



**RAVENSVIEW
WATER POLLUTION CONTROL PLANT
2025 ANNUAL REPORT**

**Environmental Compliance Approval Number: 5556-BZFGZL
Water Collection System Owner: City of Kingston
Wastewater Treatment Facility Classification: Class IV**

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1 EXECUTIVE SUMMARY

Ravensview Water Pollution Control Plant (WPCP) operates under Ministry of the Environment, Conservation and Parks, Environmental Compliance Approval (ECA) number 5556-BZFGZL, issued to the owner, the Corporation of the City of Kingston. This report is to satisfy the requirements of condition 45 of the terms and conditions of the aforementioned ECA. The facility was compliant with all but one of the conditions outlined in Schedule C of the above-mentioned ECA. The non-compliant month and effluent parameter is described in the following sections of this report.

The sewage works has a rated capacity of 95,000 m³/d, and a peak daily design flow rate of 193,000 m³/d. The average daily raw influent flow into the plant was 52,788 m³/d, the maximum daily flow into the plant was 139,893 m³/d, and the total flow received by the plant was 19,267,737 m³ in 2025.

There were two bypass events at Ravensview WPCP in 2025. There were two spills of unburnt digester gas in 2025.

2 PLANT DESCRIPTION AND TREATMENT PROCESS

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

2.1 RAW WASTEWATER RECEIVING

Raw wastewater from the central and east portions of Kingston is conveyed to the influent works. A Parshall flume metering device continuously measures the flow of raw wastewater into the plant. The septage receiving station is located in the northeast corner of the property. The septage receiving station gives approved septic truck haulers a place to discharge the contents of their tanks. The septage receiving station monitors the quantity, and origin, of the contents being unloaded and provides some pre-treatment before the contents enter the treatment plant at the influent works.

2.2 SCREENING

Three large mechanical screens remove larger materials from the incoming wastewater stream. Screened material is conveyed to a screening press where the material is compacted and stored for offsite disposal.

2.3 GRIT REMOVAL

Grit settles out of the sewage as the water flows through the tanks which are covered to keep the odours in. Air is bubbled into the tank to speed up the settling of the sand, gravel, and other heavier, and inorganic materials. In the bottom of the tank, a screw system pushes the settled grit into a hopper at the end of the tank. A pump lifts the grit and a small amount of water up into a separator where the grit is rinsed and then placed into a dumpster where it awaits disposal at a landfill.

2.4 PRIMARY CLARIFIERS

After removing the screenings and grit, the only material left in the wastewater is organic material and dissolved contaminants. The wastewater flows very slowly from one end of the tank to the other. As this happens, the solids, which are high in organic material, settle to the bottom. Large scrapers draw the material to one end of the tank where it is pumped across to the digesters for further processing. At the end of the primary clarifiers, the primary effluent flows into troughs which then direct it to the secondary treatment process. In the primary clarifiers, any grease, fats, or oils that are suspended are skimmed off by rakes and are pumped to the digesters. Any floatable materials that may have slipped through the bars in the screening process will be ground up before entering the digester.

2.5 BIOLOGICAL AERATED FILTERS

The primary effluent flows to a pumping facility which lifts the wastewater up to a channel running along the centre of the Biological Aerated Filters (BAF) facility. In each of the 11 available cells, the wastewater flows from the central channel to the bottom of the filters, and up through the filter. In the filter the wastewater is aerated, this encourages growth of microorganisms which consume carbon dissolved in the wastewater, as well as reducing ammonia and phosphorus. These microscopic organisms, referred to as biomass, stick onto the Bio Styrene media (4 mm diameter polystyrene beads), which also act to filter any suspended materials. The beads are held in place under a concrete floor with nozzles which let the clean water flow out on the surface. Like other filters, these are backwashed periodically to remove excess biomass growth and filtered particles. This helps to restore the filters' ability to process wastewater efficiently.

2.6 DISINFECTION

Disinfection is accomplished by adding sodium hypochlorite to the BAF facility effluent. The effluent flows by gravity to a chlorine contact chamber where ample time is provided for the chlorine to disinfect the BAF effluent. Just prior to exiting the chlorine contact tank, the wastewater is dosed with sodium bisulphite. This process de-chlorinates the water entering the receiving stream.

2.7 OUTFALL

After de-chlorination, the disinfected effluent from the chlorine contact tanks is discharged to the St. Lawrence River through a 1500 mm diameter outfall sewer with fourteen 250 mm elbow diffusers, approximately 240 m offshore.

2.8 BAF BACKWASH RESIDUAL TREATMENT

As wastewater is filtered through the BAF filter beds, the media becomes increasingly clogged and requires backwashing to remove excess contaminants and biomass. After leaving the BAF cell, the backwash residual water follows the backwash channel to two backwash residual tanks, each large enough to accommodate the volume of backwash residual from a backwash. The water is pumped back to the head of the plant using one of two submersible backwash residual pumps.

2.9 ANAEROBIC DIGESTERS

Raw sludge and grease and scum are pumped to the primary digester in regular intervals throughout the day. The digester facility consists of three primary digesters and one secondary digester. Inside, the mixture is heated to allow microorganisms to grow and consume carbon, this produces methane gas and carbon dioxide. The first primary digester, digester 3, is heated to 55 °C (thermophilic), which further assists in the destruction of harmful bacteria in the solids. After approximately 15 days, the solids are transferred in series to two other primary digesters, digesters 1 and 2, which are heated to 36 °C (mesophilic), where they remain for an additional 15 days before being stored in the secondary digester, digester 4, before being sent to the dewatering facility.

Sludge in digesters 1 and 2 is mixed using four mechanical mixers mounted on each of the digester's roofs. The sludge from digesters 1 and 2 is recirculated through two sludge heat exchangers, this helps the digester maintain the correct temperature. Mixing in digester 3 is accomplished using only a mixing pump. The sludge from digester 3 is also recirculated through a heat exchanger to maintain the correct temperature as well. Digester 4 sludge is pumped to holding tanks in the dewatering building where it is recirculated until ready to be dewatered.

The methane gas produced is used as fuel for the boiler system which in turn provides heat for the digestion process through the sludge heat exchangers. If more gas is being generated than can be used

in the boiler, the excess gas can be used in a combined heat and power generation system, Co-gen, to help offset the power purchased from the grid, or burned using a flare stack.

2.10 DEWATERING

Liquid biosolids, which are about 2% solid and 98% water, are pumped from the secondary digester into 2 centrifuges. Polymer is added to the biosolids before it enters the centrifuge, this helps the solids stick together, aiding the dewatering process. The centrifuge spins at a high-speed, forcing solids to the outer drum. This separates the solids, referred to as cake, from the liquid, called centrate. The cake, which now has a solids content of about 30%, is conveyed to a hopper. When enough material is in the hopper, a piston pump pushes the solid cake to the biosolids storage building. Alternatively, the cake materials can be loaded directly into a dump truck in a separate loading bay. The centrate, which contains many nutrients and some microorganisms, is returned to the headworks for treatment.

2.11 BIOSOLIDS STORAGE

The dry product, cake, that results from the treatment process is stored on site. The cake is then hauled by a third-party contractor and used on agricultural lands as a nutrient and soil conditioner when weather and crop conditions permit.

2.12 STANDBY EQUIPMENT

The power building houses two 575 Kilowatt (kW) electric back-up generators that are designed to run the water pollution control plant in the event of a power outage. These units are powered by 12-cylinder, low emission natural gas engines that will start automatically in the event of a power failure. The aforementioned Co-gen is a combined heat and power generator. This 8-cylinder engine is designed to work on natural gas, digester gas which has been cleaned and the moisture removed, or a blend of these two fuels. The Co-gen unit is designed to run continuously and produce 375 kW of electric power and 500 kW of heat reducing the amount of gas required to heat the digesters.

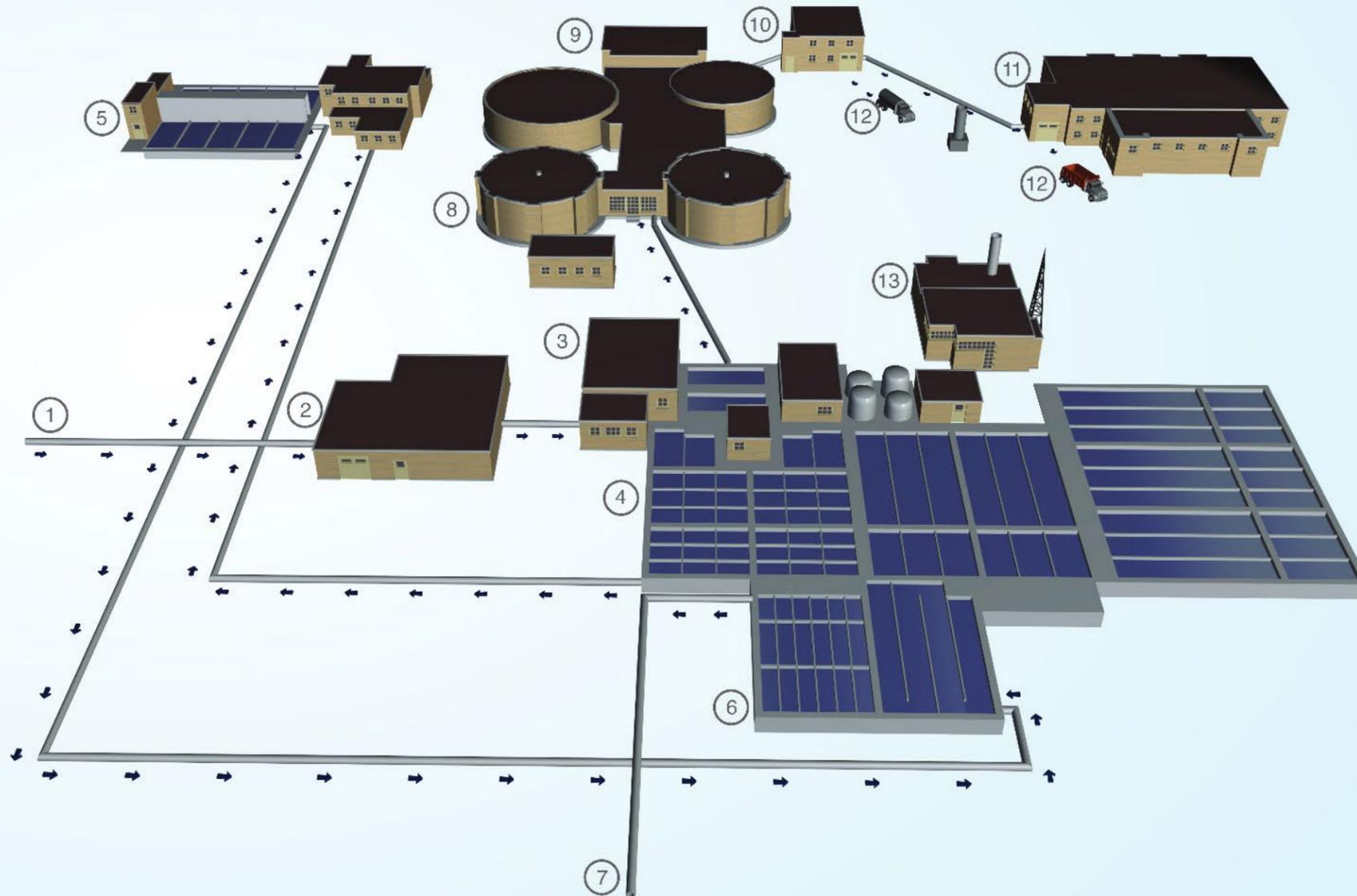
Figure 1 - Ravensview Water Pollution Control Plant General Layout

Ravensview

Wastewater Treatment Plant



- ① Wastewater from Kingston
- ② Screening
- ③ Grit Removal
- ④ Primary Clarifiers
- ⑤ Biological Aerated Filters
- ⑥ Disinfection
- ⑦ Discharge to St. Lawrence River
- ⑧ Anaerobic Digesters
- ⑨ Power Building
- ⑩ Dewatering
- ⑪ Biosolids Storage
- ⑫ Land Application
- ⑬ Administration/Lab Building



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3 OPERATION

Preventative maintenance and regular equipment inspections reduced equipment down time, and allowed operational problems to be diagnosed quickly and corrective actions to be taken immediately. Non flushable materials such as wipes, and grease continue to be prominent in the sewer system resulting in operational and maintenance challenges. Utilities Kingston continues to implement a public education program to educate customers and bring awareness to types of materials that should not be flushed down drains and toilets, and then into the sewers. This program included radio and newspaper campaigns, social media campaigns, bill stuffers, information on back of parking tickets, and bus information signs. This has been an ongoing campaign for many years with positive results.

Some of the larger operational challenges through 2025 are listed below.

In the winter, the coagulant supplier for Ravensview WPCP notified Utilities Kingston of an upcoming supply chain interruption for an unknown amount of time. The supplier provided alternate coagulant options, and staff performed testing to identify a suitable replacement. The test results revealed that the switch Ferric Sulphate was unlikely to impact plant performance, and the plant successfully switched from Ferric Chloride to Ferric Sulphate in late March.

Following routine maintenance on the coagulant system, the plant experienced lower than normal dosing of coagulant into the influent flow for 15 days. This occurred through the middle of November, leading to an exceedance of the monthly average effluent concentration limit of Total Phosphorous. To rectify the issue, safeguards have been put in place, including dosage calculations in the daily rounds sheet, to ensure a similar issue of this nature does not occur again or dramatically impact the performance of the plant.

4 INFLUENT AND SEPTAGE

Utilities Kingston monitors the raw influent sewage, as well as the imported sewage from the septage receiving station for several parameters throughout the year.

The concentration of the monitored parameters, biochemical oxygen demand (BOD), Total Kjeldahl Nitrogen (TKN), Total Suspended Solids (TSS), and Total Phosphorous (TP), in the sewage being received at the septage station has been increasing over the past several years. These higher concentrations lead to frequent operational challenges, including maintenance on the influent screening equipment, and increased costs associated with treating the wastewater. In the next calendar year there will be an increase in sampling frequencies, and verification of septage loads. This will ensure the treatment system is not impacted by the increasing concentrations of these parameters.

The concentration of the monitored parameters in the raw sewage has also been increasing over the past several years. Utilities Kingston, in keeping with the City of Kingston's sewer separation plan, has been working towards separating the combined storm/sanitary sewers to reduce stormwater flows into the sanitary sewer system, and it's possible that the reduced stormwater in the sanitary system could have an influence on the increased concentrations of these parameters. The average temperature of the sewage being received at the facility is also increasing and could also be an indicator of the reduced stormwater inputs which are typically colder than the raw sewage.

Annual average sample results for Septage Receiving from the past six years, and the 2025 annual average sample results for Raw Influent are shown in Tables 3 and 4 respectively.

5 PLANT PERFORMANCE

The ECA number 5556-BZFGZL lists the limits and objectives for the concentrations of certain effluent parameters, this is shown in Table 2. The effluent objectives listed in this table are the

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concentrations Utilities Kingston are expected to be below. The effluent concentration limits listed in the table are the concentrations Utilities Kingston is required to be below. Ravensview WPCP exceeded one of the limits set out in the ECA in 2025. The issue with coagulant dosing mentioned above led to a monthly average effluent concentration of TP of 1.03 mg/l, exceeding the limit of 1.00 mg/l.

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.

There were four samples throughout the year where plant effluent was below the pH objective of 6.50, but above the limit of 6.00. The annual average Final Effluent results can be seen in Table 5 and 6.

The average daily influent flow for the year was 55.6% of the rated capacity of the facility (95,000 m³/day), this is below the average influent flow rates from the past 8 years. The monthly average chlorine residual in the final effluent did not exceed 0.01 mg/L for any month of the year, and the highest single measurement was 0.02 mg/l. All monthly effluent loading rates were below the limits set out in the ECA, the loading results can be found in Table 7 below. Raw Influent, Septage, Final Effluent, and Sludge/Biosolids samples were collected and submitted to a third-party laboratory at or above the required frequencies based on the ECA.

6 BIO-SOLIDS MANAGEMENT

Ravensview WPCP processed 62,655.60 m³ of liquid sludge through the centrifuge. Approximately 3,536.58 Metric Tonnes of sludge cake was stored on site until GFL Environmental, contractor hired by Utilities Kingston, hauled the material off-site for land application. Ravensview WPCP produced less liquid sludge in 2025 than in 2024, however, almost the same amount of sludge cake was produced. Operational setpoints, digester performance, and centrifuge performance all factor into how much liquid and cake sludge is produced. A similar amount of sludge cake is expected to be produced next year.

The location and date of land application of the Bio-solids produced largely depends on weather, and the crops being grown on the receiving lands. Table 1 contains active spreading locations and their appropriate Non-Agricultural Source Materials (NASM) Plan.

7 MAINTENANCE

Staff continue to follow 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.
- Backwash tanks were cleaned.
- Two digester transfer pumps were rebuilt.
- Inspection and maintenance of flare stack.
- Chain, flights, and sprocket replacement on four primary clarifier scum collectors.
- Final effluent water lines to septage were repaired.
- Septage screening auger maintenance.

8 CAPITAL WORKS

The major highlights for capital works were:

- A large bus duct between Motor Control Centre (MCC) 300 and 900 was replaced with cable.
- Two new BAF air compressors were installed.
- BAF blower Programmable Logic Controllers (PLC), and Human Machine Interfaces (HMI) were replaced.
- Two BAF blower cores were rebuilt.
- 11 digester gas valves were replaced.

9 EQUIPMENT CALIBRATION

Third party contractors calibrated all plant flow meters, online analyzers, and lab equipment. As a result, the facility saw limited downtime of major equipment and saw very few mechanical or electrical failures this year. Calibration records are available upon request.

10 COMPLAINTS

In the 2025 reporting year, the Ravensview WPCP received one complaint regarding odours from the facility. Staff had taken a primary clarifier offline and were beginning to clean the tank on the day of the complaint, and we believe this is the source of the odours. The tank was cleaned later that day, and no further complaints were received.

11 BYPASS & OVERFLOW SUMMARY

Ravensview WPCP had two secondary bypass events during the reporting year. A secondary bypass is when wastewater receives primary treatment but skips secondary treatment before returning to the process stream (disinfection in this case). The plant is designed to allow bypasses, to protect infrastructure and flooding. One event occurred during a heavy rain combined with snow melt. The second bypass occurred following an equipment failure. Staff quickly reset the equipment, and replaced a faulty piece of the system. There was a total volume of 1,809 m³ bypassed during these two events.

There were two spill events of unburnt digester gas to the environment totaling 557 m³. The spills were reported to and/or planned with the Ministry of the Environment, Conservation and Parks (MECP).

The first event was a planned release of digester gas to facilitate the safe replacement of digester gas valves. Utilities Kingston notified and sent the plan to the MECP to receive approval for the release, and monitored the process closely.

The second event was a spill of unburnt digester gas to the atmosphere following a flare stack failure due to a failed pilot light during a power outage. The spill was reported to the MECP. Staff were able to reignite the flare stack, and a contractor was hired to service the flare stack to avoid future issues with the unit.

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.

12 BIOSOLIDS RECIPIENTS

Table 1 – Biosolids Recipients

Non-Agricultural Source Materials Plan (NASM)	Address
25097	Lot 17-19 Concession 3 South Town of Greater Napanee
25097	Lot 14-15 Concession 4 South Town of Greater Napanee
62736	Lot 26-31 Concession 1 Stone Mills Township
25196	Lot 8-12 Concession 2 South Town of Greater Napanee
25209	Lot 50 Concession 4 Stone Mills Township
60616	Lot 13-14 Concession 2 Town of Greater Napanee

13 EFFLUENT OBJECTIVES AND LIMITS

Table 2 – Effluent Objectives and Limits

Effluent Parameter	Objective	Limits
CBOD5	15.00 mg/L (Monthly Average)	25.00 mg/L (Monthly Average)
Total Suspended Solids	15.00 mg/L (Monthly Average)	25.00 mg/L (Monthly Average)
Total Phosphorus	0.8 mg/L (Monthly Average)	1.00 mg/L
Total Ammonia Nitrate (Winter)	12.00 mg/L (October to May)	N/A
Total Ammonia Nitrate (Summer)	7.00 mg/L (June and September)	N/A
Total Ammonia Nitrate (Fall)	5.00 mg/L (July to August)	N/A
E. Coli	100 CFU/100mL	200 CFU/100mL
CBOD5 Monthly Average Daily Effluent Loading	N/A	2,375 kg/d
Total Suspended Solids Monthly Average Daily Effluent Loading	N/A	2,375 kg/d
Total Phosphorous Monthly Average Daily Effluent Loading	N/A	95 kg/d
Total Residual Chlorine	Non-detectable	0.02 mg/L (Single Sample Result)
pH	6.5-9.0	6.0-9.5

14 SEPTAGE RECEIVING

Table 3 – Septage Receiving

Parameter	2019	2020	2021	2022	2023	2024	2025
BOD5 (mg/L)	204	804	565	790	1476	1072	704
TP (mg/L)	360	29	22	53	99	30	39
TKN (mg/L)	7	548	227	299	564	287	322
TSS (mg/L)	114	1975	1213	995	3658	2334	2147

15 PLANT PERFORMANCE RESULTS

Table 4 – Raw Influent Results

(Monthly Average)

Month	BOD5 (mg/L)	Total Suspended Solids (mg/L)	Total Phosphorus (mg/L)	Total Ammonia Nitrogen (mg/L)	Total Kjeldahl Nitrogen (mg/L)	pH	Temp (°C)
January	42	47	2.30	20.24	26.34	7.74	9.3
February	45	57	2.40	20.43	26.28	7.69	6.33
March	30	48	2.10	17.53	21.2	7.57	13.1
April	40	49	1.70	13.6	16.62	7.54	14.72
May	10	25	1.20	11.1	13.15	7.6	15.68
June	23	38	1.60	12.25	14.58	7.64	18.9
July	27	21	1.80	14.1	17.34	7.62	21.06
August	45	82	2.50	15.58	24.73	7.65	20.13
September	41	74	2.80	18.8	27.38	7.69	18.18
October	44	84	3.20	22.56	29.9	7.77	18.14
November	52	72	2.80	18.35	29.25	7.64	15.73
December	40	52	2.20	13.65	20.66	7.71	13.66
Annual Average	37	54	2.22	16.52	22.29	7.66	15.41

Table 5 – Final Effluent Results (Part 1)

(Monthly Average)

Month	CBOD5 (mg/L)	Total Suspended Solids (mg/L)	Total Phosphorus (mg/L)	Total Ammonia Nitrogen (mg/L)	Un-ionized Ammonia (mg/L)
January	1.90	4.50	0.47	3.82	0.02
February	2.70	5.70	0.66	5.41	0.03
March	2.90	5.90	0.39	3.47	0.01
April	1.80	4.70	0.32	1.6	0.01
May	1.70	3.90	0.32	1.78	0.01
June	3.00	3.40	0.39	1.49	0.01
July	2.60	5.00	0.57	3.57	0.02
August	1.90	6.20	0.58	2.91	0.02
September	2.30	11.50	0.61	6.94	0.03
October	2.70	8.90	0.59	5.83	0.03
November	3.00	8.50	1.03*	3.59	0.02
December	2.50	6.40	0.43	3.48	0.01
Annual Average	2.42	6.22	0.53	3.66	0.02

*Indicates an exceedance of the Monthly Average Effluent Concentration limit

Table 6 – Final Effluent Results (Part 2)

Month	pH	Temperature (°C)	E Coli (CFU/100mL)	Acute Lethality (Pass or Fail)	Total Residual Chlorine (mg/L)
January	7.16	13.68	2	Pass	0.00
February	7.05	10.03	2	N/A	0.00
March	6.96	14.65	11	N/A	0.00
April	6.93	15.8	9	Pass	0.01
May	7.05	16.78	13	N/A	0.00
June	7.24	18.69	48	N/A	0.01
July	7.12	20.94	71	Pass	0.01
August	7.08	20.69	24	N/A	0.01

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Month	pH	Temperature (°C)	E Coli (CFU/100mL)	Acute Lethality (Pass or Fail)	Total Residual Chlorine (mg/L)
September	7	20.56	5	N/A	0.00
October	6.99	18.7	14	Pass	0.00
November	7.16	16.89	12	N/A	0.00
December	7.18	14.74	5	N/A	0.00
Annual Average	7.08	16.85	18.00	PASS	0.00

Table 7 – Effluent Loading Limits

Month	CBOD5 (kg/d)	Total Suspended Solids (kg/d)	Total Phosphorous (kg/d)
January	88.82	210	22
February	116.66	246	29
March	229.77	467	31
April	139.12	363	25
May	143.79	330	27
June	237.32	269	31
July	163.57	315	36
August	96.51	315	29
September	114.48	572	30
October	127.32	420	28
November	146.84	416	50
December	140.40	359	24
Annual Average	145	357	30

Table 8 – Monthly Plant Influent Flows

Month	Rated Capacity Average Daily Flow (m3/day)	Average Daily Flow (m3/day)	Approved Peak Daily Flow (m3/day)	Peak Daily Flow (m3/day)
January	95,000	44,074	193,000	62,441
February	95,000	41,102	193,000	48,934
March	95,000	70,624	193,000	134,325
April	95,000	65,745	193,000	119,342
May	95,000	71,219	193,000	139,893
June	95,000	63,765	193,000	90,000
July	95,000	50,819	193,000	59,939
August	95,000	43,315	193,000	54,909
September	95,000	41,880	193,000	49,052
October	95,000	40,295	193,000	76,606
November	95,000	49,021	193,000	68,778
December	95,000	50,770	193,000	106,987

Table 9 – Annual Plant Influent Flows

Parameter	2019	2020	2021	2022	2023	2024	2025
Average (m3/day)	77,265	59,435	57,278	68,505	61,303	52,292	52,788
Max (m3/day)	160,459	141,016	146,486	153,434	148,549	129,380	139,893
Design (m3/day)	95,000	95,000	95,000	95,000	95,000	95,000	95,000
Design Peak (m3/day)	193,000	193,000	193,000	193,000	193,000	193,000	193,000
Daily/Design (%)	81.3	62.6	60.3	72.1	64.5	55.0	55.6
Max/Peak (%)	83.1	73.1	75.9	79.5	77.0	67.0	72.5