CANA WATER POLLUTION CONTROL PLANT
2025 ANNUAL REPORT

Environmental Compliance Approval Number: 4021-9WUKDE
Wastewater Collection System Owner: City of Kingston
Wastewater Treatment Facility Classification: Class II

TABLE OF CONTENTS

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, issued to the owner, the Corporation of the City of Kingston. This report is to satisfy the requirements of condition 11 of the aforementioned ECA. The facility did not exceed any of the effluent limits outlined in condition 7 of the above-mentioned ECA during 2025.

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 50.15 m^3/d, the maximum daily flow through the plant was 189 m^3/d, and the total flow through the plant was 18,303 m^3 in 2025.

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 and 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 the WPCP's being operated by Utilities Kingston were below average in 2025. These low flows most likely are a result of the very low amounts of rainfall through the end of the summer and fall. Flow data over the past several years (Table 9) indicate that the system has been experiencing significantly elevated flows during rain events. A large project to reline pipes (a trenchless pipe repair) in the Cana WPCP collection system was completed at the end of the spring. This has shown to have significantly reduced the amount of groundwater infiltration into the collection system.

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

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 were no exceedances of the limits set out in the ECA in 2025. 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 effluent objectives. 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.

The tables below include several parameters that are monitored to satisfy ECA requirements, even though they do not have limits or objectives assigned to them. These metrics are essential for operational oversight and process control. This includes Nitrate Nitrogen which is produced during

nitrification of Total Ammonia Nitrogen. Higher Nitrate Nitrogen concentrations are an indicator of complete nitrification occurring within the plant.

4 OPERATION

Staff continued 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.

In January, operators discovered the lines to the sludge tanks to be frozen which caused operational difficulties. However, operators responded and were able to thaw the lines and bring the system back online. In addition, a project was undertaken to heat trace and insulate all of the sludge lines following this incident.

In the spring, the plant saw significant flows during a high rain event. The facility was unable to keep up with the flows, and vacuum trucks were contracted to haul excess influent to the Ravensview WPCP for treatment. This contingency activity avoided a sewage bypass of the treatment system.

The sand in the tertiary treatment system was replaced in October, which will improve flow rates through the media and filter performance. However, the replacement initially resulted in elevated TSS in the effluent as the filter matured, leading to an exceedance of the monthly average effluent TSS concentration objective. After 3 weeks, the monthly average effluent concentration of TSS returned to results being below the limit.

5 BIOSOLIDS MANAGEMENT

There were 11 loads, totaling 120 m^3 in volume, of sludge collected and brought to the Ravensview WPCP septage receiving facility. The volume of sludge hauled in 2025 increased significantly compared to 2024. The difference was primarily driven by ongoing plant maintenance, which required sludge to be hauled immediately rather than undergoing the standard supernate cycles. As a result, the sludge could not be reduced in volume prior to transport. Staff anticipate a reduced amount of sludge to be generated and transported to Ravensview in 2026.

6 MAINTENANCE

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

Additional Maintenance completed this year:

- Infrared scans of high voltage electrical was performed across the plant.
- Equipment and motors had routine vibration monitoring conducted.
- Sand filter media replacement.
- Post Equalization Tank Cleanouts following high flows.

7 CAPITAL WORKS

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

- Sludge lines to the digester had heat trace and insulation installed.

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 2025 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	125	112	2.50	17.27	7.64	23.94
February	154	584	6.20	19.58	7.70	46.80
March	74	136	2.80	11.55	7.49	19.95
April	66	80	1.70	11.71	7.52	15.12
May	57	237	1.70	12.08	7.48	16.88
June	60	150	2.80	13.85	7.64	19.85
July	238	1142	9.80	27.42	7.47	86.10
August	86	100	3.00	21.43	7.47	30.20
September	150	240	4.60	30.38	7.54	49.20
October	99	139	3.20	24.86	7.48	36.88
November	186	643	5.40	13.97	7.36	42.55
December	125	564	5.80	11.73	7.70	39.76
Annual Average	118	344	4.13	17.99	7.54	35.60

Table 3 – Final Effluent Results (Part 1)

(Monthly Average)

Month	CBOD5 (mg/L)	Total Suspended Solids (mg/L)	Total Phosphorous (mg/L)	Total Ammonia Nitrogen (mg/L)
January	3.00	5.10*	0.09	0.24
February	3.00	5.80*	0.09	0.15
March	3.10	3.80	0.12*	0.18
April	3.00	4.70	0.07	0.64
May	3.00	3.40	0.06	0.44
June	3.00	3.90	0.06	0.05
July	3.00	3.00	0.10	0.08
August	3.00	3.10	0.14*	0.07
September	3.00	4.80	0.07	0.06
October	3.00	8.30*	0.11*	0.10
November	3.00	5.80*	0.09	0.06
December	3.00	5.40*	0.09	0.05
Annual Average	3.01	4.76	0.09	0.18

*Indicates an exceedance of the Monthly Average Effluent Concentration objective

Table 4 – Final Effluent Results (Part 2)

Month	Nitrate Nitrogen (mg/L)	pH	E Coli (CFU/100mL)	Acute Lethality (Pass or Fail)
January	4.28	7.75	1	N/A
February	6.74	7.82	1	N/A
March	3.43	7.57	2	N/A
April	2.71	7.61	1	PASS
May	2.83	7.51	1	N/A
June	2.91	7.73	1	N/A
July	6.3	7.94	1	N/A
August	9.06	7.93	1	N/A
September	10.51	8.02	1	N/A
October	9.95	7.97	1	PASS
November	5.92	7.98	2	N/A
December	4.36	7.94	2	N/A
Annual Average	5.75	7.81	1.25	PASS

Table 5 – Upstream Surface Water Monitoring

Date	CBOD (mg/L)	Total Suspended Solids (mg/L)	Total Phosphorus (mg/L)	Total Ammonia Nitrogen (mg/L)	Nitrate Nitrogen (mg/L)	E. Coli (CFU/100 mL)	pH
April 23 2025	3.00	20.00	0.09	0.12	0.18	10	8.22
October 3 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 Nitrogen (mg/L)	Nitrate Nitrogen (mg/L)	E. Coli (CFU/100 mL)	pH
April 23 2025	3.00	4.00	0.06	0.52	1.32	0	8.27
Oct 20 2025	3.00	26.00	0.16	0.05	5.90	49	8.05

Table 7 – Reportable Bypasses

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

No bypass events to report for 2025

Table 8 – Reportable Bypass Sampling

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

No bypass events to report for 2025

Table 9 – Annual Plant Flows

Parameter	2020	2021	2022	2023	2024	2025
Average (m3/day)	70.10	60.00	62.70	62.70	57.70	50.15
Max (m3/day)	110.50	97.00	160.00	180.00	116.00	189.00
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 (%)	56.08	48.00	50.16	50.16	46.16	40.12

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	25.8	125	104.6	52.3	1,674
February	23.7	125	56.6	36.3	981
March	44.0	125	189.0	109.4	3,391
April	62.8	125	143.1	89.9	2,697
May	60.0	125	118.0	81.5	2,526
June	38.1	125	87.2	59.4	1,782
July	19.9	125	44.1	27.9	864
August	16.4	125	25.1	21.2	659
September	5.7	125	26.7	19.2	577
October	12.0	125	52.1	22.3	691
November	27.0	125	55.8	39.1	1,172
December	18.5	125	80.4	41.6	1,289
Annual Average	29.5	125	81.9	50.0	1,525