Courtice Water Pollution Control Plant
2025 Annual Performance Report

The Regional Municipality of Durham
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Environmental Compliance Approval (ECA): 3393-68RLD4 Dated January 28, 2005
Amendment: Dated April 18, 2007
Environmental Compliance Approval (Air): 7446-6AGNQZ Dated April 30, 2005

The Courtice Water Pollution Control Plant (WPCP) 2025 Annual Performance Report provides staff, stakeholders and customers a performance overview of the Courtice 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 Courtice WPCP is located in the Municipality of Clarington (Courtice) and is owned and operated by the Regional Municipality of Durham (the Region). The plant is operated according to the terms and conditions of the ECAs. The Courtice WPCP treats wastewater from the Oshawa and Courtice service areas in the Region. The Courtice WPCP receives most of its flow from the Harmony Creek catchment area via the Harmony Creek Sanitary Sewage Pumping Station (SSPS). The plant treats wastewater from approximately 151,034 residents or 73.7% of the total catchment population and the remaining 26.3% of the flow is treated at the Harmony Creek WPCP.
The Courtice WPCP is designed to treat wastewater at an average daily flow rate of 68,200 cubic metres per day (m^3/d) with a peak flow rate of 180,000 m^3/d. The plant is an MECP Class 4 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 collected through approximately 662 kilometres of sanitary sewers in Oshawa and Courtice and is conveyed to the Harmony Creek SSPS located at the Harmony Creek WPCP.

Approximately 73.7% of the Harmony Creek Sanitary Sewage Pumping Station (SSPS) influent flow is diverted 6.4 kilometres to the Courtice Water Pollution Control Plant (WPCP) via a 1,050-millimetre diameter forcemain. In addition, a small service area in Courtice is serviced by gravity to the Courtice WPCP, which includes the Durham York Energy Centre and surrounding businesses and industries.

Preliminary Treatment

Screening: Two automatic, mechanically cleaned screens remove paper products and large material that could harm pumps and process equipment. Screenings removed in the process are compacted for landfill disposal.

Grit Removal: Heavy suspended material such as sand and small stones (grit) is removed in the two aerated grit tanks. The velocity of the wastewater rolling in the tanks is controlled by the quantity of air added to produce conditions that 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 the process is dewatered and transported to landfill.

Primary Treatment

The two primary clarifiers utilize the physical process of sedimentation which allows the 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 digesters.

Phosphorus Removal

The phosphorus removal system lowers the total phosphorous level in the final effluent by adding a chemical coagulant, ferrous chloride, at various locations within the plant. In 2025, ferrous chloride was dosed only in the aeration tanks.

Secondary Treatment

Aeration Tank: The aeration tanks are comprised of two distinct zones. The first is an anoxic zone, where no oxygen is introduced. This allows for denitrification. Subsequently, the wastewater 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. 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 two chlorine contact chambers. Disinfected effluent is dechlorinated with a sodium bisulphite solution before being discharged through the 1,676-millimetre diameter outfall extending 770 metres 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 and the digester gas is used to meet the heating requirements of the digesters and for heating areas of the treatment facility.
Sludge Management: All digested sludge produced at the Courtice Water Pollution Control Plant (WPCP) is pumped to the sludge holding facility. From there the treated sludge can be utilized on approved agricultural fields or be transferred to the Duffin Creek WPCP for incineration.

Environmental Compliance Approval (ECA)

Under Condition 10(6) of ECA #3393-68RLD4 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 Courtice WPCP effluent was determined to be compliant with the ECA approval limits during the reporting period. The plant operated at 66.9% of its annual average rated flow capacity and received a maximum daily flow of 140,033 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:

- Difficulty maintaining digester temperature due to vivianite and struvite buildup in heating lines, reducing overall heat transfer from the hot water system. A bypass line was installed and the heat loop rerouted to mitigate the issue.
- High solids resulting from lower raw sludge pumping to conserve digester temperature. This caused operating issues such as floating sludge, low dissolved oxygen, high

ammonia and high phosphorus. Conditions improved following upgrades/optimization and these parameters returned to normal.

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:

- Cleaned aeration tank number (No.) 200 of grit and settled solids
- Replaced ceramic air diffusers in aeration tanks with EPDM diffusers and PVC backer plates
- Replaced flights and chains on primary clarifier No. 200
- Repaired broken flights and chain on secondary clarifiers No. 200 and No. 100
- Replaced process water pump
- Installed a bypass pumping line for the digester raw feed and circulation line
- Repaired grit augers in the aerated grit chamber
- Replaced raw sewage flow meter No. 200 and repaired raw sewage flow meter No. 100

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 and/or lab testing equipment.

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

Calibration of the effluent flow meter was conducted on November 14, 2025.

Calibration of in-house lab equipment was conducted on November 25, 2025 and December 4 2025.

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

f) Description of efforts made, and results achieved in meeting the effluent objectives

The Regional Municipality of Durham continually strives to achieve the best effluent quality at all times and remain below the objectives specified in the ECA:

- The average daily rated flow capacity of 68,200 cubic metres per day (m^3/d) was not exceeded. The rated peak flow capacity of 180,000 m^3/d was not exceeded.
- The total phosphorus objective of 0.8 milligram per litre (mg/L) was exceeded in 68 out of 344 samples (19.8%).
- The total suspended solids objective of 15.0 mg/L was exceeded in 25 out of 346 samples (7.2%).

- The total ammonia nitrogen summer objective of 8.0mg/L from May 1-October 31 was exceeded in 19 of 172 samples (11.0%).
- The E. coli monthly objective of 200cfu/100mL was exceeded in 4 of 104 samples (3.8%).
- The pH minimum objective of 6.5 was exceeded in 5 of 364 samples (1.4%).

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 Courtice Water Pollution Control Plant (WPCP) in 2025 was 104,691 cubic meters (m^3).

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

Due to one of the digesters being out of service for maintenance, only primary digestion occurs before the sludge is pumped to the sludge holding facility. The sludge produced at this facility was applied on agricultural fields or transferred to Duffin Creek WPCP for incineration.

Receiving facilities included:

Agricultural Fields – 51,754 m^3 or 49.4%

Duffin Creek WPCP – 52,937 m^3 or 50.6%

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

All complaints received from the public are administered and tracked through a central database. No complaints were received in 2025.

i) Summary of all By-pass, Spill or Abnormal Discharge

There was one by-pass which occurred on December 19, 2025 resulting from a power failure and backup generator failure. The existing backup generator was out of service for upgrades and the temporary generator provided by the contractor was not synchronized with the plant alarm system f power failures. 9,767 m3 of sewage bypassed secondary treatment during the seven-hour, fifty-minute event.

j) Any other information the District Manager requires from time to time

No additional information was requested.

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

This plant was last inspected by the MECP on June 22, 2017.

Table 1 Final Effluent 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	1,593,576	51,406	62,831
February	1,313,795	46,921	53,525
March	2,023,527	65,275	99,798
April	1,842,052	61,402	140,033
May	1,573,980	50,774	96,000
June	1,238,199	41,273	54,381
July	1,009,230	32,556	45,986
August	1,098,043	35,421	44,955
September	1,098,237	36,608	50,277
October	1,171,903	37,803	47,370
November	1,205,764	40,192	47,703
December	1,413,820	45,607	61,785
Total	16,582,126		
Average	1,381,844	45,430**	
Minimum	1,009,230		
Maximum	2,023,527		140,033
ECA Limit		68,200	180,000
Met Compliance		Yes	Yes

*Metered at the final effluent

**Annual Average Daily Flow

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 average conc. mg/L	Dissolved Reactive Phosphorus average conc. mg/L	Total Kjeldahl Nitrogen average conc. mg/L
January	313	552	5.1	2.90	45.44
February	220	359	4.6	2.06	41.98
March	217	349	3.5	1.39	34.20
April	239	270	3.9	1.78	38.89
May	280	455	4.3	2.22	44.48
June	282	438	5.2	2.54	46.74
July	240	373	6.1	3.35	51.48
August	224	317	6.0	3.15	54.83
September	186	306	5.6	2.93	52.39
October	193	439	5.5	2.58	53.37
November	199	456	5.1	2.66	52.01
December	199	416	4.4	2.25	50.47
Average	233	394	4.9	2.48	47.19
Minimum	186	270	3.5	1.39	34.20
Maximum	313	552	6.1	3.35	54.83
Sampling Frequency Requirement Met	Yes	Yes	Yes	Yes	Yes

Table 2 Raw Influent Analyses continued

Month	Total Ammonia Nitrogen average concentration (conc.) milligram per litre (mg/L)	Alkalinity average conc. mg/L	pH minimum	pH maximum	Temperature degree Celsius average
January	33.8	276	7.4	7.9	13.5
February	28.1	280	7.4	7.8	13.3
March	21.1	273	7.3	8.0	14.2
April	23.7	278	6.9	7.8	15.2
May	27.1	279	7.4	8.0	17.1
June	28.1	284	7.3	8.3	20.3
July	32.4	268	7.3	8.2	21.9
August	32.5	268	7.4	8.0	22.0
September	34.2	269	7.0	7.7	20.5
October	34.2	275	6.6	7.7	19.2
November	33.7	274	7.2	7.7	16.8
December	30.4	267	7.2	7.9	14.4
Average	29.9	274			17.4
Minimum	21.1	267	6.6		13.3
Maximum	34.2	284		8.3	22.0
Sampling Frequency Requirement Met	Yes	Yes	Yes	Yes	Yes

Table 3 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 average conc. mg/L	Total Ammonia Nitrogen average conc. mg/L winter	Total Ammonia Nitrogen average conc. mg/L summer
January	1.6	3.4	0.56	1.57	
February	1.6	4.3	0.57	2.82	
March	2.1	4.8	0.55	0.32	
April	1.8	8.2	0.60	1.32	
May	2.5	5.8	0.61		4.67
June	2.8	12.8	0.83		7.58
July	2.4	20.0	0.97		1.50
August	1.0	3.3	0.81		0.17
September	1.0	2.3	0.69		0.21
October	1.3	2.6	0.72		0.08
November	2.1	3.6	0.69	0.16	
December	1.8	3.4	0.70	0.28	
Average	1.8	6.2	0.69	1.08	2.37
Minimum	1.0	2.3	0.55	0.16	0.08
Maximum	2.8	20.0	0.97	2.82	7.58
ECA Limit	25	25	1.0	24	15
ECA Objective	15	15	0.8	12	8
Within Compliance	Yes	Yes	Yes	Yes	Yes
Sampling Frequency Requirement Met	Yes	Yes	Yes	Yes	Yes

Table 3 Final Effluent Analyses continued

Month	Dissolved Reactive Phosphorus average concentration (conc.) milligram per litre (mg/L)	Unionized Ammonia Nitrogen average conc. mg/L	Nitrate Nitrogen average conc. mg/L	Alkalinity average conc. mg/L
January	0.42	0.0	16.16	110
February	0.42	0.0	14.32	106
March	0.38	0.0	14.08	136
April	0.44	0.0	15.09	146
May	0.43	0.0	12.83	144
June	0.49	0.0	9.93	146
July	0.47	0.0	19.08	61
August	0.59	0.0	23.26	33
September	0.59	0.0	21.96	45
October	0.62	0.0	21.72	55
November	0.59	0.0	25.11	55
December	0.61	0.0	21.74	71
Average	0.50	0.0	17.94	92
Minimum	0.38	0.0	9.93	33
Maximum	0.62	0.0	25.11	146
ECA Limit		0.2		
ECA Objective		0.1		
Within Compliance		Yes		
Sampling Frequency Requirement Met	Yes	Yes	Yes	Yes

Table 3 Final Effluent Analyses continued

Month	Total Chlorine Residual average concentration (conc.) milligram per litre (mg/L)	pH minimum	pH maximum	Temperature degree Celsius average
January	0.00	6.8	7.3	12.0
February	0.00	6.7	7.2	11.9
March	0.00	6.8	7.4	13.2
April	0.00	6.7	7.4	13.9
May	0.00	6.7	7.3	16.6
June	0.00	7.0	7.3	19.5
July	0.00	6.5	7.0	21.7
August	0.00	6.3	7.0	22.1
September	0.00	6.6	7.1	21.1
October	0.00	6.6	7.1	19.4
November	0.00	6.6	7.0	16.3
December	0.00	6.6	7.0	13.3
Average	0.00			16.8
Minimum	0.00	6.3		11.9
Maximum	0.00		7.4	22.1
ECA Limit		6.0	9.5	
ECA Objective		6.5	9.0	
Within Compliance		Yes	Yes	
Sampling Frequency Requirement Met	Yes	Yes	Yes	Yes

Table 4 *Escherichia coli* Sampling

Month	Number of Samples	Monthly Geometric Mean Density
January	9	6
February	8	9
March	9	26
April	9	4
May	8	2
June	8	11
July	10	57
August	8	10
September	9	10
October	9	12
November	8	19
December	9	32
ECA Objective		200
Sampling Frequency Requirement Met	Yes	

Table 5 Energy and Chemical Usage

Month	Ferrous Chloride Litres (L)	Sodium Hypochlorite kilograms as chlorine	Sodium Bisulphite L	Hydro kilowatt hours	Natural Gas m^3
January	82,159	3,740.9	13,396	768,918	53,536
February	64,487	4,130.5	11,086	671,352	74,413
March	35,161	5,084.0	13,257	878,132	37,564
April	36,110	5,374.6	11,601	790,406	25,181
May	34,572	5,305.2	11,524	671,545	8,588
June	72,019	4,612.9	9,721	670,806	4,665
July	102,729	4,244.9	9,823	838,493	4,774
August	136,620	4,351.1	11,464	842,774	4,697
September	112,712	4,816.1	10,981	669,477	5,125
October	97,580	5,955.7	11,275	666,784	17,728
November	84,025	5,455.0	10,923	645,330	17,349
December	89,682	6,724.6	11,828	665,319	40,980
Total	947,856	59,796	136,879	8,779,337	294,600