DURHAM REGION

Duffin Water Pollution Control Plant 2025 Annual Performance Report

The Regional Municipalities of Durham and York
Duffin Creek Water Pollution Control Plant 2025 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 2025. 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 247,259 residents in the Town of Ajax and the City of Pickering in the Regional Municipality of Durham as well as 1,037,090 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 1,284,349.

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 734 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 83% of the plant flow treated in 2025. The remaining sanitary sewage flow of 17.0% 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. No land application or landfill of biosolids occurred in 2025 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 7%. Please see Figure 1 for detailed historical annual average daily flows.

Refer to Table 2 for raw influent analyses and Table 6 for imported sewage monitoring data.

Table 3 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% 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 983,295 m^3 on April 3, 2025.

There were no objective exceedances for the reporting period.

Refer to Table 4, Final Effluent Analyses, for detailed final effluent monitoring data.

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

Due to an 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 was returned to service in July 2025. Stage two digester complex is offline as of November 2025. Capacity was limited for sludge storage and digester gas production. Imported sludge was occasionally directed to influent flow via the septic receiving station to accommodate limited capacity at Digesters. Digester capital construction is expected to be completed in 2028.

Stage two 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.

There are multiple capital upgrade projects on going throughout 2025. 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

- Installed pump Number (No.) 3250 for influent pumping station
- Repaired faulty cable to stage No. 2 digestion complex
- Replaced motor for Return Activated Sludge pump No. 1702 and No. 2001
- Replaced turn table motor for secondary No. 9
- Replaced motor for conveyor No. 4500 in west headworks
- Installed new grinder in east headworks
- Installed new forcemain for sump pump No. 3501 and No. 3502 in loading bay
- Replaced aeration mixer No. 503
- Installed Aquamonitrix unit in aeration tank No.13
- Replaced bridge cables for bridges No. 5 and No. 10
- Replaced pump and motor for Return Activated Sludge pump No. 2201
- Replaced secondary No. 6 flow meter
- Installed new Flygt pump Waste Activated Sludge No. 930
- Replaced hot water pump No. 4
- Replaced grit pump No. 1200 for east headworks
- Fixed broken diffusers for aeration tanks No. 1, No. 5, and No. 13
- Replaced bottom bearing for screws No.120, No. 522, and No.122
- Replaced chain and wear shoes for secondary No. 20
- Rebuilt new flights and installed new chain for scum collector No. 2002
- Replaced chain on sludge collector No. 2003, No. 2004, No. 2008, and No. 2009
- Replaced Waste Activated Sludge pump No. 932
- Replaced sump pump No. 3502 for east headworks
- Replaced Return Activated Sludge pump No. 1901
- Repaired leaking pipes for ferrous pump No. 10 in east headworks
- Repaired sodium hypochlorite dosing line for contact chamber No. 3
- Replaced intake air filters for blowers No.1-9
- Replaced aeration mixer No. 103 and No. 402
- Replaced ribbon for bridge No. 4
- Replaced lobes and plate for Raw Sewage Pump No. 301
- Repaired chain for cross collector No. 8
- Replaced Raw Sewage Pump No. 101
- Replaced 3-way valve actuator for scum pot No. 8
- Replaced cables for primary bridge No. 8

- Replaced chain and sprocket for secondary No. 1904 drive
- Replaced various diffuser heads in aeration tanks

Incineration

- Repaired Induced Draft fan No. 3 discharge silencer leak
- Repaired steam drum for auxiliary boiler No. 3
- Repaired shaft for ash thickening tank No. 3
- Replaced feedwater pump No. 9920B
- Replaced filtrate pump No. 9110
- Repaired boiler feed water tubes for economizer No. 4
- Rebuilt venturi damper No. 1
- Replaced recirculation feed water pumps No. 1 and No. 2
- Replaced gauge glass for reactor No. 1
- Rebuilt south ash vacuum pump
- Repaired sump pumps No. 1161 and No. 1162
- Replaced air compressor in north incineration
- Replaced Emission Data Inventory modules
- Replaced purge air actuator on reactor No. 4
- Replaced recirculation pump and gauge glass for auxiliary boiler No. 1
- Repaired recirculation pump and refractory for auxiliary boiler No. 2
- Repaired refractory for auxiliary boiler No. 3
- Repaired burner pilot sensor and replaced disc for reactor No. 1
- Repaired overflow pump for ash thickener No. 3140
- Replaced north filtrate pump
- Replaced digester gas valves in digester boiler building
- Replaced Continuous Emissions Monitoring System sampling line No. 3
- Repaired reactor No. 1 refractory
- Replaced two auxiliary feedwater pumps for auxiliary boilers
- Replaced turbine No. 3 controller
- Repaired leaking sand pipes in south incineration
- Installed new shaft for ash thickener tank No. 3
- Rebuilt ash thickener Ozone Depleting Substances No. 2A pump
- Replaced shafts and gearbox for south ash drum agitator No. 3

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

On-line instrumentation is verified by plant operators using various field and/or lab testing 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 19, 2025.

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 9, 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

On April 6, 2025, a noise concern from a local resident was received by an operator. There was a vacuum truck performing maintenance on the clarifier and the sound was travelling into the south Ajax neighbourhood. The vacuum truck was moved behind the berm and the sound deceased.

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

On November 29, 2025, a spill of sludge occurred from the sludge blending tank. The spill was contained, and the affected area was cleaned up. Ministry of the Environment, Conservation and Parks (MECP) Incident Report # 1-PUNZY8.

k) Summary of all Notice of Modifications to Sewage Works

No notice of modifications was submitted in 2025.

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

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	August 31 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	March 31 2026
RFTC-1472-23	Replacement of Incineration Units 1 and 2	November 30 2033	November 30 2033

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 2026 is listed below. The following list demonstrates the 2026 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

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

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

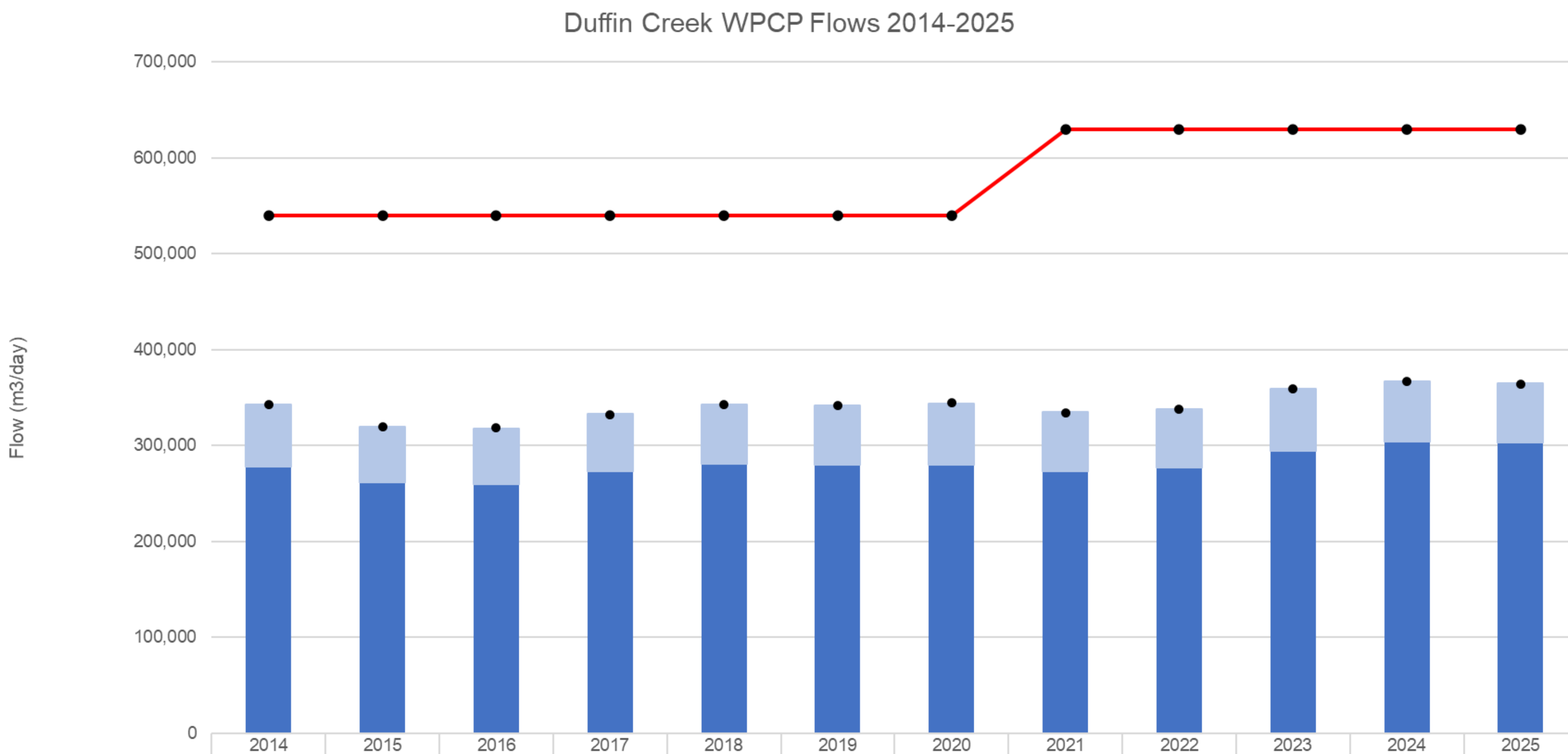
The last plant inspection was February 15, 2022.

Table 1 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	8,857,137	1,819,436	10,676,573	344,406	381,362
February	7,843,169	1,585,705	9,428,874	336,746	368,060
March	10,598,120	2,357,168	12,955,288	417,913	618,192
April	10,491,617	2,327,868	12,819,485	427,316	983,295
May	9,900,413	2,132,472	12,032,885	388,158	522,075
June	9,171,228	1,820,027	10,991,255	366,375	391,687
July	9,373,933	1,768,251	11,142,184	359,425	389,735
August	8,988,360	1,724,265	10,712,625	345,569	408,960
September	8,694,127	1,698,143	10,392,270	346,409	403,231
October	8,591,698	1,753,429	10,345,127	333,714	361,842
November	8,717,402	1,733,348	10,450,750	348,358	373,822
December	9,461,255	1,930,646	11,391,901	367,481	578,917
Total (%)	110,688,459 (83%)	22,650,758 (17%)	133,339,217 (100%)		
Average	9,224,038	1,887,563	11,111,601	365,313**	
Minimum	7,843,169	1,585,705	9,428,874		
Maximum	10,598,120	2,357,168	12,955,288		983,295
ECA Limit				630,000	
Compliance Met				Yes	

*Metered at the raw influent

**Annual average daily flow



	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Durham	64,842	57,911	57,503	60,367	62,112	61,910	63,489	61,257	60,596	64,356	63,099	62,057
York	278,137	262,038	260,194	273,152	281,047	280,136	279,948	273,575	277,552	294,652	304,285	303,256
Average Daily Fow	342,979	319,948	318,567	332,607	343,159	342,047	344,379	333,917	338,147	359,009	367,384	364,315
Rated Capacity	540,000	540,000	540,000	540,000	540,000	540,000	540,000	630,000	630,000	630,000	630,000	630,000

Figure 1 – Annual Average Flow 2014-2025

Table 2 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	258	271	4.9	45.69
February	294	353	8.3	68.08
March	245	286	5.2	43.45
April	221	224	5.1	48.05
May	277	298	6.3	52.51
June	263	352	6.4	52.53
July	249	387	6.5	53.69
August	251	354	7.7	61.03
September	199	368	7.3	58.39
October	182	367	6.9	58.81
November	194	425	6.3	52.68
December	204	421	6.7	54.76
Average	236	342	6.5	54.14
Minimum	182	224	4.9	43.45
Maximum	294	425	8.3	68.08
Sampling Frequency Requirement Met	Yes	Yes	Yes	Yes

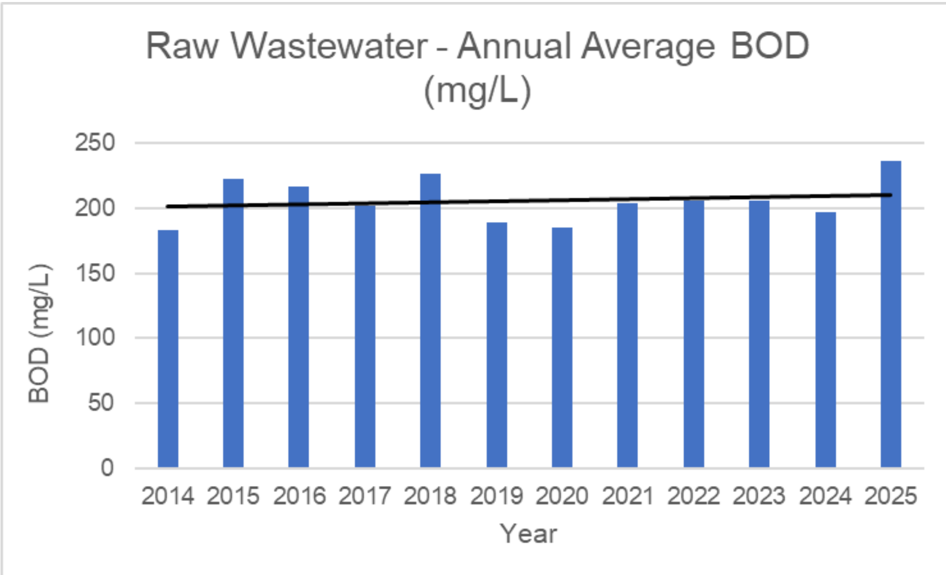


Figure 2 – Raw Influent – Annual Average Biochemical Oxygen Demand

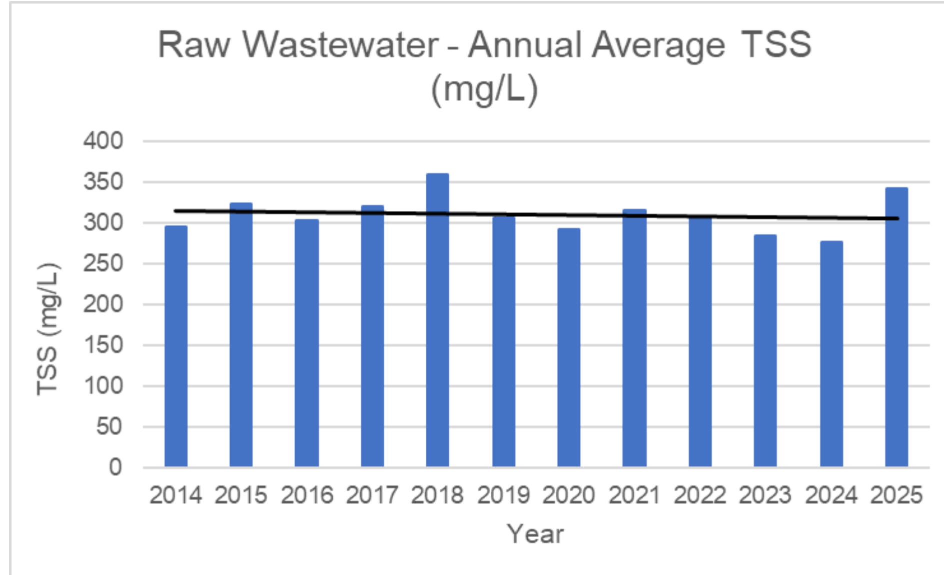


Figure 3 – Raw Influent - Annual Average Total Suspended Solids

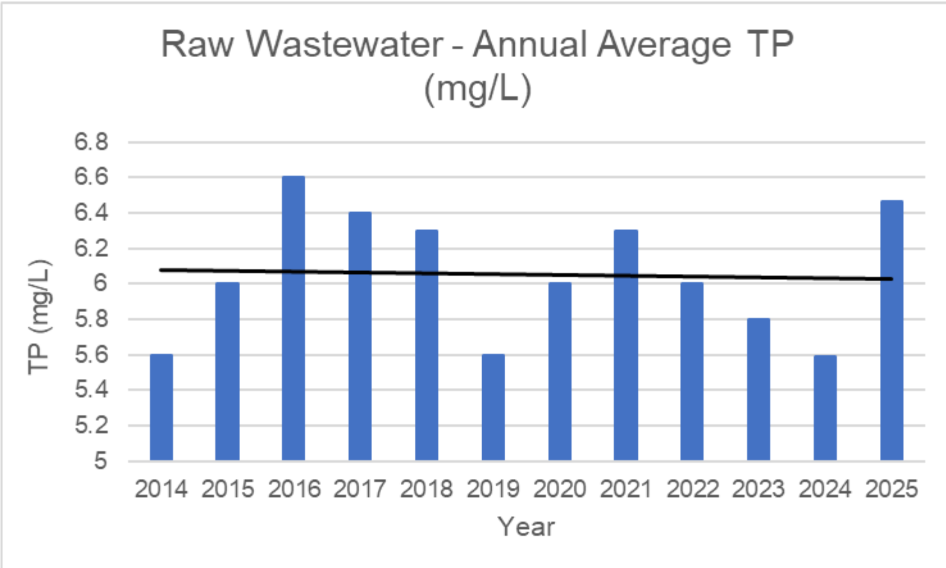


Figure 4 – Raw Influent – Annual Average Total Phosphorus

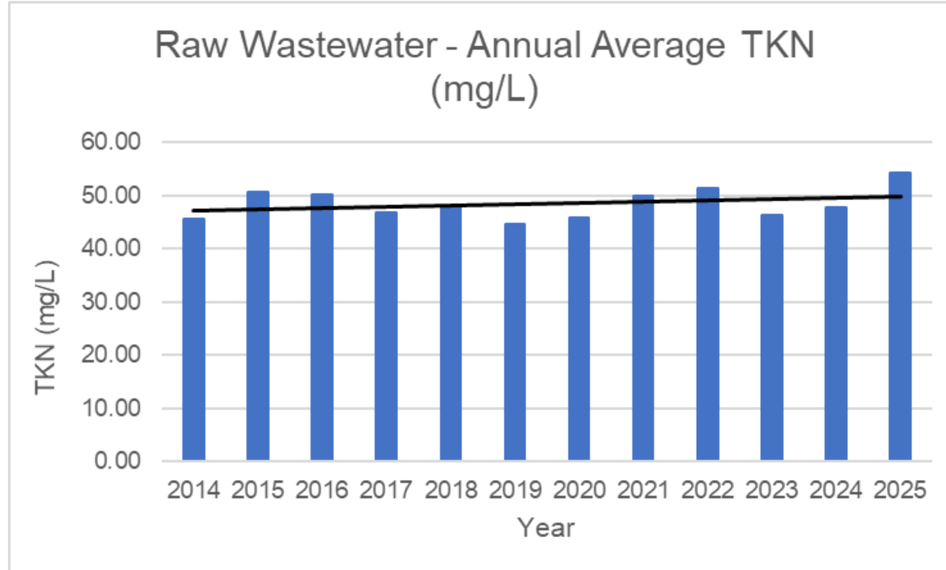


Figure 5 – Raw Influent – Annual Average Total Kjeldahl Nitrogen

Table 3 Historical Raw Influent Characteristics

Year	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
2014-2025	203	308	6.0	47.90
2025	236	342	6.5	54.14
Percent Change	16.3	11.3	7.5	13.0

Table 4 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	3.1	8.9	0.3	0.4	
February	2.8	6.3	0.3	2.0	
March	2.9	5.8	0.2	1.3	
April	3.1	5.3	0.2	1.8	
May	3.2	6.2	0.4		1.6
June	2.7	5.6	0.3		0.8
July	3.2	6.9	0.4		2.3
August	2.0	4.7	0.4		1.6
September	2.2	4.3	0.3		1.5
October	2.0	5.2	0.3		0.8
November	2.6	5.1	0.4	1.0	
December	2.7	6.7	0.3	0.5	
Average	2.7	5.9	0.3	1.2	1.4
Minimum	2.0	4.3	0.2	0.4	0.8
Maximum	3.2	8.9	0.4	2.0	2.3
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 4 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	7.1	14.5
February	0.0	0.00	6.7	7.1	12.9
March	0.0	0.00	6.8	7.1	14.2
April	0.0	0.00	6.8	7.3	15.3
May	0.0	0.00	6.7	7.2	18.5
June	0.0	0.00	6.6	7.0	20.9
July	0.0	0.00	6.6	7.1	22.9
August	0.0	0.00	6.6	7.3	22.9
September	0.0	0.00	6.8	7.7	21.6
October	0.0	0.00	6.7	7.6	19.7
November	0.0	0.00	6.6	7.6	17.1
December	0.0	0.00	6.6	7.2	15.3
Average	0.0	0.00			18.0
Minimum	0.0	0.00	6.6	N/A	12.9
Maximum	0.0	0.00		7.7	22.9
ECA Limit	N/A	0.02	6.0	9.5	
ECA Objective		Non-detectable	6.5	8.5	
Within Compliance	N/A	Yes	Yes	Yes	
Sampling Frequency Requirement Met	Yes	Yes	Yes	Yes	Yes

Table 5 *Escherichia coli* Sampling

Month	Monthly Geometric Mean Density	Number of Samples
January	71	22
February	47	19
March	31	21
April	29	20
May	60	21
June	15	21
July	39	22
August	29	20
September	22	20
October	36	22
November	32	19
December	54	21
ECA Limit	200	
ECA Objective	100	
Within Compliance	Yes	
Sampling Frequency Requirement Met		Yes

Table 6 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	4,854	6,572	2,414.00	154.4	4.1	4.0	8.1
February	3,467	5,912	1,084.20	177.9	2.9	3.4	6.3
March	6,692	5,663	2,033.54	107.7	3.0	5.0	8.0
April	2,374	10,022	444.77	56.9	9.0	7.8	16.8
May	5,428	5,164	1,169.40	135.7	3.0	3.9	6.9
June	5,098	3,312	1,291.60	83.5	1.7	1.9	3.6
July	4,858	3,370	1,475.50	167.5	2.1	3.9	6.0
August	2,832	1,850	1,424.24	107.1	1.2	1.8	3.0
September	3,094	2,203	2,139.00	148.3	1.4	2.4	3.8
October	2,365	4,040	1,096.60	148.1	2.2	5.2	7.4
November	2,346	2,137	552.12	41.6	1.5	1.5	3.0
December	6,018	8,504	2,639.83	246.6	6.0	4.1	10.1
Total					38.1	44.9	83.0
Average	4,119	4,896	1,480.40	131.3	3.2	3.7	6.9
Sampling Requirement Frequency Met	Yes	Yes	Yes	Yes			

Table 7 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	596,535	18,505	25,869		6,243,920	459,812
February	628,626	16,363	21,554		6,087,623	346,669
March	706,781	22,548	28,564		6,318,798	247,582
April	562,378	23,609	23,868	9,000	6,023,202	206,088
May	668,512	24,338	22,018		6,286,785	236,298
June	640,116	21,858	19,847		6,063,008	160,204
July	682,806	20,859	21,707		6,370,512	232,838
August	770,955	20,486	22,238		6,164,940	195,920
September	738,979	20,639	22,399		5,634,360	108,904
October	687,698	20,505	20,969		5,934,088	178,168
November	708,541	19,199	21,551		5,751,724	257,584
December	764,997	20,464	24,195		6,290,356	557,312
Total	8,156,924	249,373	274,779	9,000	73,169,316	3,187,379

*Based on amount purchased

Table 8 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	Durham Imported Solids dry tonnes
January	2,396	492	2,889	776
February	2,768	560	3,328	662
March	3,035	675	3,711	509
April	2,349	521	2,870	321
May	2,947	635	3,582	593
June	3,224	640	3,864	633
July	3,626	684	4,310	370
August	3,179	610	3,789	273
September	3,195	624	3,819	307
October	3,150	643	3,793	215
November	3,703	736	4,439	127
December	3,981	812	4,793	508
Total	37,553	7,632	45,187	5,294

Table 9 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	2.7	25.4	5.5	3,226	2,786	899
February	2.5	24.4	6.2	3,488	3,083	987
March	3.0	26.0	5.8	3,976	3,406	1,170
April	3.2	26.6	5.6	3,383	2,949	1,196
May	2.6	25.1	6.0	3,304	2,563	1,051
June	2.5	25.7	5.4	3,533	2,886	1,141
July	2.3	25.2	6.1	3,271	3,026	1,186
August	2.3	26.1	5.3	3,162	2,754	1,100
September	2.5	26.2	5.1	2,936	2,353	929
October	2.2	25.2	5.0	3,076	2,843	1,007
November	2.5	26.2	4.8	3,268	2,641	898
December	2.5	24.6	5.2	3,471	2,798	1,027
Average	2.6	25.6	5.5	3,341	2,841	1,049
Total				40,094	34,088	12,591

*Polymer consumption based on active ingredient

Table 10 Sludge Cake Analysis

Parameter	Concentration – Annual Average (milligrams/kilogram)
Total Solids	217,946
Total Phosphorus	23,964
Total Ammonia Nitrogen	2,663
Nitrate as Nitrogen	27.88
Arsenic	2.33
Cadmium	0.90
Cobalt	13.5
Chromium	34.11
Copper	327.83
Lead	10.97
Mercury	0.28
Molybdenum	1.00
Nickel	17.00
Potassium	1,337
Selenium	5.98
Zinc	489.39