
Total Suspended Solids	5.00 mg/L (Monthly Average)	10.00 mg/L (Monthly Average)
Total Phosphorus	0.10 mg/L (Monthly Average)	0.20 mg/L
Total Ammonia Nitrate (Winter)	2.00 mg/L (October to March)	3.00 mg/L
Total Ammonia Nitrate (Summer)	1.00 mg/L (April to September)	2.00 mg/L
E. Coli	100 CFU/100mL	200 CFU/100mL

Note: pH maintained between 6.5 to 8.5 at all times

12 PLANT PERFORMANCE RESULTS

Table 2 – Raw Influent Results

(Monthly Average)

Month	BOD5 (mg/L)	Total Suspended Solids (mg/L)	Total Phosphorus (mg/L)	Total Ammonia Nitrogen (mg/L)	pH	Total Kjeldahl Nitrogen (mg/L)
January	78	88	2.10	10.79	7.34	15.15
February	55	81	2.10	16.48	7.87	20.24
March	30	49	1.70	13.45	7.65	16.78
April	59	85	2.20	17.01	7.55	20.70
May	59	128	2.90	18.80	7.45	25.30
June	40	88	2.20	15.55	7.52	18.23
July	49	77	2.20	13.68	7.46	16.85
August	83	144	2.60	14.21	7.56	20.92
September	64	98	2.50	20.13	7.71	23.18
October	74	89	2.90	25.48	7.72	28.26
November	126	110	2.50	16.33	7.66	21.65
December	97	103	2.20	13.61	7.51	19.35
Annual Average	68	95	2.34	16.29	7.58	20.55

Table 3 – Final Effluent Results (Part 1)

(Monthly Average)

Month	CBOD5 (mg/L)	Total Suspended Solids (mg/L)	Total Phosphorous (mg/L)	Total Ammonia (mg/L)
January	3.00	4.40	0.14	0.09
February	3.00	5.60	0.12	0.08
March	3.00	5.50	0.10	0.46
April	3.00	4.10	0.10	0.46
May	3.00	3.50	0.10	0.04
June	3.00	3.50	0.08	0.05
July	3.00	3.60	0.08	0.03
August	3.00	3.50	0.10	0.04
September	3.00	2.90	0.07	0.08
October	3.00	4.30	0.08	0.06
November	3.00	4.10	0.10	0.05
December	3.00	11.00	0.12	0.08
Annual Average	3.00	4.67	0.10	0.13

Table 4 – Final Effluent Results (Part 2)

Month	Nitrate (mg/L)	pH	E Coli (CFU/100mL)	Acute Lethality (Pass or Fail)
January	5.07	7.82	0	N/A
February	5.5	8.04	0	N/A
March	4.58	7.71	2	N/A
April	3.86	7.82	1	PASS
May	3.77	7.71	1	N/A
June	7.71	7.8	1	N/A
July	5.76	7.6	1	N/A
August	6.26	7.69	1	N/A
September	7.05	7.82	2	N/A
October	7.33	7.84	2	PASS
November	8.83	7.72	1	N/A
December	5.24	7.8	3	N/A
Annual Average	5.91	7.78	1.25	PASS

Table 5 – Upstream Surface Water Monitoring

Date	CBOD (mg/L)	Total Suspended Solids (mg/L)	Total Phosphorus (mg/L)	Total Ammonia Nitrate (mg/L)	Nitrate Nitrogen (mg/L)	E. Coli (CFU/100 mL)	pH
April 16th 2024	3.00	8.00	0.04	0.05	0.13	14	8.13
October 3rd 2024	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 6 – Downstream Surface Water Monitoring

Date	CBOD (mg/L)	Total Suspended Solids (mg/L)	Total Phosphorus (mg/L)	Total Ammonia Nitrate (mg/L)	Nitrate Nitrogen (mg/L)	E. Coli (CFU/100 mL)	pH
April 16th 2024	3.00	6.00	0.08	0.05	0.05	13	8.23
October 3rd 2024	3.00	4.00	0.05	0.05	8.86	4	8.16

Table 7 – Reportable Bypasses

Date	Start Time	Duration (hours)	Volume (m3)	Reason	Precipitation (mm)

No bypass events to report for 2024

Table 8 – Reportable Bypass Sampling

Date	Start Time	Duration (hours)	Volume (m3)	Reason	Precipitation (mm)

No bypass events to report for 2024

Table 9 – Annual Plant Flows

Parameter	2019	2020	2021	2022	2023	2024
Average (m3/day)	100.05	70.10	60.00	62.70	62.70	57.70
Max (m3/day)	243.00	110.50	97.00	160.00	180.00	116.00
Design (m3/day)	125.00	125.00	125.00	125.00	125.00	125.00
Design Peak (m3/day)	200.00	200.00	200.00	200.00	200.00	200.00
Daily/Design (%)	80.04	56.08	48.00	50.16	50.16	46.16

Table 10 – Monthly Flows

Month	Rated Capacity Flow (m3/day)	Minimum Flow (m3/day)	Maximum Flow (m3/day)	Average Flow (m3/day)	Total Flow (m3/month)
January	125	53.0	116.0	81.7	2,533
February	125	58.0	107.0	81.0	2,348
March	125	59.0	101.0	78.1	2,422
April	125	41.0	113.0	78.6	2,357
May	125	40.0	72.0	55.1	1,709
June	125	31.0	62.0	49.8	1,494
July	125	33.4	78.4	49.5	1,533
August	125	30.6	89.3	51.4	1,596
September	125	25.8	67.7	41.5	1,201
October	125	13.4	36.5	30.6	921
November	125	23.5	61.6	34.2	1,025
December	125	32.1	104.6	61.4	1,860
Annual Average	125	36.7	84.1	57.7	1,750