DURHAM REGION

Harmony Water Pollution Control Plant
2025 Annual Performance Report

The Regional Municipality of Durham
Harmony Creek Water Pollution Control Plant 2025 Annual Performance Report

Environmental Compliance Approval (ECA): 2407-AK8KJH Dated May 23, 2017
Environmental Compliance Approval (Air): 5562-AM9RPN Dated May 18, 2017

The Harmony Creek Water Pollution Control Plant (WPCP) 2025 Performance Report provides staff, stakeholders, and customers a performance overview of the Harmony Creek WPCP. Further, this report fulfills the annual reporting requirements of the Ontario Ministry of the Environment, Conservation and Parks (MECP). This report demonstrates our 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 Harmony Creek WPCP, located in the City of Oshawa, is owned and operated by the Regional Municipality of Durham (Region). The plant is operated according to the terms and conditions of the ECA's. Harmony Creek WPCP treats wastewater from the Oshawa and Courtice (Municipality of Clarington) service areas. The plant shares its catchment area flows with the Courtice WPCP. The Harmony Creek WPCP services approximately 53,833 residents or 26.3% of the total catchment population. The plant is designed to treat wastewater at an average flow rate of 34,100 cubic metres per day (m^3/d). Harmony Creek WPCP is a 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), and
- Solids management

Raw Influent Pumping

Wastewater is collected through approximately 661 kilometers of sanitary sewers in Oshawa and Courtice and is conveyed to the Harmony Creek WPCP and the Harmony Creek Sanitary Sewage Pumping Station (SSPS). Approximately 73.7% of the influent flow is diverted to the Harmony Creek Sanitary Sewage Pumping Station and conveyed to the Courtice WPCP. The remaining flow (26.3%) is treated at the Harmony Creek WPCP.

Preliminary Treatment

Screening: One mechanically cleaned screen and one emergency manual screen remove rags and large debris that could harm pumps and process equipment. Screenings are compacted for landfill disposal.
Grit Removal: Heavy suspended material such as sand and small stones (grit) is removed in the aerated grit tank. 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 this process is transported to landfill.

Primary Treatment

The primary clarifier utilizes the physical process of sedimentation which allows suspended material to settle to the bottom of the tank as sludge. This raw sludge, along with 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 digester 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 the primary clarifier effluent. This coagulant enhances the settling of solids in the clarifier, thereby increasing the removal of phosphorus.

Secondary Treatment

Aeration: The flexible aeration system can operate as two individual aeration tanks or as one large aeration tank. The current configuration is one large aeration tank. The effluent from the primary clarifier flows into the aeration tanks. Fine bubbled air is diffused into the wastewater to assist bacteria in removing dissolved and suspended organics, and nutrients from the wastewater.
Secondary Clarifier: The effluent from the aeration tank is directed to the two secondary clarifiers where the solids settle quickly 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 tank and the excess activated sludge is wasted to the primary clarifier.

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 chlorine contact chamber. Disinfected effluent is dechlorinated with a sodium bisulphite solution before being discharged to Lake Ontario.

Solids Management

Anaerobic Digestion: The raw sludge that is collected from the primary clarifier is pumped into the anaerobic digester 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. The digester gas is used for heating of the digester to offset the natural gas requirements.
Sludge Management: All digested sludge produced at the Harmony Creek 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 11.(4) of ECA 2407-AK8KJH the Region of Durham 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. The plant operated at an average of 48% of its annual average rated flow capacity and received a maximum daily flow of 101,575 cubic metres per day (m^3/d) on April 3, 2025. Tables 1 and 2 summarize the flow and raw wastewater characteristics during the reporting period. The Harmony Creek WPCP effluent was determined to be compliant with the ECA approval limits during the reporting period.

b) Summary and interpretation of all Final Effluent monitoring data and a comparison to the compliance limits condition

The Harmony Creek WPCP effluent was determined to be compliant with the ECA approval limits during the reporting period. See Tables 3 and 4 for the final effluent results.

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

Due to required repairs, the primary clarifier was out of service for most of January 2025. Following its return to service, and increased flows, aged sludge was introduced to build biomass. This significantly increased oxygen demand, and blower capacity was insufficient to maintain dissolved oxygen levels. The resulting low dissolved oxygen conditions led to filamentous bacteria growth, severe foaming, and solids issues in the aeration and final tanks. The filamentous bacteria type was confirmed through laboratory testing. Corrective actions included increasing aeration, optimizing wasting, and physically removing accumulated foam.

While the primary clarifier was offline, sludge was hauled in from other facilities to maintain digester activity. Batch feeding resulted in temporary increases in volatile fatty acids. Once the primary was returned to service and continuous feeding resumed, digester performance stabilized.

d) 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:

- Repaired flange leak on the hypochlorite tank
- Repaired bar screen auger
- Emergency primary clarifier repair

e) 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.

f) Summary of the calibration and maintenance carried out on all influent and final effluent monitoring equipment

Calibration of the influent flow meter occurred on May 21, 2025.

Calibration of the in-house laboratory equipment was conducted on December 4, 2025.

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

g) Description of efforts made and results achieved in meeting the design objectives condition

The Region continually strives to achieve the best effluent quality and remain below the limits specified in the Environmental Compliance Approval:

- The average daily rated flow capacity of 34,100 cubic metres per day (m^3/d) was not exceeded.
- On March 5, 2025 the measured effluent pH was 6.4, which is below the minimum objective of 6.5.

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

h) Tabulation of the volume of sludge generated in the reporting period, 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

The volume of sludge generated at the Harmony Creek Water Pollution Control Plant (WPCP) in 2025 was 17,759 cubic metres (m^3).

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

The sludge produced at this facility was applied on agricultural fields or transferred to Duffin Creek WPCP for incineration.

Receiving facilities included:

Agricultural Fields – 1,792 m^3 or 10.1%

Duffin Creek WPCP – 15,967 m^3 or 89.9%

i) 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.

j) Summary of By-passes, Overflows, reportable spills or abnormal discharge events

- On December 16, 2024, through January 27, 2025 approximately 404,582 m^3 of sewage bypassed primary treatment during a 43-day bypass event for primary clarifier repairs. The bypassed flow received full secondary treatment, disinfection and de-chlorination before being discharged to Lake Ontario via the normal outfall. MECP Incident Report #1-EUZZ30.
- On April 3 2025, approximately 64,078 cubic metres (m^3) of sewage bypassed primary and secondary treatment during a 10 hour bypass event due to heavy precipitation. The bypassed flow was disinfected and dechlorinated before being discharged to Lake Ontario through the normal outfall. Ministry of the Environment, Conservation and Parks (MECP) Incident Report #1-N7G8CW.

Due to the extreme nature of the weather events and unforeseeable nature of the clarifier failure, it was determined that the bypass events were unavoidable and no changes to operational procedures or equipment were required to prevent future occurrences.

k) Schedule ‘B’, Section 1 Notice of Modifications and Status Update

No schedule ‘B’, Section 1 Notice of Modifications were submitted in 2025.

l) Schedule ‘B’, Section 3 Modifications

No schedule ‘B’, Section 3 Modifications were completed in 2025.

MECP Inspection

This plant was last inspected by the MECP on January 20, 2024.

Table 1 Final Effluent Flows

Month	Total Flow to Plant* cubic metre (m^3)	Average Daily Flow cubic metre per day (m^3/d)	Maximum Daily Flow m^3/d
January	317,763	10,250	19,751
February	297,743	10,634	19,767
March	472,549	15,244	25,881
April	629,251	20,298	101,575
May	587,090	18,938	36,026
June	514,844	17,161	21,934
July	568,245	18,330	21,930
August	450,988	14,548	17,459
September	512,804	17,093	19,116
October	547,478	17,661	21,141
November	502,685	16,756	21,622
December	514,486	16,596	32,977
Total	5,915,926		
Average	492,994	16,208**	
Minimum	297,743		
Maximum	629,251		101,575
ECA Limit		34,100	
Met Compliance		Yes	

*Metered at the secondary clarifier

**Annual Average Daily Flow

Table 2 Raw Influent Analyses

Month	Biochemical Oxygen Demand (BOD_5) average (avg.) concentration (conc.) milligram per litre (mg/L)	Total Suspended Solids (TSS) avg. conc. mg/L	Total Phosphorus (TP) avg. conc. mg/L	Total Kjeldahl Nitrogen (TKN) average avg. conc. mg/L
January	275	233	4.7	38.18
February	196	216	4.8	50.38
March	153	177	3.1	38.60
April	104	143	3.8	37.84
May	253	245	4.3	39.80
June	275	267	5.0	44.68
July	274	316	6.1	50.46
August	157	270	4.8	43.65
September	135	178	4.1	44.40
October	119	218	4.6	49.60
November	154	174	4.1	56.00
December	138	238	4.4	46.70
Average	186	223	4.5	45.02
Minimum	104	143	3.1	37.84
Maximum	275	316	6.1	56.00
Sampling Frequency Requirement Met	Yes	Yes	Yes	Yes

Table 3 Final Effluent Analyses

Month	Carbonaceous Biochemical Oxygen Demand ($CBOD_5$) average (avg.) concentration (conc.) milligram per litre (mg/L)	$CBOD_5$ Loading kilogram per day (kg/d)	Total Suspended Solids (TSS) avg. conc. mg/L	TSS Loading kg/d	Total Phosphorus (TP) avg. conc. mg/L	TP Loading kg/d	Total Ammonia Nitrogen (TAN) avg. conc. mg/L
January	2.9	29.3	4.1	41.8	0.3	2.7	1.74
February	11.6	123.1	14.7	155.8	0.8	8.6	1.41
March	3.4	52.4	7.1	107.9	0.3	4.3	0.08
April	5.1	104.3	9.3	189.0	0.3	6.3	0.29
May	3.2	60.4	4.9	92.8	0.3	6.1	0.09
June	1.8	31.1	2.8	47.2	0.3	4.8	0.51
July	1.8	33.4	2.0	35.7	0.6	11.0	0.30
August	1.0	15.1	2.1	29.8	0.5	7.1	0.27
September	1.3	22.0	2.2	37.4	0.4	6.3	0.45
October	1.5	26.8	1.9	33.9	0.4	7.2	0.09
November	2.2	37.4	2.4	40.2	0.3	5.5	0.15
December	2.5	42.2	3.5	57.4	0.3	4.6	0.25
Average	3.2	51.8	4.7	76.4	0.4	6.4	0.47
Minimum	1.0	15.1	1.9	29.8	0.23	2.7	0.08
Maximum	11.6	123.1	14.7	189.0	0.8	11.0	1.74
ECA Limit	25.0	852.5	25.0	852.5	1.0	34.1	
ECA Objective	15.0		15.0		0.8		
Within Compliance	Yes	Yes	Yes	Yes	Yes	Yes	
Sampling Frequency Requirement Met	Yes		Yes		Yes		Yes

Table 3 Final Effluent Analyses continued

Month	Total Chlorine Residual avg. conc. mg/L	pH minimum	pH maximum	Temperature degree Celsius avg.
January	0.00	6.8	7.4	12.2
February	0.00	6.7	7.2	12.9
March	0.00	6.4	7.4	13.9
April	0.00	7.1	7.6	14.6
May	0.00	7.0	7.6	17.2
June	0.00	7.0	7.4	19.2
July	0.00	6.9	7.5	21.6
August	0.00	7.0	7.5	21.7
September	0.00	6.6	7.5	20.5
October	0.00	7.0	7.8	18.5
November	0.00	7.2	7.9	17.7
December	0.00	7.1	8.1	14.9
Average	0.00			17.1
Minimum	0.00	6.4		12.2
Maximum	0.00		8.1	21.7
ECA Limit	0.02	6.0	9.5	
ECA Objective	0.01	6.5	8.5	
Within Compliance	Yes	Yes	Yes	
Sampling Frequency Requirement Met	Yes	Yes	Yes	Yes

Table 4 *Escherichia coli* Sampling

Month	Number of Samples	Geometric Mean Density
January	10	7
February	8	68
March	8	51
April	9	87
May	9	13
June	8	21
July	9	9
August	9	3
September	8	12
October	10	6
November	8	14
December	9	18
ECA Limit		200
ECA Objective		150
Within Compliance		Yes
Sampling Frequency Requirement Met	Yes	

Table 5 Energy and Chemical Usage

Month	Ferrous Chloride litres (L)	Sodium Hypochlorite (L)	Sodium Bisulphite (L)	Hydro kilowatt hour	Natural Gas cubic metres
January	20,867	12,733	5,121	586,202	18,520
February	18,150	33,764	4,527	554,148	15,197
March	28,541	19,743	8,898	635,662	10,660
April	17,425	13,180	9,970	620,301	7,924
May	20,487	14,258	8,698	566,377	4,084
June	24,640	13,973	8,226	449,225	2,451
July	22,859	16,084	9,133	481,391	2,512
August	26,099	11,594	6,791	426,717	4,110
September	32,780	17,094	7,917	409,019	1,782
October	27,896	16,481	8,602	46,397	7,510
November	27,369	14,130	6,465	549,957	11,326
December	26,113	16,555	6,911	605,598	20,490
Total	293,226	199,590	91,259	5,930,996	106,566