Duffin Creek Water Pollution Control Plant

2024 Annual Performance Report

The Regional Municipalities of Durham and York
Duffin Creek Water Pollution Control Plant 2024 Annual Performance Report

Environmental Compliance Approval (ECA): 0288-CVPN8W Dated November 28, 2023
Environmental Compliance Approval (Air): 0788-CVNPPF Dated November 24, 2023

International Organization for Standardization (ISO) 14001 Certification: CA05/3563/E

The Duffin Creek Water Pollution Control Plant (WPCP) Annual Performance Report provides staff, stakeholders, and customers an overview of the performance of the Duffin Creek WPCP in 2024. Further, this report fulfills the annual reporting requirements of the Ontario Ministry of the Environment, Conservation and Parks (MECP) and demonstrates the commitment of ensuring the WPCP continues to deliver wastewater services to our customers in an environmentally responsible manner.

Water Pollution Control Plant Process Description

General

The Duffin Creek WPCP is jointly owned by The Regional Municipality of Durham and The Regional Municipality of York. It is operated in accordance with the terms and conditions of the ECAs noted above. The plant, located in the City of Pickering, is operated by The Regional Municipality of Durham. This MECP Class 4 conventional activated sludge treatment plant is designed to treat wastewater at an average daily flow rate of 630,000 cubic metres per day (m^3/d). The Duffin Creek WPCP is ISO 14001 certified.

The Duffin Creek WPCP treats wastewater for approximately 243,763 residents in the Town of Ajax and the City of Pickering in the Regional Municipality of Durham as well as 1,022,200 residents in the Regional Municipality of York, which includes the Municipalities of Aurora, East Gwillimbury, King, Markham, Newmarket, Richmond Hill, Whitchurch-Stouffville, and Vaughan. The total population served by Duffin Creek WPCP is approximately 1,265,963.

The Duffin Creek WPCP utilizes the following processes to treat wastewater:

- Raw influent pumping
- Preliminary treatment
- Primary treatment
- Phosphorus removal
- Secondary treatment
- Disinfection (chlorination/dechlorination)
- Solids management
- Incineration

Raw Influent Pumping

Wastewater collected through approximately 732 kilometres (km) of sanitary sewers in Ajax and Pickering is conveyed to the Water Pollution Control Plant (WPCP) by gravity and by the following sanitary sewage pumping stations located in the collection system: Bayly Street, Jodrel Road, Toy Avenue, Finch Avenue and Liverpool Road. Wastewater collected from York Region is conveyed to the WPCP via the Primary Trunk Sewer and the twin Southeast Collector Trunk Sewers which are part of the York Durham Sewage System (YDSS). Wastewater from York Region accounted for 82.8% of the plant flow treated in 2024. The remaining sanitary sewage flow of 17.2% was generated by the Town of Ajax and the City of Pickering in Durham Region. The combined flows enter a diversion chamber, which then splits the flow between Stages 1, 2 and 3 process areas at the Duffin Creek WPCP. There are two Influent Pumping Stations (IPS), each with eight submersible pumps, that direct the wastewater to the preliminary treatment process. From the IPS, the wastewater flows by gravity through the treatment processes.

Preliminary Treatment

Screening: Eight mechanically cleaned screens remove rags and large debris that could harm pumps and process equipment. Screenings are compacted for disposal in landfill.

Grit Removal: There are eight grit tanks equipped with coarse bubble diffusers to provide aeration in the grit removal process. Heavy suspended material such as sand and small stones (grit) is settled to the bottom of the tanks while lighter organic particles are kept in suspension and passed through the tanks for further treatment. The grit removed is dewatered for landfill disposal.

Primary Treatment

Fourteen primary clarifiers each equipped with a travelling bridge system utilize the physical process of sedimentation, which cause heavy particles to settle to the bottom of the tank as raw sludge and lighter particles to float to the surface as scum. The sludge, along with waste activated sludge from the secondary treatment process is collected by scraper blades, which push the sludge into hoppers. The sludge is then pumped to anaerobic digestion and/or dewatering holding tanks. The scum is collected by the travelling bridge and pumped to anaerobic digestion.

Phosphorus Removal

Iron salts are added throughout the treatment process to aid in phosphorus and suspended solids removal. Chemical addition can be supplemented by the addition of polymer at various locations throughout the plant for enhanced treatment.

Secondary Treatment

Aeration Tank: There are fourteen aeration tanks each containing anoxic and aerobic zones. In the first part of the tank no oxygen is introduced (anoxic), this is for denitrification. The second part of the tank is where fine bubbled air is diffused into the wastewater (aerobic) to remove dissolved and suspended organics and nutrients from the wastewater.

Secondary Clarifier: Twenty-two secondary clarifiers receive effluent from the aeration tanks where solids settle quickly as activated sludge leaving a clear effluent on top. A portion of the activated sludge collected on the bottom of the clarifier is pumped back to the front of the aeration tanks and any excess activated sludge is ‘wasted’ to the primary clarifier to co-settle with primary sludge.

Disinfection (chlorination/dechlorination)

Chlorine in the form of liquid sodium hypochlorite is metered into the effluent stream for pathogen control. Adequate contact time is provided by the chlorine contact chambers. Disinfected effluent is dechlorinated with a sodium bisulphite solution before being discharged to Lake Ontario through a 3.05 metre (m) diameter outfall pipe, approximately 1,100 m long with a 183 m long diffuser pipe.

Solids Management

Anaerobic Digestion: A portion of the raw sludge collected from the primary clarifiers is pumped into one of the four primary digesters, which overflow into two secondary digesters for thickening. Digested sludge is pumped to dewatering storage tanks where it is blended with additional raw sludge from the primary clarifiers before being dewatered. All solids produced are dewatered and incinerated on site.

Imported Sludge: Durham’s Regional Biosolids Management Program imports sludge from other Regionally owned Water Pollution Control Plants within Durham Region. In addition, sludge may be imported from York Region’s facilities.

Dewatering: Duffin Creek WPCP utilizes eight dewatering solid bowl centrifuges in order to separate the heavier material and the liquid supernatant (centrate). All dewatered solids (sludge cake) are sent to incineration. The centrate is pumped to the head of the plant where it combines with the influent to undergo treatment.

Incineration

There are four fluidized bed process trains, which feeds the sludge cake through the combustion process to burn off organic substances contained in the sludge cake and convert the cake into ash and flue gas. Steam boilers are utilized for waste heat recovery. All ash was hauled to St. Mary’s Cement in Bowmanville, Ontario except 117 tonnes of ash produced was sent to the Toy Avenue transfer station in Pickering, Ontario. No land application or landfill of biosolids occurred in 2024 from this facility.

Environmental Compliance Approval (ECA)

Under Condition 11(4) of ECA 0288-CVPN8W the Region of Durham must produce an annual performance report that contains the following information:

a) A summary and interpretation of all influent, imported sewage monitoring data, and a review of the historical trend of sewage characteristics and flow rates.

Based on an average of daily flows for the past 11 years, flow has increased by 8%. Please see Figure 1 for detailed historical annual average daily flows.

Refer to table 3 for raw influent analyses and table 7 for imported sewage monitoring data.

Table 4 and Figures 2-5 outline the historical characteristics of the raw influent.

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.

The Duffin Creek Water Pollution Control Plant (WPCP) effluent was determined to be compliant with the ECA limits during the reporting period.

The plant operated at 58.3% of its approved average daily flow rate of 630,000 cubic metres (m^3) for this reporting period. The plant received a maximum daily flow of 769,865 m^3 on April 12, 2024.

There were no objective exceedances for the reporting period.

Refer to Table 5 Final Effluent Analyses for detailed final effluent monitoring data.

c) Summary of all operating issues encountered, and corrective actions taken.

Influx of influent rags/wipes – the influent pumping stations were flushed weekly to help reduce the buildup, and the public is reminded of what is acceptable to flush via communication campaigns.

Stage one digester complex is offline which limits the capacity for sludge storage and digester gas production for hot water boilers. Imported sludge is forced to go to influent flow and directly to dewatering due to digester limitations. The increased sludge to dewatering results in decreased primary and digester sludge pumping and can impact centrifuge and incinerator operations. Digester capital construction is expected to be complete in 2027.

On October 1, Durham staff identified a security breach affecting a limited component of the digital systems at the Duffin Creek Water Pollution Control Plant. The affected system was isolated and operations at Duffin Creek are currently running in auto or manual mode. There was no impact to any other component of the network at Duffin Creek or elsewhere in Durham’s network. There was no impact to health, safety, or the environment. No private or sensitive information was contained in the affected system and Duffin Creek is fully operational.

A break in the sodium hypochlorite dosing line for contact chamber 4 resulted in lower total chlorine residuals and increased e. Coli results. Due to the nature of the repair, it required an external contactor to complete. After the repair was complete, total chlorine levels returned to normal and e. Coli results decreased.

Due to sulfur dioxide concerns in incineration stack emissions, Duffin Creek transitioned to ferric chloride from ferric sulphate. Ferric chloride is a proven coagulant and was used prior to the switch to ferric sulphate.

There are multiple capital upgrade projects on going throughout 2024. There was an increase in coordination meetings to give the plant time to make proper operational adjustments.

d) 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.

Operations

- Replaced return activated sludge pump 2202.
- Replaced return activated sludge pump and motor 1802 and 2002.
- Replaced chain and wear shoes for secondary 22.
- Replaced turn table for secondary 14.
- Replaced cables on primary bridge 5, 8, 11, 12, 13.
- Rebuilt scum mixing pump 3.
- Rebuilt raw sludge pump 1101.
- Replaced aeration mixer 302, 404, 802, 901, and 903.
- Replaced main header gasket for aeration 301.
- Descaled centrate line for struvite buildup.
- Repaired schwing feed screw pump.
- Replaced distribution conveyor hanger bearing.
- Installed mixer for sludge mixing tank.
- Replaced return activated sludge flow meter for building 1.
- Replaced mechanical seal for digester sludge pump 008.
- Rebuilt both imported sludge haulage pumps.
- Installed fiber wrap on draft tubes for mixers 301, 302, 303, and 304.

Incineration

- Replaced continuous emissions monitoring systems (CEMS) sampling line.
- Upgrade CEMS total hydrocarbon unit.
- Refractory repairs on reactor 1.
- Decoupled turbine 4 from FAB 4.
- Replaced induced draft fan 1 motor.
- Replaced gearbox for ash thickener 3.

- Water tube leak for economizer – pending repair work and new bypass line design

e) Summary of any effluent quality assurance or control measures undertaken

On-line instrumentation is verified by plant operators using various field or lab test equipment.

Analytical balances are calibrated by a third-party company.

In-house lab equipment was calibrated by operations staff and various manufacturers.

f) Summary of the calibration and maintenance carried out on all Influent, Imported Sewage and Final Effluent monitoring equipment.

Plant flows are measured at the influent of this plant.

All influent flow meters were calibrated on February 14, 2024.

All monitoring and laboratory equipment was calibrated and maintained according to manufacturer's specifications.

g) Summary of efforts made to achieve the design objectives in this Approval

The annual average daily flow did not exceed the rated capacity of 630,000 cubic metres per day (m^3/d). There were no objective exceedances for the reporting period. Best efforts will continue to be applied to maintain results below the objectives.

h) 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

Refer to Table 10 Dewatering and Incineration Summary.

There is no increase of sludge volume expected in the next reporting period.

All sludge generated at Duffin Creek Water Pollution Control Plant is incinerated under normal operating conditions.

i) A summary of any complaints received, and any steps taken to address the complaints

There were no complaints received during the reporting period.

j) Summary of all By-passes, Spill or Abnormal Discharge Events

There is no mechanism for by-passing untreated wastewater at this facility. There are no anticipated by-passes planned for the next reporting period. There were no spill or abnormal discharge events for the reporting period.

k) Summary of all Notice of Modifications to Sewage Works

No notice of modifications was submitted in 2024.

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.

Receiving Water Assessment

In 2006, lake modelling was undertaken to assess the potential impacts of the expanded plant's treated effluent on Lake Ontario, the shoreline, surrounding water users, and to examine the feasibility of increasing the average flow capacity to 630,000 cubic metres per day (m^3/d). The outfall diffusers were modified to accommodate the potential increase in flow capacity and to meet the 20:1 dilution requirement. The dilution guideline means that for every 1-part plant effluent, 20-parts of lake water dilute the effluent within the immediate area of the diffuser under normal lake water conditions.

Elimination of bypass/overflows

As of July 2023, the installation of variable diffusers for the outfall is complete. This will allow the maximum flow through the outfall to be increased from 1,050,000 m3/day to 1,900,000 m3/day. This project will reduce the potential for future overflows.

Under the current Stage 3 Liquid Rehabilitation Project, there will be two (2) stormwater spill containment chambers to be installed at the southernmost end of the plant on Stage 1 and 2 and Stage 3 storm sewer trunks. The construction project is ongoing and anticipated to be fully commissioned in early 2027. The two stormwater spill containment chambers (one for Stage 1 and 2 and one for Stage 3) are designed to prevent any spills collected in the storm sewer trunk system from entering the receiving water body (Lake Ontario). Each chamber is equipped with one electric-actuated slide gate that is wired back to the Plant's Supervisory Control and Data Acquisition (SCADA) system for easy access control. The gate will be normally opened during normal operation. In the event when operators identify an unexpected spill, they will have the ability to close the gate remotely via the SCADA system or locally in the field at the chamber location. Immediately closing the gate will contain the spill in the storm sewage trunk system, which allows adequate spill storage volume and sufficient response time for the operators to take corrective actions. The containment chamber gates are used to intercept the spills, to prevent from entering the environment, and to allow evacuation of spills for further treatment within the plant. The estimate for the overall construction cost, including excavation, foundation, chambers, materials, and installation, is $1,000,000.

Industrial Wastes

Durham Region's Sewer Use By-Law (55-2013) outlines concentration limits for discharge into land drainage works or the sanitary sewer system. Violations of the by-law can result in fines of up to $100,000 for personal or corporate offences. Durham Region may establish a Compliance Program that will permit an industrial user to discharge non-complying sewage upon such terms and conditions deemed appropriate by the Durham Region Commissioner of Works. The compliance program allows industry to not be prosecuted for violating the concentration limits outlined in the by-law. The compliance program outlines the length of time necessary to plan, design, construct or install facilities to eliminate the non-compliance. A Sewage Surcharge Agreement is an agreement between Durham Region and a company, that permits the discharge of overstrength sewage to the Region's sanitary sewer collection system. Companies are billed for the overstrength sewage to pay for the additional cost of treatment and collection. The eligible parameters for a sewage Surcharge Agreement are Biochemical Oxygen Demand, Total Suspended Solids, Total Phosphorus, Total Kjeldahl Nitrogen, Animal/Vegetable Oil & Grease, and Sulphates. Sewer use by-law office staff routinely monitor and sample the wastewater collection system to ensure compliance with the by-law. Similarly, York Region has Sewer Use By-law programs in place to regulate discharges to the wastewater system. York Region's Environmental Monitoring and Enforcement team (EME) is responsible for administering the programs and enforcing the bylaw. These programs are being administered in ways that similarly align with Durham Region's programs, except York Region does not issue surcharge agreements for Animal/Vegetable Oil & Grease and Sulphates.

m) Any changes or updates to the schedule for the completion of construction and commissioning operation of major process(es) / equipment groups in the Proposed Works

Table 1 - Projected Completion Dates

Contract Number	Project Description	Original Projected Completion Date	Updated Projection Completion Date
T-20-08	Biosolids Treatment Replacement Project – Contract 1 (enabling)	June 1 2023	February 28 2026
T-20-230	Digester Mixing and Electrical Upgrades	July 15 2022	July 9 2028
D2023-24	Stage 3 Liquids and Miscellaneous Remedial Works	June 18 2024	February 16 2027
RFTC-1151-23	Equipment Storage Building	June 24 2024	January 27 2026

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

There was no deviation from the monitoring schedule. The monitoring schedule for 2025 is listed below. The following list demonstrates the 2025 sample schedule with the following definitions:

- SIM1 – Carbonaceous biochemical oxygen demand (CBOD5), suspended solids
- SIM2 – Biochemical oxygen demand (BOD5), suspended solids, Total Kjeldahl Nitrogen (TKN), Total Phosphorous (TP)
- SIM2M, Hg – BOD5, suspended solids, TKN, TP, Al, As, Cd, Co, Cr, Cu, Fe, Mn, Mo, Ni, Pb, Sb, Se, Zn
- SIM3M, Cl - BOD5, suspended solids, TKN, TP, Total Ammonia Nitrogen (TAN), Nitrite (NO2), Nitrite + Nitrate (NO2+NO3), dissolved phosphorous, Aluminum (Al), Arsenic (As), Cadmium (Cd), Cobalt (Co), Chromium (Cr), Copper (Cu), Iron (Fe), Manganese (Mn),

Molybdenum (Mo), Nickel (Ni), Lead (Pb), Antimony (Sb), Selenium (Se), Zinc (Zn), Chloride

- SIM3 - BOD5, suspended solids, TKN, TAN, NO2, NO2+NO3, dissolved phosphorous, TP.
- SIM3C - CBOD5, suspended solids, TKN, TAN, NO2, NO2+NO3, dissolved phosphorous, TP.
- SIM3C-TP - CBOD5, suspended solids, TKN, TAN, NO2, NO2+NO3, dissolved phosphorous.
- TP-HACH – Total Phosphorous
- SIM3MC - CBOD5, suspended solids, TKN, TP, TAN, NO2, NO2+NO3, dissolved phosphorous, Al, As, Cd, Co, Cr, Cu, Fe, Mn, Mo, Ni, Pb, Sb, Se, Zn
- SIM4MC-TP - BOD5, CBOD5, susp. Solids, TKN, TAN, NO2, NO2+NO3, DP, pH, Hg, Al, As, Cd, Co, Cr, Cu, Fe, Mn, Mo, Ni, Pb, Sb, Se, Zn
- SLU2 - Total solids, ashed total solids, volatile total solids, TKN, TP, TAN, NO2+NO3, Mercury (Hg), As, Cd, Co, Cr, Cu, Potassium (K), Mo, Ni, Pb, Se, Zn
- MFEC-WW – E. coli

Table 2 - Duffin Creek WPCP Sampling Matrix – Regional Environmental Lab Schedule

Duffin Creek WPCP Sampling Matrix – Regional Environmental Lab Schedule	
Raw Influent	Three Times Weekly: SIM3 Monthly: SIM3M, Cl
Primary Effluent	Monthly: SIM3
Secondary Effluent	Monthly: SIM3C
Final Effluent	Monday - Friday: MFEC-WW, HACH-TP Tuesday and Thursday: SIM3C-TP Monday, Wednesday, Friday: SIM3C-TP Monthly: SIM4MC-TP
Digestion	Bi-Weekly: SLU2
Imported Wastewater	Weekly: SIM2 Monthly: SIM2M, Hg

Proposed Alterations, Extensions or Replacements

Replacement of Incineration Units 1 and 2

Detailed design of the new incinerator systems to replace Units 1 and 2 is underway. The detailed design is anticipated to be completed by June 2025 due to the project complexity in phasing and construction sequencing. Stage 1 of the Enabling Contract of construction started on June 20, 2023, and will end in February 2026. Stage 2 of the Main Contract of construction will commence in March 2026 and the overall program completion is scheduled to occur in 2033.

Stage 3 Liquid Rehabilitation and Retrofit Work

Construction of this project started on June 18, 2024, and the overall project completion is scheduled to occur in February 2027.

Ministry of the Environment, Conservation and Parks (MECP) Inspection

The last plant inspection was February 15, 2022.

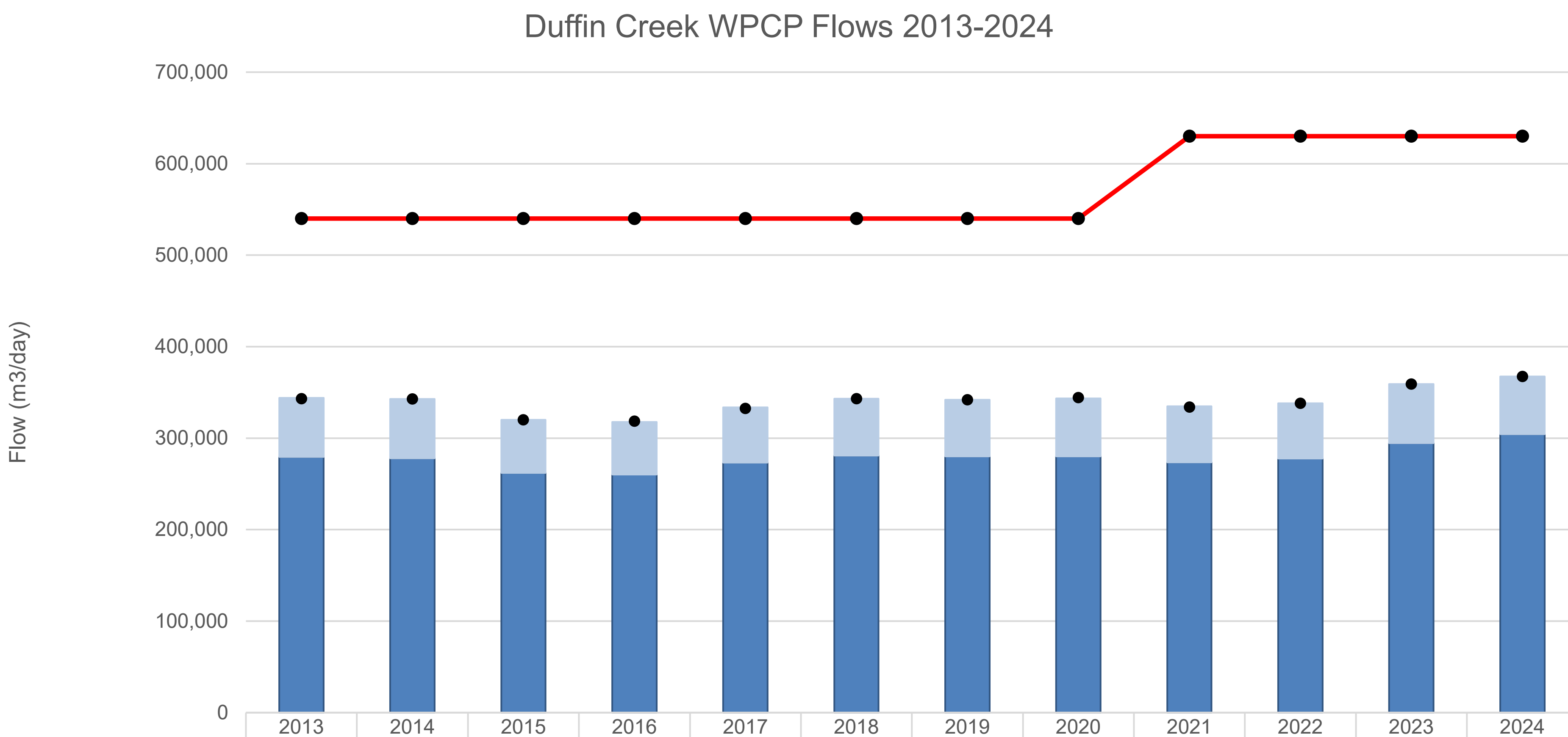
Table 3 - Raw Influent Flows

Month	York Region Plant Flow cubic metre (m^3)	Durham Region Plant Flow m^3	Total Flow to Plant* m^3	Average Daily Flow cubic metre per day (m^3/d)	Maximum Daily Flow m^3/d
January	10,003,037	2,186,853	12,189,890	393,222	557,715
February	9,007,330	1,754,560	10,761,890	371,100	435,022
March	9,717,527	2,104,569	11,822,096	381,358	454,220
April	11,066,373	2,605,753	13,672,126	455,738	769,865
May	9,728,304	1,964,883	11,693,187	377,200	461,966
June	9,101,933	1,837,357	10,939,290	364,643	474,008
July	9,645,591	2,058,331	11,703,922	377,546	568,717
August	9,389,060	1,805,188	11,194,248	361,105	456,288
September	8,386,775	1,672,743	10,059,518	335,317	386,399
October	8,178,297	1,671,722	9,850,019	317,743	340,570
November	8,212,662	1,610,058	9,822,720	327,424	355,939
December	8,931,333	1,822,308	10,753,641	346,892	507,282
Total (%)	111,368,222 (82.8%)	23,094,325 (17.2%)	134,462,547 (100%)		
Average	9,280,685	1,924,527	11,205,212	367,384**	
Minimum	8,178,297	1,610,058	9,822,720		
Maximum	11,066,373	2,605,753	13,672,126		769,865
ECA Limit				630,000	
Compliance Met				Yes	

*Metered at the raw influent

**Annual average daily flow

Figure 1 - Annual Average Flow 2013-2024



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Durham	64,808	64,842	57,911	57,503	60,367	62,112	61,910	63,489	61,257	60,596	64,356	63,099
York	279,344	278,137	262,038	260,194	273,152	281,047	280,136	279,948	273,575	277,552	294,652	304,285
Average Daily Fow	343,211	342,979	319,948	318,567	332,607	343,159	342,047	344,379	333,917	338,147	359,009	367,384
Rated Capacity	540,000	540,000	540,000	540,000	540,000	540,000	540,000	540,000	630,000	630,000	630,000	630,000

Table 4 - Raw Influent Analyses

Month	Biochemical Oxygen Demand average concentration (conc.) milligram per litre (mg/L)	Total Suspended Solids average conc. mg/L	Total Phosphorus (TP) average conc. mg/L	Total Kjeldahl Nitrogen average conc. mg/L
January	186	249	5.1	43.90
February	195	251	5.3	44.87
March	179	226	5.3	45.59
April	181	257	4.6	38.58
May	209	260	5.1	42.88
June	247	286	5.6	45.90
July	207	285	5.6	45.74
August	188	292	5.8	46.92
September	195	302	6.1	54.06
October	184	273	6.1	53.54
November	192	340	6.4	54.71
December	199	300	6.1	57.10
Average	197	277	5.6	47.82
Minimum	179	226	4.6	38.58
Maximum	247	340	6.4	57.10
Sampling Frequency Requirement Met	Yes	Yes	Yes	Yes

Figure 2 - Raw Influent - Annual Average Biochemical Oxygen Demand

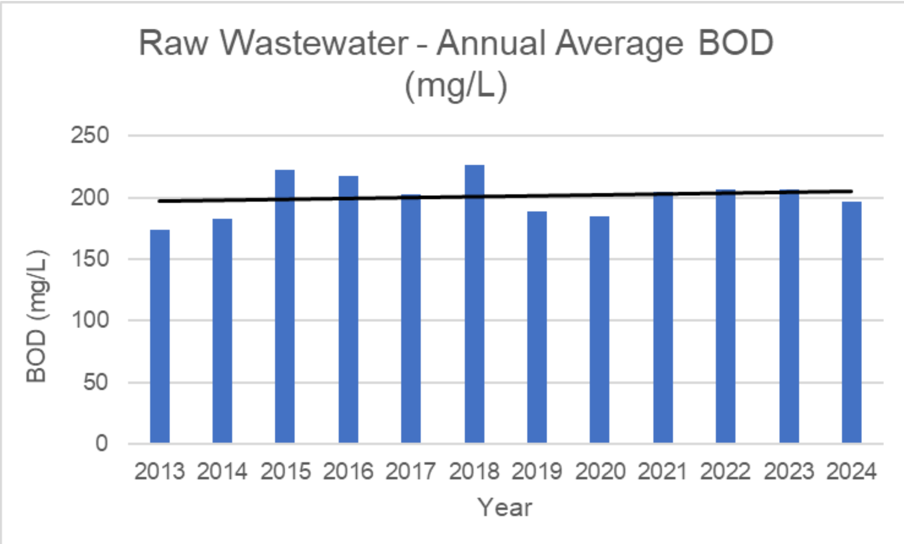


Figure 3 - Raw Influent - Annual Average Total Suspended Solids

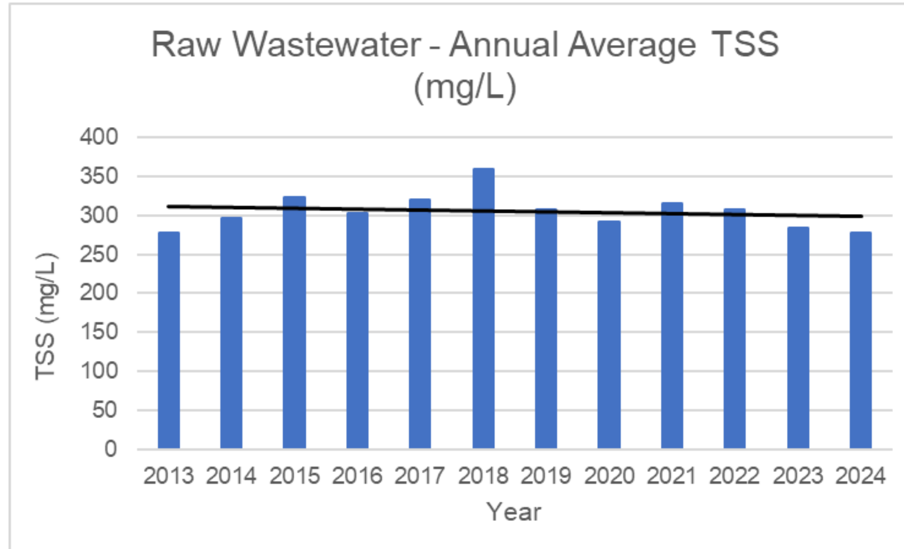


Figure 4 - Raw Influent - Annual Average Total Phosphorus

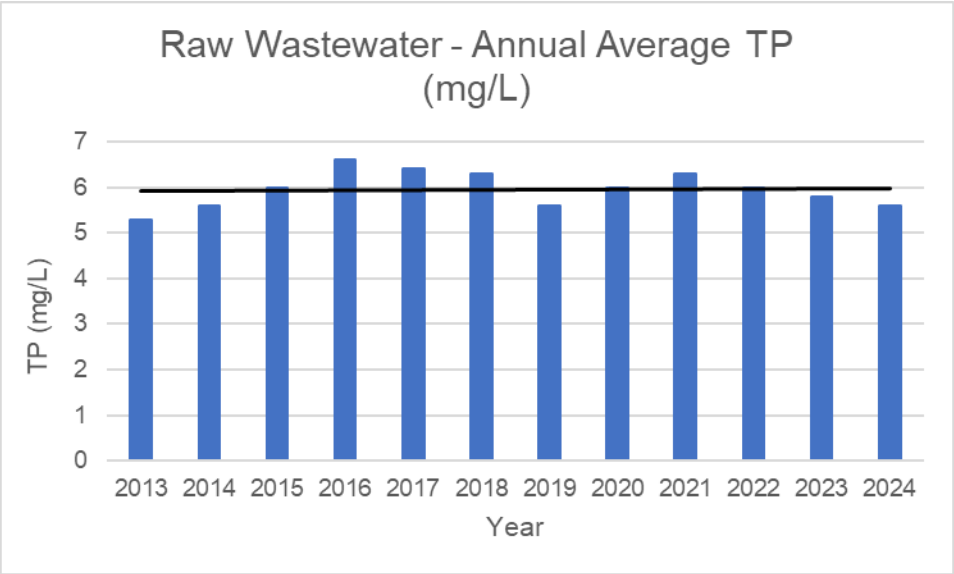


Figure 5 - Raw Influent - Annual Average Total Kjeldahl Nitrogen

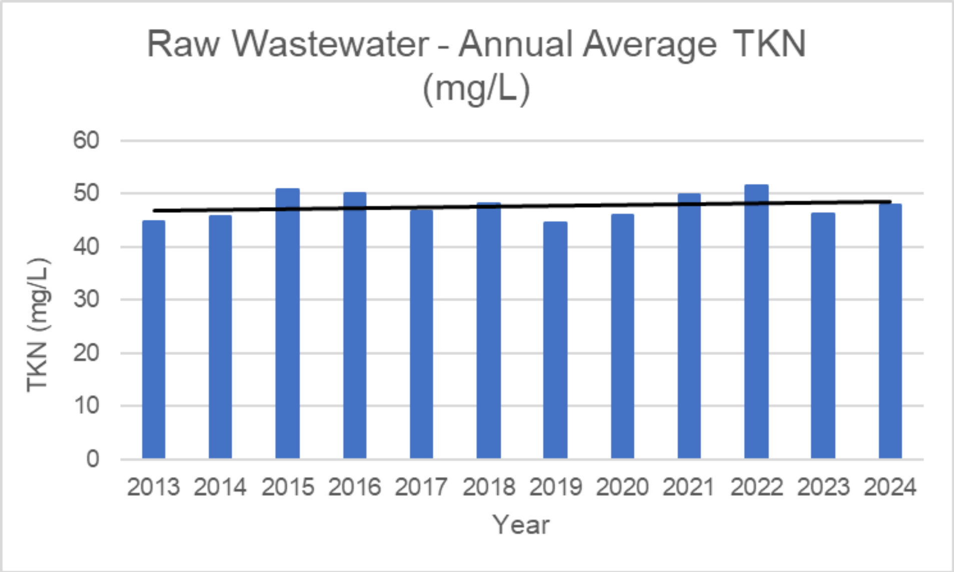


Table 5 - Final Effluent Analyses

Month	Carbonaceous Biochemical Oxygen Demand average concentration (conc.) milligram per litre (mg/L)	Total Suspended Solids average conc. mg/L	Total Phosphorus (TP) average conc. mg/L	Total Ammonia Nitrogen average conc. mg/L winter	Total Ammonia Nitrogen average conc. mg/L summer
January	2.0	4.3	0.2	0.3	
February	2.2	3.4	0.3	0.3	
March	1.4	4.0	0.3	0.2	
April	1.7	3.7	0.2	0.2	
May	2.1	3.6	0.3		0.3
June	2.3	3.7	0.3		0.6
July	2.0	4.2	0.3		0.9
August	1.7	3.2	0.3		0.8
September	1.9	3.6	0.4		0.5
October	3.1	6.1	0.4	1.4	
November	2.9	5.5	0.4	0.8	
December	2.3	4.4	0.3	0.3	
Average	2.1	4.1	0.3	0.5	0.6
Minimum	1.4	3.2	0.2	0.2	0.3
Maximum	3.1	6.1	0.4	1.4	0.9
ECA Limit	25.0	25.0	0.8	10.0	6.0
ECA Objective	15.0	15.0	0.6	5.0	5.0
TP Annual Loading			110 kilogram per day (kg/d)		
ECA Limit			311 kg/d		
Within Compliance	Yes	Yes	Yes	Yes	Yes
Sampling Requirement Frequency Met	Yes	Yes	Yes	Yes	Yes

Table 5 - Final Effluent Analyses continued

Month	Unionized Ammonia Nitrogen average concentration (conc.) milligram per litre (mg/L)	Total Chlorine Residual average conc. mg/L	pH minimum	pH maximum	Temperature Degree Celsius
January	0.0	0.00	6.6	7.3	15.0
February	0.0	0.00	6.6	7.4	14.9
March	0.0	0.00	6.5	7.3	15.1
April	0.0	0.00	7.0	7.3	16.1
May	0.0	0.00	6.9	7.3	19.0
June	0.0	0.00	6.9	7.4	21.1
July	0.0	0.00	6.6	7.5	22.4
August	0.0	0.00	7.0	7.4	22.1
September	0.0	0.00	6.7	7.4	21.6
October	0.0	0.00	6.6	7.3	19.9
November	0.0	0.00	6.6	7.1	19.5
December	0.0	0.00	6.5	7.1	16.3
Average	0.0	0.00			18.6
Minimum	0.0	0.00	6.5		14.9
Maximum	0.0	0.00		7.5	22.4
ECA Limit		0.02	6.0	9.5	
ECA Objective		Non-detectable	6.5	8.5	
Within Compliance		Yes	Yes	Yes	
Sampling Frequency Requirement Met	Yes	Yes	Yes	Yes	Yes

Table 6 - *Escherichia coli* Sampling

Month	Monthly Geometric Mean Density	Number of Samples
January	47	22
February	25	20
March	35	20
April	39	21
May	26	22
June	24	20
July	25	22
August	16	21
September	38	19
October	36	22
November	27	20
December	93	20
ECA Limit	200	
ECA Objective	100	
Within Compliance	Yes	
Sampling Frequency Requirement Met		Yes

Table 7 - Imported Wastewater Analyses and Septage Amounts

Month	Biochemical Oxygen Demand average concentration (conc.) milligram per litre (mg/L)	Total Suspended Solids average conc. mg/L	Total Kjeldahl Nitrogen average conc. mg/L	Total Phosphorus average conc. mg/L	York Septage Solids dry tonnes	Durham Septage Solids dry tonnes	Total Septage Solids dry tonnes
January	2,414	6,672	1,331.83	150.7	3.5	5.4	8.9
February	4,393	9,169	1,343.00	140.2	4.1	8.4	12.5
March	7,628	19,644	2,687.20	239.2	10.9	11.1	22.0
April	3,549	11,322	1,314.90	132.7	6.4	7.7	14.1
May	5,200	6,958	1,591.40	185.5	5.5	5.3	10.8
June	2,402	3,598	779.60	117.0	3.0	2.8	5.8
July	3,778	5,118	949.20	124.1	4.2	4.2	8.4
August	2,678	2,582	1,044.40	113.8	1.5	1.4	2.9
September	5,018	3,246	2,858.00	181.4	2.8	2.2	5.0
October	3,998	3,498	1,891.96	147.6	2.8	2.9	5.7
November	5,062	5,604	2,144.00	156.1	2.7	4.8	7.5
December	2,422	6,107	975.50	115.1	3.9	3.6	7.5
Total					51.3	59.8	111.1
Average	4,045	6,960	1,575.92	150.3	4.3	5.0	9.3
Sampling Requirement Frequency Met	Yes	Yes	Yes	Yes			

Table 8 - Energy and Chemical Usage

Month	Iron Salt litre	Sodium Hypochlorite kilogram as chlorine	Sodium Bisulphite litre	Anionic Polymer kilogram*	Hydro kilowatt hour	Natural Gas cubic metre
January	655,492	23,789	24,854		6,248,541	400,171
February	603,199	20,814	22,518		5,935,808	229,310
March	602,413	23,265	24,831	9,000	6,196,116	309,121
April	604,574	27,119	29,798		6,169,831	250,686
May	572,187	24,550	23,252	9,000	6,073,448	148,941
June	671,227	21,513	22,825		6,097,544	254,280
July	704,548	23,758	25,892		6,424,428	112,134
August	695,852	23,155	22,393	9,000	5,970,220	8,905
September	664,782	21,115	23,090		5,667,695	20,572
October	769,792	21,309	22,889		5,751,134	313,186
November	770,965	20,320	22,048	9,000	6,064,710	357,377
December	677,672	19,628	26,056		6,230,479	458,478
Total	7,992,703	270,335	290,446	36,000	72,829,955	2,863,161

*Based on amount purchased

Table 9 - Summary of Sludge Produced and Imported

Month	Sludge produced from York Influent Solids dry tonnes	Sludge produced from Durham Influent Solids dry tonnes	Total Sludge produced from all Influent Solids dry tonnes	York Imported Solids dry tonnes	Durham Imported Solids dry tonnes	Total Imported Solids dry tonnes
January	2,489	544	3,034	0	620	620
February	2,264	441	2,705	0	445	445
March	2,195	475	2,671	0	482	482
April	2,842	669	3,511	0	364	364
May	2,531	511	3,043	0	318	318
June	2,606	526	3,132	0	189	189
July	2,744	586	3,330	0	394	394
August	2,746	528	3,274	0	155	155
September	2,535	506	3,041	0	149	149
October	2,234	457	2,690	0	385	385
November	2,792	547	3,340	0	112	112
December	2,679	547	3,226	0	517	517
Total	30,657	6,337	36,997	0	4,130	4,130

Table 10 - Dewatering and Incineration Summary

Month	Average Feed Solids percent (%) Total Solids (TS)	Average Sludge Cake % TS	Average Polymer* Dosage kilogram per tonne	Total Sludge Output dry tonnes	Dewatered Sludge Incinerated dry tonnes	Ash Produced by Incineration tonnes
January	2.5	25.0	7.3	3,164	2,842	938
February	2.5	25.0	6.6	3,636	2,942	932
March	2.8	25.9	5.9	3,406	2,680	794
April	2.9	26.5	5.9	3,534	3,027	1,068
May	2.4	25.3	6.2	3,203	2,496	935
June	2.1	24.9	6.8	3,024	2,351	814
July	2.3	26.2	6.1	3,937	3,189	1,382
August	2.4	26.5	5.4	3,350	2,701	929
September	2.3	25.9	4.6	2,559	2,448	637
October	2.2	24.2	5.6	1,144	1,056	368
November	2.1	24.4	6.6	3,443	3,623	1,175
December	2.5	25.7	5.8	3,872	3,545	1,069
Mobile Centrifuge				1,290		
Average	2.4	25.5	6.1	3,189	2,742	920
Total				38,272	32,900	11,041

*Polymer consumption based on active ingredient

Table 11 - Sludge Cake Analysis

Parameter	Concentration (milligrams/kilogram)
Total Solids	244,653
Total Phosphorus	7,255
Total Ammonia Nitrogen	2,641
Nitrate as Nitrogen	15.52
Arsenic	2.03
Cadmium	0.78
Cobalt	3.23
Chromium	37.43
Copper	260.36
Lead	8.99
Mercury	0.28726
Molybdenum	3.75
Nickel	15.05
Potassium	1,153
Selenium	5.4
Zinc	381.98