Port Darlington Water Pollution Control Plant
2025 Annual Performance Report

The Regional Municipality of Durham
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Environmental Compliance Approval (ECA): 0114-8S8RTA Dated April 24, 2012
Environmental Compliance Approval (Air): 2242-8TFNN3 Dated June 19, 2012

The Port Darlington Water Pollution Control Plant (WPCP) 2025 Annual Performance Report provides staff, stakeholders, and customers a performance overview of the Port Darlington WPCP. Further, this report fulfills the annual reporting requirements of the Ontario Ministry of the Environment, Conservation and Parks (MECP). This report demonstrates the Regional Municipality of Durham's commitment to ensuring that the WPCP continues to deliver wastewater services to our customers in an environmentally responsible manner.

Water Pollution Control Plant Process Description

General

The Port Darlington WPCP is located in the Municipality of Clarington (Bowmanville) and is owned and operated by the Regional Municipality of Durham (Region). The plant operates in accordance with the terms and conditions of the ECAs. Port Darlington WPCP treats wastewater from the Bowmanville service area. Two process trains were added in November 2015 and are treating all incoming wastewater. The four existing trains have been removed from service for refurbishment. The plant treats wastewater from approximately 50,098 residents in the Bowmanville service area. The Port Darlington WPCP is designed to treat wastewater at an average daily flow rate of 27,276 cubic metres per day (m^3/d). The plant is an MECP Class 3 conventional activated sludge treatment plant that utilizes the following processes to treat wastewater:

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

Raw Influent Pumping

Wastewater is collected through approximately 164 kilometres of sanitary sewers in Bowmanville and is conveyed to the Port Darlington WPCP by gravity to the raw sewage pumping station located at the WPCP.

Preliminary Treatment

Screening: Two automatic, mechanically cleaned screens remove paper products and large material that could harm pumps and process equipment. Screenings removed in this process are compacted for landfill disposal.
Grit Removal: Heavy suspended material such as sand and small stones (grit) is removed in the two vortex grit tanks. The velocity of the wastewater swirling in the tanks is controlled by the velocity of influent flow to allow heavy grit material to settle, while keeping the lighter organic material in suspension to proceed to the next process tank. The grit removed in this process is dewatered and transported to landfill.

Primary Treatment

The two primary clarifiers utilize the physical process of sedimentation which allows suspended material to settle to the bottom of the tank as sludge. This raw sludge, along with the excess activated sludge from the secondary treatment process is collected by a flight and chain mechanism which pushes the sludge into hoppers. The sludge is then pumped to the anaerobic digesters for further treatment. Any material floating on the surface of the clarifier is also removed to the digester.

Phosphorus Removal

The phosphorus removal system lowers the total phosphorus level in the final effluent by adding a chemical coagulant, ferrous chloride, into various locations throughout the Water Pollution Control Plant. In 2025, ferrous chloride was dosed only at the head of the third aeration pass.

Secondary Treatment

Aeration Tanks: The aeration tanks are comprised of two distinct sections. The first section is an anoxic zone, where no oxygen is introduced and allows for denitrification. Subsequently, the flow leaves the anoxic zone and enters the aerated zone where fine bubbled air is diffused into the wastewater to assist bacteria in removing dissolved and suspended organics, and nutrients.
Secondary Clarifier: The effluent from the aeration tanks is directed to the two secondary clarifiers where the solids settle to the bottom as activated sludge, leaving clear supernatant on top. A portion of the activated sludge collected on the bottom of the clarifier is pumped back to the head of the aeration tanks and the excess activated sludge is wasted to the primary clarifiers.

Disinfection (chlorination/dechlorination)

Chlorine in the form of liquid sodium hypochlorite is metered into the secondary effluent stream for pathogen control. Adequate contact time is provided by the single chlorine contact chamber. Disinfected effluent is dechlorinated with a sodium bisulphite solution before being discharged through a 1,350 millimetre (mm) diameter land section of effluent sewer extending 525 metres (m) to a 1,200 mm diameter marine section of effluent outfall which extends 1,055 m into Lake Ontario.

Solids Management

Anaerobic Digestion: The raw sludge that is collected from the primary clarifiers is pumped into the anaerobic digesters where anaerobic bacteria reduce the volume of sludge. As a result of digestion the plant produces biosolids, water, carbon dioxide, methane, and hydrogen sulphide. The supernatant is returned to the head of the plant for further treatment.
Sludge Management: All stabilized sludge produced at the Port Darlington Water Pollution Control Plant (WPCP) is hauled to the Duffin Creek WPCP for incineration.

Environmental Compliance Approval (ECA)

Under Condition 10(6) of ECA #0114-8S8RTA the Regional Municipality of Durham (the Region) must produce an annual performance report that contains the following information:

a) Summary and interpretation of all monitoring data and a comparison to the effluent limits

The raw wastewater flowing into the plant is analyzed for its chemical and physical composition. Monitoring of the raw wastewater is performed in accordance with the conditions in the ECA. Table 2 summarizes the raw wastewater characteristics during the reporting period.

The Port Darlington WPCP effluent was determined to be compliant with the ECA approval limits during the reporting period. The plant operated at 48.3% of its annual average rated flow capacity and received a maximum daily flow of 39,104 cubic metres per day (m^3/d) on April 3, 2025. See tables 3 and 4 for effluent results.

b) Description of any operating problems encountered and corrective actions taken

Operating problems encountered and corrective actions taken in 2025 included:

- Reduced/stopped ferrous flow due to contaminants in the chemical clogging the discharge lines. Lines and pumps were cleaned or replaced as needed.

c) Summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works

Major maintenance items in 2025 included:

- Replaced ferrous discharge hose to aeration tank number (No.) 6
- Replaced shoes on flights for primary clarifiers No. 5A, No. 5B, No. 6A and No. 6B
- Tightened chains on flights for primary clarifiers No. 5A, No. 5B, No. 6A and No. 6B
- Replaced scum collector mechanisms on primary clarifiers No. 5A, No. 5B, No. 6A and No. 6B
- Replaced shoes on flights for secondary clarifiers No. 5A, No. 5B, No. 6A and No. 6B
- Tightened chains on flights for secondary clarifiers No. 5A, No. 5B, No. 6A and No. 6B
- Replaced scum collector mechanisms on secondary clarifiers No. 5A, No. 5B, No. 6A and No. 6B

- Removed raw sewage pump number (No.) 3 from dry well to send out for refurbishment

d) Summary of any effluent quality assurance or control measures undertaken in the reporting period

In-house laboratory (lab) test results are compared to the results of the Regional Environmental Laboratory on comparable samples to determine the in-house accuracy.

Online instrumentation is verified by Water Pollution Control Plant (WPCP) operators using various field or lab test equipment.

e) Summary of the calibration and maintenance carried out on all effluent monitoring equipment

The raw influent flow meter was calibrated on May 21, 2025.

Calibration of in-house laboratory equipment was conducted on November 26, 2025.

Calibration of the in-house lab pH meter is conducted regularly.

f) A description of efforts made and results achieved in meeting the Effluent Objectives

The Regional Municipality of Durham (the Region) continually strives to achieve the best effluent quality at all times and remain below the objectives specified in the Environmental Compliance Approval:

- The annual average daily flow did not exceed the rated capacity of 27,276 cubic metres per day (m3/d) during the reporting period.
- The lower pH objective of 6.5 was exceeded in 6 of 364 samples (1.6%).
- The total suspended solids objective of 15.0 mg/L was exceeded in 37 of 328 samples (11.3%).
- The total ammonia nitrogen summer objective of 8.0 mg/L from June 1-October 31 was exceeded in 1 of 102 samples (1.0%).
- The total ammonia nitrogen winter objective of 12.0 mg/L from November 1-May 31 was exceeded in 7 of 97 samples (7.2%).
- The total phosphorus objective of 0.8 mg/L was exceeded in 58 of 323 samples (18%).
- The E.coli objective of 200cfu/100mL was exceeded in 5 of 105 samples (4.8%).

Best efforts will continue to be applied to maintain results below the objectives.

g) Biosolids Production

Tabulation of Volume of Sludge Generated

The volume of sludge removed from Port Darlington Water Pollution Control Plant in 2025 was 23,923 cubic metres.

Outline of anticipated volumes to be generated in the next reporting period

Even with the increase in population on a year-to year basis, no significant changes to flows or processing are anticipated. Therefore, no significant changes in sludge generation are expected for the next year.

Summary of locations to where sludge was disposed

All stabilized sludge produced at the Port Darlington Water Pollution Control Plant (WPCP) was hauled to the Duffin Creek WPCP for incineration.

h) Summary of any complaints received during the reporting period and any steps taken to address the complaints

A summary of complaints received from the public is administered through a central database. No complaints were received in 2025

i) A summary of all By-pass, Spills or Abnormal Discharge events

There were no by-passes during the reporting period. There are no anticipated by-passes planned during the next reporting period.

There were no spills during the reporting period.

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

This plant was last inspected by the MECP on February 1, 2024.

Table 1 Raw Influent Flows

Month	Total Flow to Plant* - cubic metre	Average Daily Flow cubic metre per day (m^3/d)	Maximum Daily Flow m^3/d
January	400,352	12,915	16,591
February	329,937	11,783	13,445
March	552,386	17,819	28,158
April	506,825	16,894	39,104
May	473,018	15,259	27,789
June	374,932	12,498	15,323
July	346,799	11,187	12,360
August	332,039	10,711	12,179
September	341,956	11,399	14,247
October	355,850	11,479	12,866
November	362,387	12,080	13,896
December	429,722	13,862	25,475
Total	4,806,203		
Average	400,517	13,168**	
Minimum	329,937		
Maximum	552,386		39,104
ECA Limit		27,276	
Met Compliance		Yes	

*Metered at the raw influent

**Annual Average Daily Flow

Table 2 Raw Influent Analyses

Month	Biochemical Oxygen Demand average (avg.) concentration (conc.) milligram per litre (mg/L)	Total Suspended Solids avg. conc. mg/L	Total Phosphorus avg. conc. mg/L	Total Kjeldahl Nitrogen avg. conc. mg/L
January	222	222	6.4	56.02
February	243	262	6.0	63.93
March	140	174	3.5	41.06
April	133	144	3.9	40.21
May	142	168	4.8	46.55
June	148	181	4.8	45.90
July	137	163	5.3	50.93
August	142	230	5.8	55.96
September	132	208	6.0	52.34
October	153	208	5.7	52.91
November	153	181	5.3	51.74
December	174	239	5.9	57.43
Average	160	198	5.3	51.25
Minimum	132	144	3.5	40.21
Maximum	243	262	6.4	63.93
Sampling Frequency Requirement Met	Yes	Yes	Yes	Yes

Table 3 Final Effluent Analyses

Month	Carbonaceous Biochemical Oxygen Demand average (avg.) concentration (conc.) milligram per litre (mg/L)	Total Suspended Solids avg. conc. mg/L	Total Phosphorus (TP) avg. conc. mg/L	Total Ammonia Nitrogen avg. conc. mg/L summer	Total Ammonia Nitrogen avg. conc. mg/L winter
January	4.0	5.1	0.51		4.64
February	4.0	9.7	0.45		3.47
March	3.3	9.9	0.33		7.25
April	4.1	12.0	0.54		11.88
May	3.9	8.2	0.26		2.87
June	4.0	9.1	0.38	0.67	
July	3.6	7.0	0.41	1.15	
August	3.0	7.4	0.49	2.87	
September	3.9	10.4	0.54	1.03	
October	3.2	13.6	0.49	0.90	
November	3.0	6.4	0.41		0.92
December	2.4	4.5	0.21		1.89
Average	3.5	8.6	0.42	1.32	4.70
Minimum	2.4	4.5	0.21	0.67	0.92
Maximum	4.1	13.6	0.54	2.87	11.88
ECA Limit	25.0	25.0	0.8	14.0	24.0
ECA Objective	15.0	15.0	0.6	8.0	12.0
Annual Loading			5.5 kilograms per day		
Within Compliance	Yes	Yes	Yes	Yes	Yes
Sampling Frequency Requirement Met	Yes	Yes	Yes	Yes	Yes

Table 3 Final Effluent Analyses continued

Month	Unionized Ammonia average (avg.) concentration (conc.) milligram per litre (mg/L)	Total Chlorine Residual avg. conc. mg/L	pH minimum	pH maximum	Temperature Degree Celsius avg.
January	0.0	0.00	6.5	8.9	11.0
February	0.0	0.00	6.6	8.6	9.3
March	0.0	0.00	6.8	7.7	10.7
April	0.0	0.00	7.1	7.8	12.1
May	0.0	0.00	6.5	7.8	14.8
June	0.0	0.00	6.5	7.1	18.1
July	0.0	0.00	6.0	7.4	20.4
August	0.0	0.00	6.1	7.7	21.1
September	0.0	0.00	6.1	8.3	19.7
October	0.0	0.00	6.2	7.6	17.9
November	0.0	0.00	6.6	7.8	14.6
December	0.0	0.00	6.7	7.4	11.8
Average	0.0	0.00			15.1
Minimum	0.0	0.00	6.0		9.3
Maximum	0.0	0.00		8.9	21.1
ECA Limit		0.02	6.0	9.5	
ECA Objective		0.01	6.5	9.0	
Within Compliance		Yes	Yes	Yes	
Sampling Frequency Requirement Met	Yes	Yes	Yes	Yes	Yes

Table 4 *Escherichia coli* Sampling

Month	Number of Samples	Monthly Geometric Mean Density
January	9	12
February	8	3
March	9	1
April	9	7
May	8	1
June	9	5
July	9	23
August	8	3
September	9	7
October	9	7
November	8	2
December	10	1
ECA Limit		200
ECA Objective		100
Within Compliance		Yes
Sampling Frequency Requirement Met	Yes	

Table 5 Energy and Chemical Usage

Month	Ferrous Chloride Litre (L)	Sodium Hypochlorite kilogram as chlorine	Sodium Bisulphite L	Hydro kilowatt hours	Natural Gas m^3
January	51,179	1,352	6,043	346,808	66,928
February	35,092	877	5,464	317,179	69,692
March	37,050	1,711	5,988	326,019	58,630
April	25,551	1,260	5,898	299,281	53,641
May	40,912	1,902	6,074	313,015	35,882
June	46,219	1,917	5,979	286,372	29,975
July	45,709	1,527	6,080	281,650	24,441
August	30,830	3,269	5,635	274,337	21,740
September	38,080	1,980	5,257	274,802	23,799
October	41,927	2,319	5,840	290,326	27,654
November	32,875	1,931	5,875	307,918	60,845
December	36,016	1,676	5,648	333,436	56,031
Total	461,440	21,720	69,781	3,651,143	529,258

Table 6 Summary of Raw Water Bacteriological Analyses at the Bowmanville Water Supply Plant

Month	*Escherichia coli* (*E. coli*) Number of Samples	*E. coli Colony Forming Units per 100 millilitre (CFU/100ml) Results Range*	Total Coliform Number of Samples	Total Coliform Results Range
January	17	Non-Detect (ND) - 1	17	ND - 29
February	15	ND	15	ND - 2
March	17	ND	17	ND - 180
April	18	ND	18	ND - 5
May	16	ND	16	ND
June	17	ND – 1	17	ND - 1
July	18	ND – Overgrown (OG)	18	ND - OG
August	15	ND - OG	15	ND - OG
September	16	ND - OG	16	ND - OG
October	17	ND - 1	17	ND - 28
November	15	ND - 2	15	ND - 5
December	16	ND - 2	16	ND - 36