Duffin Creek Water Pollution Control Plant

2022 Annual Performance Report

The Regional Municipalities of Durham and York
Duffin Creek Water Pollution Control Plant 2022 Annual Performance Report

Environmental Compliance Approval (ECA): 5547-C43QV9 Dated October 26,2021
Environmental Compliance Approval (Air): 2693-BY5F5Y Dated May 17, 2021

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 2022. 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 234,307 residents in the Town of Ajax and the City of Pickering in the Regional Municipality of Durham as well as 991,630 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 1,225,937.

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, and
- incineration.

Raw Influent Pumping

Wastewater collected through approximately 691 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 South East Collector Trunk Sewers which are part of the York Durham Sewage System (YDSS). Wastewater from York Region accounted for 82.1% of the plant flow treated in 2022. The remaining sanitary sewage flow of 17.9% 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

Ferric chloride is 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 solids at the Duffin Creek WPCP were incinerated during the reporting period. The ash from the incineration process is sent to St. Mary's Cement in Bowmanville, Ontario for reuse. No land application or landfill of biosolids occurred in 2022 from this facility.

Environmental Compliance Approval (ECA)

Under Condition 11.5 of ECA 5547-C43QV9 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 1.0%. Please see Figure 1 for detailed historical annual average daily flows.

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 Environmental Compliance Approval limits during the reporting period.

The plant operated at 54% 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 634,895 m^3 on February 17, 2022.

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

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

Intermittent sludge blend tank foaming – foaming has been reduced by minimizing sludge retention time and maintaining more controlled ratios of digested and raw sludge.

Insufficient disinfection - Stage 3 experienced extremely high nitrite levels resulting in “nitrite lock” which negatively affected the disinfection process. The nitrites were consuming the sodium hypochlorite and the plant could not obtain an adequate chlorine residual for disinfection purposes for two weeks. Sodium hypochlorite dosing increased dramatically to overcome the chlorine demand until nitrite levels returned to normal. Sodium bisulphite dosing was increased to help neutralize the chlorine residual after the chlorine demand subsided.

Influx of influent rags/wipes – the influent pumping station was flushed periodically to help reduce buildup.

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

- Repaired flights for secondary clarifier 20,
- Repaired cover coating for blend tank 1**,**
- Repaired diffusers for aeration tank 11,
- Replaced bridge cables for primary bridges 1, 5, 6, 11, 13, and 14,

- Replaced wear strips and repaired scum collector for secondary clarifier18,
- Replaced motor and intermediate gearbox for primary clarifier 13,
- Rebuilt raw sludge pumps 401, 0901, and 1402,
- Replaced auger for conveyor 1300 in east headworks,
- Repaired cogwheel and gearbox bearings for primary bridge 8,
- Replaced gearbox, shaft, bearings and cogwheel for primary bridge 11,
- Replaced bearings and repaired chain for primary cross collectors 9 and 13,
- Aligned flights for secondary clarifier 21,
- Replaced incline auger in east headworks,
- Installed pumps 3130 and 3230,
- Replaced grit auger 11 and repaired broken shaft and wear strips,
- Replaced wear strips for secondary clarifier 19,
- Replaced bottom bearing for return screw 521,
- Repaired air leak for channel 19,
- Repaired auger for grit tank 11 in west headworks,
- Installed new liners and auger for grit conveyor 2500 in east headworks,
- Replaced grit distribution conveyor for conveyor 2400 in east headworks,
- Installed digester mixers 0301 and 0401,
- Replaced motor on pump 0401 variable frequency drive,
- Performed annual blower maintenance,
- Replaced grinder for Muffin Monster™ unit in east headworks,
- Repaired new controller on oxygen analyzer AIT-3231,
- Installed pH probe for stage 3 works.

Dewatering

- Replaced suction and discharge housing for pump 162,
- Replaced feed screws for pump 462.

Incineration

- Repaired Philly gearbox,
- Inspected freight and passenger elevator,
- Performed annual maintenance on digester boilers,
- Performed annual maintenance on removable covers for waste heat boiler 3 and 4,
- Repaired boiler feed water pump,
- Inspected digester boiler building,
- Performed maintenance and repaired continuous emissions monitoring unit,
- Installed emergency crossover duct for sorbent polymer composite vessel 3,
- Inspected and repaired stack flues,
- Performed annual maintenance for hot water boiler,

- Replaced steam stop check valves for unit 3,
- Rerouted boiler blowdown pipes,
- Repaired gearbox for fluidizing air blower 2,
- Repaired economizer water tubes for waste heat boiler 4,
- Remediated coating for sorbent polymer composite vessel 4.

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

In-house laboratory test results are compared to the results of the Regional Environmental Laboratory on comparable samples to determine the in-house accuracy. All results were found to be within an acceptable range.

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

Analytical balances are calibrated by Novamed.

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 January 4, 2022.

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).

The total residual chlorine objective of 'non-detectable' was exceeded in 2 of 12 monthly samples (16.7%). Sodium bisulphite is monitored to ensure low total chlorine residuals.

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 8 Summary of Sludge Produced and Imported.

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.

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 2022.

l) Summary of efforts made to achieve conformance with the Ministry's Treatment and Collection System Requirements (Procedure F-5-1);

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 2022, 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.

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 similarily align with Durham Region's programs, except York Region does not issue surcharge agreements for Animal/Vegetable Oil & Grease and Sulphates.

m) 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-1025-2021	Replacement of Variable Frequency Drives for Blower Buildings 1&2 at Duffin Creek WPCP	April 8 2022	December 31 2023
T-20-08	Biosolids Treatment Replacement Project – Contract 1 (enabling)	June 1 2023	December 31 2024
T-20-230	Digester Mixing and Electrical Upgrades	July 15 2022	April 6 2028

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 the end of 2024 due to delays in receipt of pre-purchase equipment information required to complete the detailed design. Stage 1 of construction is currently tendered, and construction will commence in June 2023. Overall program completion is scheduled to occur in 2031.

Stage 3 Rehabilitation and Retrofit Work

A consultant has been retained to complete the conceptual design by the end of 2022. Detailed design has started in the new year 2023. The completion of detailed design phase is anticipated to occur by Fall 2023.

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

The last previous plant inspection was February 15, 2022.

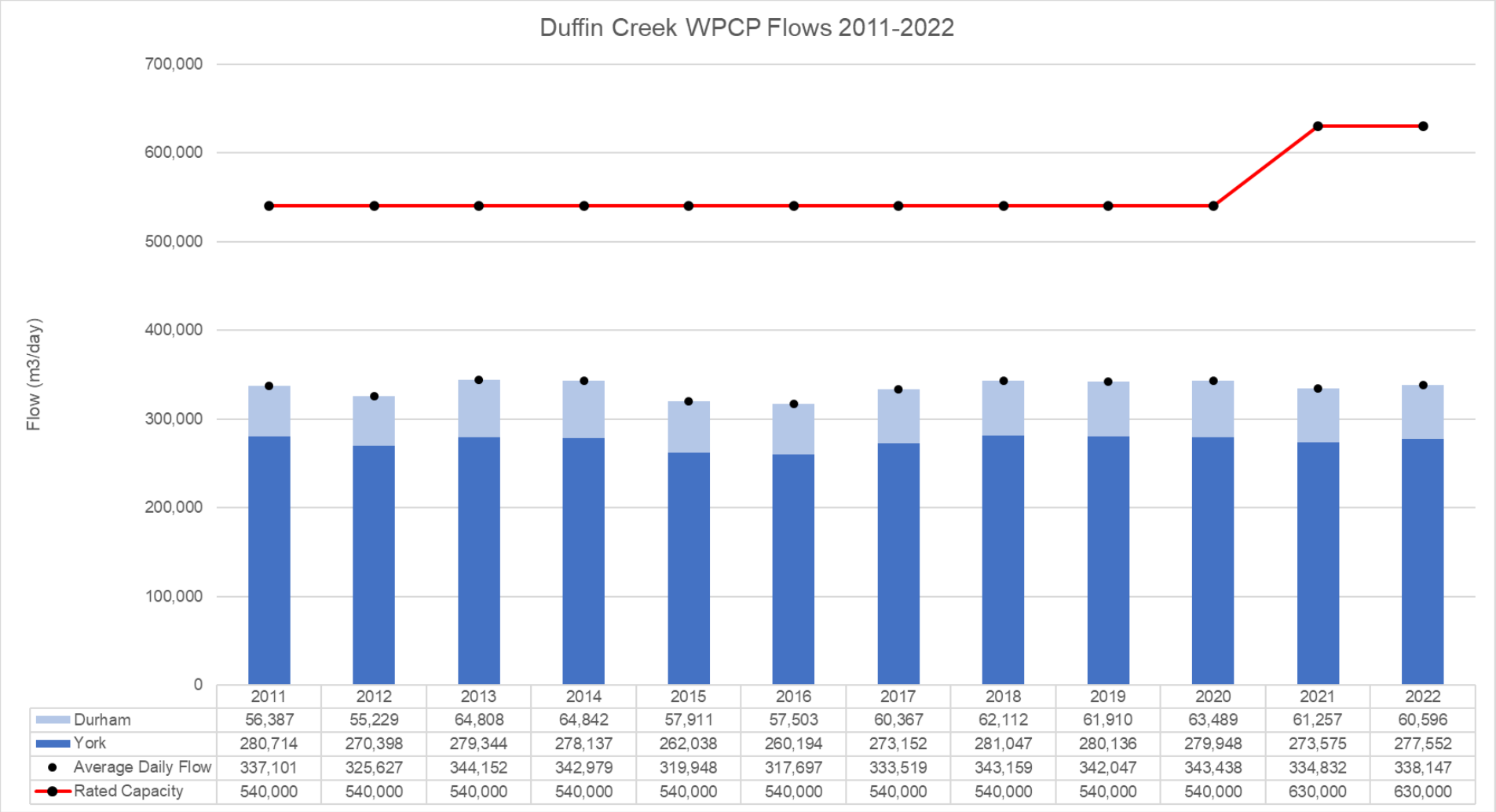
Table 1 Raw Influent Flows

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	8,369,902	1,867,814	10,237,716	330,249	339,918
February	8,197,503	2,026,496	10,223,999	365,143	634,895
March	9,837,929	2,431,138	12,269,067	395,776	518,586
April	8,752,213	1,957,951	10,710,164	357,005	377,966
May	8,585,955	1,893,671	10,479,626	338,052	416,720
June	8,332,717	1,776,968	10,109,685	336,990	411,947
July	8,193,007	1,729,633	9,922,640	320,085	386,814
August	8,269,355	1,654,862	9,924,217	320,136	379,233
September	7,833,020	1,583,271	9,416,291	313,876	343,641
October	8,069,996	1,626,774	9,696,770	312,799	348,524
November	7,908,290	1,635,173	9,543,463	318,115	353,486
December	8,956,436	1,933,619	10,890,055	351,292	617,965
Total (%)	101,306,323 (82.1%)	22,117,370 (17.9%)	123,423,693 (100%)		
Average	8,442,194	1,843,114	10,285,308	338,147**	
Minimum	7,833,020	1,583,271	9,416,291		
Maximum	9,837,929	2,431,138	12,269,067		634,895
ECA Limit				630,000	
Compliance Met				Yes	

*Metered at the raw influent

**Annual average daily flow

Figure 1 – Annual Average Flow 2011-2022



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Durham	56,387	55,229	64,808	64,842	57,911	57,503	60,367	62,112	61,910	63,489	61,257	60,596
York	280,714	270,398	279,344	278,137	262,038	260,194	273,152	281,047	280,136	279,948	273,575	277,552
Average Daily Flow	337,101	325,627	344,152	342,979	319,948	317,697	333,519	343,159	342,047	343,438	334,832	338,147
Rated Capacity	540,000	540,000	540,000	540,000	540,000	540,000	540,000	540,000	540,000	540,000	630,000	630,000

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	211	322	6.1	55.36
February	225	332	6.2	53.59
March	174	267	5.0	46.44
April	172	252	5.4	47.78
May	175	247	5.6	49.97
June	200	256	5.7	49.79
July	215	311	6.2	51.73
August	230	364	6.6	53.55
September	221	379	6.7	54.35
October	205	310	6.4	54.89
November	223	323	6.5	52.46
December	222	315	5.8	47.71
Average	206	307	6.0	51.47
Minimum	172	247	5.0	46.44
Maximum	230	379	6.7	55.36
Sampling Frequency Requirement Met	Yes	Yes	Yes	Yes

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
2011-2021	199	316	6.2	47.36
2022	206	307	6.0	51.47
Percent Change	3.6%	-2.9%	-3.4%	8.7%

Figure 2 – Raw Influent – Annual Average Biochemical Oxygen Demand

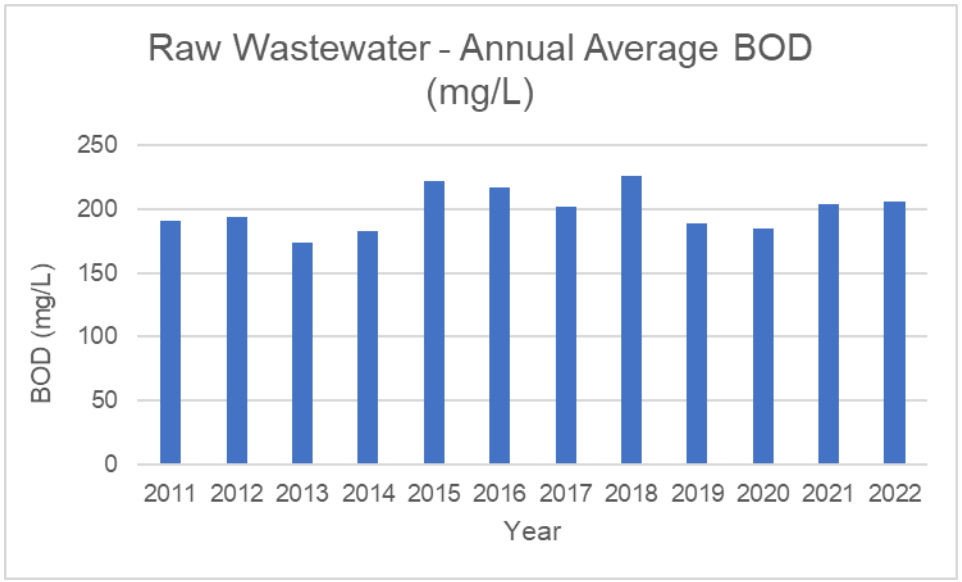


Figure 3 – Raw Influent - Annual Average Total Suspended Solids

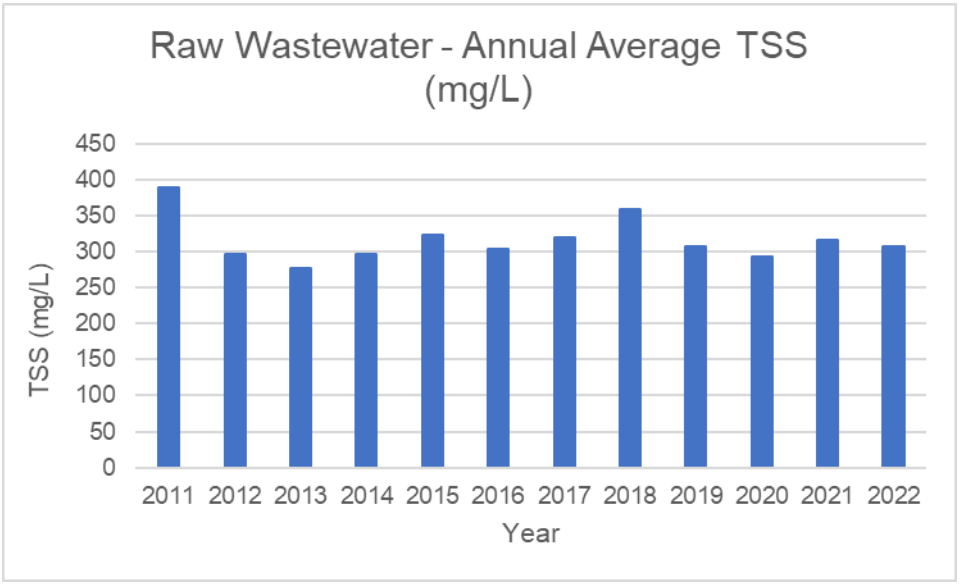


Figure 4 – Raw Influent – Annual Average Total Phosphorus

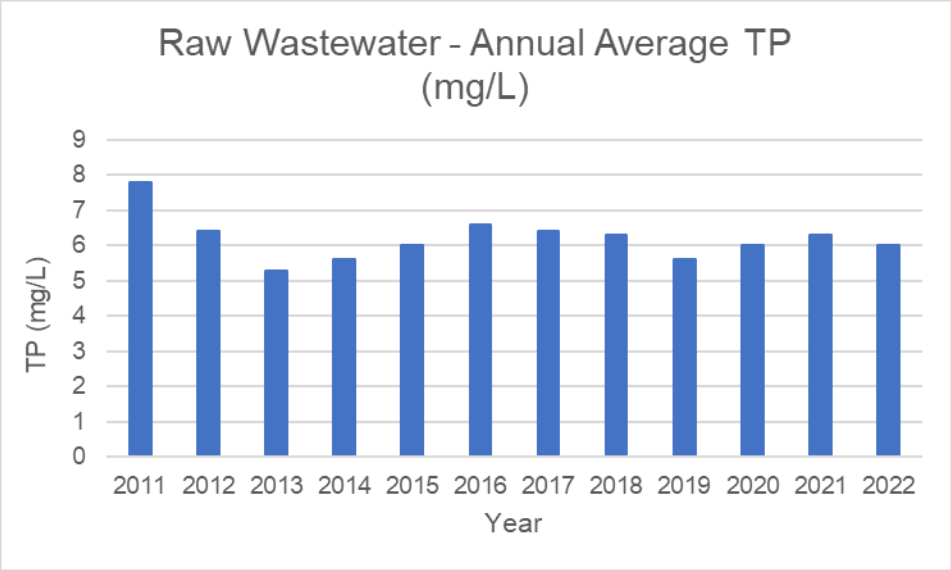


Figure 5 – Raw Influent – Annual Average Total Kjeldahl Nitrogen

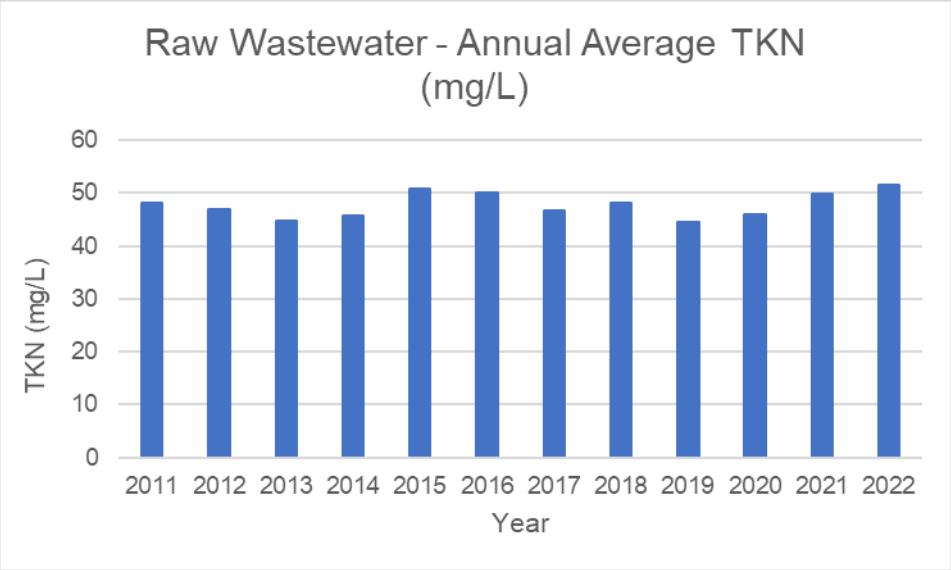


Table 4 Final Effluent Analyses

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	2.2	5.3	0.31	0.22	
February	3.1	5.4	0.29	0.91	
March	4.8	6.5	0.27	1.30	
April	4.9	7.6	0.34	1.48	
May	3.3	6.3	0.37		0.85
June	1.2	4.9	0.28		0.51
July	1.3	4.1	0.31		0.60
August	1.1	3.5	0.28		0.63
September	1.1	4.0	0.32		0.63
October	1.1	4.3	0.36	0.63	
November	1.1	4.5	0.34	0.28	
December	1.2	4.4	0.26	0.97	
Average	2.2	5.1	0.31	0.83	0.64
Minimum	1.1	3.5	0.26	0.22	0.51
Maximum	4.9	7.6	0.37	1.48	0.85
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			105 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	6.5	7.1	13.6
February	0.0	0.00	6.8	7.2	14.0
March	0.0	0.00	7.0	7.3	13.6
April	0.0	0.00	6.9	7.3	15.3
May	0.0	0.01	6.8	7.2	18.1
June	0.0	0.00	6.7	7.4	20.1
July	0.0	0.00	6.7	7.2	21.7
August	0.0	0.00	6.7	7.2	22.4
September	0.0	0.00	6.7	7.1	21.8
October	0.0	0.01	6.7	7.1	19.4
November	0.0	0.00	6.6	7.2	18.1
December	0.0	0.00	6.7	7.0	16.3
Average	0.0	0.00			18.3
Minimum	0.0	0.00	6.5		13.6
Maximum	0.0	0.00		7.4	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 5 *Escherichia coli* Sampling

Month	Monthly Geometric Mean Density	Number of Samples
January	72	20
February	44	19
March	32	23
April	46	19
May	73	26
June	29	22
July	36	20
August	18	22
September	27	19
October	32	20
November	54	21
December	21	20
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	4,635	10,848	2,851.33	244.6	4.5	2.7	7.2
February	3,695	14,629	2,078.20	224.5	6.3	6.9	13.1
March	7,158	8,488	2,439.20	198.9	7.1	5.1	12.3
April	2,691	3,430	1,385.40	111.1	3.5	2.8	6.3
May	4,362	19,847	2,319.67	232.7	35.8	13.9	49.7
June	18,440	27,340	3,107.60	583.2	46.8	20.5	67.3
July	5,866	3,695	3,726.00	211.6	2.8	2.8	5.6
August	4,740	4,390	2,831.60	166.3	3.3	3.3	6.6
September	3,440	38,672	1,205.54	167.2	17.0	47.9	64.9
October	4,577	8,826	1,849.00	196.0	6.1	5.4	11.4
November	1,439	5,987	670.53	80.2	4.4	4.6	9.0
December	3,822	4,338	1,997.60	163.2	2.7	2.4	5.1
Total					140.3	118.1	258.4
Average	5,405	12,541	2,205.14	215.0	11.7	9.8	21.5
Sampling Requirement Frequency Met	Yes	Yes	Yes	Yes			

Table 7 Energy and Chemical Usage

Month	Ferric Chloride litre	Sodium Hypochlorite kilogram as chlorine	Sodium Bisulphite litre	Anionic Polymer kilogram*	Hydro kilowatt hour	Natural Gas cubic metre
January	587,809	19,218	19,879		5,529,400	386,768
February	579,312	17,284	20,269		5,218,378	380,325
March	648,601	23,570	24,163	9,000	5,693,829	298,557
April	568,660	23,232	18,521		5,494,766	267,593
May	614,036	34,413	21,429		5,499,104	163,092
June	647,334	21,442	21,652	9,000	5,238,457	86,488
July	687,014	21,557	20,839		5,550,436	77,262
August	661,076	22,429	23,101		5,472,290	55,868
September	600,270	20,456	22,243		5,338,919	204,467
October	643,636	21,114	21,662	9,000	5,608,963	211,167
November	649,534	19,296	19,634		4,984,475	312,737
December	663,509	18,786	22,488		5,927,633	386,961
Total	7,550,791	262,797	255,880	27,000	65,556,650	2,831,285

*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	York Imported Solids dry tonnes	Durham Imported Solids dry tonnes	Total Imported Solids dry tonnes
January	2,698	602	3,300	0	545	545
February	2,720	672	3,392	0	430	430
March	2,628	649	3,277	0	526	526
April	2,204	493	2,697	0	260	260
May	2,123	468	2,591	0	174	174
June	2,135	455	2,590	0	126	126
July	2,547	538	3,085	0	138	138
August	3,009	602	3,611	0	167	167
September	2,969	600	3,569	0	107	107
October	2,498	503	3,001	0	132	132
November	2,554	528	3,082	0	164	164
December	2,823	609	3,432	0	403	403
Total	30,908	6,719	37,627	0	3,172	3,172

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	2.1	24.8	9.0	2,882	2,598	871
February	2.3	25.4	9.2	2,959	2,853	912
March	2.7	25.5	7.8	3,295	2,674	933
April	2.7	25.3	6.9	3,252	2,499	921
May	2.5	25.6	6.8	2,701	2,101	798
June	2.7	25.6	5.9	2,937	2,175	814
July	2.4	25.7	7.3	2,624	2,104	783
August	2.2	26.0	7.8	2,690	2,248	782
September	2.2	26.1	7.4	2,775	2,503	769
October	2.2	25.8	7.7	2,862	2,679	751
November	2.4	25.5	7.7	2,277	1,777	583
December	2.2	25.3	8.5	3,279	2,423	1017
Average	2.4	25.6	7.7	2,878	2,386	828
Total				34,533	28,634	9,934

*polymer consumption based on active ingredient