Sunderland Water Pollution Control Plant

2024 Annual Performance Report

The Regional Municipality of Durham
Sunderland Water Pollution Control Plant 2024 Annual Performance Report

Environmental Compliance Approval (ECA): 9252-8CUNBZ Dated June 28, 2012
Amendment to ECA: 9252-8CUNBZ Dated June 28, 2017

The Sunderland Water Pollution Control Plant (WPCP) 2024 Annual Performance Report provides staff, stakeholders and customers an overview of the performance of the Sunderland WPCP. Further, this report fulfills the annual reporting requirements of the Ontario Ministry of the Environment, Conservation and Parks (MECP). This report demonstrates the commitment of 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 Sunderland WPCP located in the Community of Sunderland in the Township of Brock is owned and operated by the Regional Municipality of Durham (Region). The plant is operated according to the terms and conditions of the ECA and its amendment. This MECP Class 1 wastewater treatment plant is designed to treat wastewater at a rated capacity of 632 cubic metres per day (m^3/d) and utilizes a seasonal retention wastewater stabilization lagoon system. The Sunderland WPCP has a service population of approximately 1,575 residents.

Raw Influent

Wastewater is collected through 9.5 kilometres of sanitary sewers in the Sunderland service area and is conveyed to the treatment facility by a sanitary sewage pumping station (SSPS) located on River Street.

Lagoon Treatment

The Sunderland WPCP is a two-cell lagoon system where the wastewater enters a retention stabilization lagoon and overflows into an exfiltration cell giving a combined retention time of approximately 182.5 days. The ECA permits two seasonal discharges per year. Spring discharge is for 20 days in May and fall discharge is for 20 days in November. Additional discharges may be granted by the MECP. Prior to and during discharge to the Beaver River, samples are collected to verify the effluent meets the limits established in the ECA.

Environmental Compliance Approval

Under Condition 9(4) of ECA #9252-8CUNBZ 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 lagoons is sampled and analyzed for its chemical and physical composition. Monitoring of the raw wastewater is performed in accordance with the conditions in the ECA. Table 2 Raw Influent Analyses summarizes the raw wastewater characteristics during the reporting period.

The Sunderland WPCP effluent was determined to be compliant with the approval limits during the reporting period. The plant operated at 57.9% of its rated capacity and received a maximum daily flow of 700 cubic metres per day (m^3/d) on April 12, April 13, and April 14, 2024. The total treated effluent discharged to the Beaver River in 2024 was calculated to be 118,144 cubic metres (m^3).

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

In 2019, the Region contacted the MECP after two of the five newly installed groundwater monitoring wells showed elevated ammonia and total kjeldahl nitrogen (TKN) values when compared to historical results from decommissioned wells. The wells are used for the monitoring of groundwater levels and water quality around the lagoons. In 2020, ground penetrating radar technology was used to map water movement between the lagoon and groundwater to detect if the lagoon infrastructure was possibly breached or if the elevated results are due to a historical release that was not identified until the new wells were installed. In 2022, a third-party consultant was provided with all data collected to date to propose next steps. They proposed further studies to determine if the eastern containment structures of the lagoons could be contributing to the elevated ammonia and TKN results. The Region examined its operations at its other existing lagoons in Cannington. In the case of Cannington, a partial clean out of the lagoon around the influent inlet pipe was conducted. Sampling of the monitoring wells around the lagoon revealed that levels of ammonia and TKN decreased after the partial clean out. Based on the success in Cannington, a partial clean out of the inlet area of the Sunderland facultative lagoon was carried out in October 2022. Monthly sampling of the monitoring wells has been conducted and no visible trends have been observed in the upgradient wells since the clean out in 2022. Lagoon well 3 is located downgradient from the facultative lagoon and has shown increasing total ammonia, TKN, and BOD. Lagoon well 2 is located downgradient from the exfiltration lagoon and has shown a downward trend in total ammonia and TKN and an upward trend for total phosphorous. Further investigation will continue and include dye testing the sewer from the sanitary sewer pumping station to the lagoon.

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 2024 included:

- Installed new variable frequency drive for pump 1

- Installed bearing and rebuilt pump 1
- Replaced conduit from the station to wet well
- Installed new railings and platform in wet well
- Repaired milltronics support in wet well

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

In-house lab test results are compared to the results of the Regional Environmental Laboratory on comparable samples to determine the in-house accuracy. Temperature and pH are monitored in the field, all other routine process control tests are performed at the Lake Simcoe WPCP laboratory in Beaverton.

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

Calibration of the influent flow meter located at River Street Sanitary Sewage Pumping Station was conducted on June 12, 2024.
All monitoring and laboratory equipment is calibrated and maintained according to manufacturer's specifications at Lake Simcoe WPCP.

f) Estimate of sludge settling capacity of the lagoons and its annual depletion

The annual depletion of the sludge settling capacity is negligible. There was no removal of sludge during the reporting period.

g) Efforts made and results achieved in meeting the effluent objectives

The Region strives to achieve the best effluent quality at all times consistently remaining well below ECA limits:

- The maximum pH objective of 8.0 was exceeded in 2 of 16 samples (12.5%). pH is monitored three times per week to ensure values are within compliance.
- The maximum total suspended solids (TSS) objective of 15.0 mg/L was exceeded in 2 of 11 samples (18.2%).

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

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 2024.

i) Summary of all By-pass, spill or abnormal discharge

No by-passes, spills or abnormal discharges occurred during the reporting period.

j) Status update of the initial effluent characterization

The initial effluent characterization report was submitted to Ministry of the Environment, Conservation and Parks (MECP) in April 2016.

k) Information required by MECP District Manager

No additional information was requested.

MECP Inspection

The plant was inspected by the MECP on September 21, 2023.

Table 1 Raw Influent 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	13,932	449	526
February	12,424	428	470
March	13,818	446	519
April	17,350	578	741
May	14,089	454	678
June	10,796	360	403
July	10,626	343	652
August	8,774	283	323
September	7,965	266	308
October	7,743	250	266
November	7,729	258	302
December	8,651	279	330
Total	133,897		
Annual Average	11,158	366**	
Minimum	7,729		
Maximum	17,350		741
ECA Limit		632**	
Met Compliance		Yes	

*Metered at River Street Pumping Station

**Annual average daily flow

Table 2 Raw Influent Analyses

Month	Carbonaceous Biochemical Oxygen Demand average (avg.) concentration (conc.) milligrams per litre (mg/L)	Biochemical Oxygen Demand avg. conc. mg/L	Total Suspended Solids avg. conc. mg/L	Total Phosphorous avg. conc. mg/L
January	105	165	187	5.1
February	162	208	223	5.1
March	118	179	218	4.7
April	117	145	177	3.3
May	132	198	217	4.5
June	150	174	278	5.2
July	146	193	228	6.3
August	142	184	260	7.2
September	133	210	287	7.7
October	126	211	606	10.4
November	152	207	282	7.1
December	162	240	492	7.9
Average	137	193	288	6.2
Minimum	105	145	177	3.3
Maximum	162	240	606	10.4
Sampling Frequency Requirement Met	Yes	Yes	Yes	Yes

Table 2 Raw Influent Analyses continued

Month	Total Ammonia Nitrogen average (avg.) concentration milligrams per litre	pH minimum	pH maximum	Temperature Degree Celsius avg.
January	27.4	8.0	8.2	10.6
February	28.1	9.1	8.1	10.2
March	26.8	7.9	8.2	9.7
April	20.6	7.8	8.2	10.9
May	26.0	8.0	8.1	12.3
June	31.3	8.0	8.2	14.4
July	38.5	8.4	8.4	16.8
August	43.7	8.2	8.3	17.4
September	43.7	8.3	8.4	17.7
October	50.5	7.5	8.4	16.8
November	44.3	8.3	8.4	14.9
December	44.2	8.0	8.4	12.8
Average	35.4			13.7
Minimum	20.6	7.5		9.7
Maximum	50.5		8.4	17.7
Sampling Frequency Requirement Met	Yes	Yes	Yes	Yes

Table 3 Calculated Effluent Flows

Month	Effluent Flow cubic metres
January	
February	
March	
April	
May	63,582
June	
July	
August	
September	
October	
November	54,562
December	
Total	118,144
Annual Average	59,072
Minimum	54,562
Maximum	63,582

Table 4 Final Effluent Analyses

Month	Carbonaceous Biochemical Oxygen Demand average (avg.) concentration (conc.) milligrams per litre (mg/L)	Biochemical Oxygen Demand avg. conc. mg/L	Total Suspended Solids avg. conc. mg/L	Total Phosphorous (TP) avg. conc. mg/L	TP loading kilogram per month
January					
February					
March					
April					
May	3.5	3.9	6.0	0.12	8
June					
July					
August					
September					
October					
November	6.0	8.0	20.8	0.20	11
December					
Annual Loading					19**
Average	4.8	6.0	13.4	0.16*	
Minimum	3.5	3.9	6.0	0.12	
Maximum	6.0	8.0	20.8	0.20	
ECA Limit	10*		15*	0.3*	69**
ECA Objective	10		15	0.5	
Lake Simcoe Phosphorus Reduction Strategy				0.25*	58**
Within Compliance	Yes		Yes	Yes	Yes
Sampling Frequency Requirement Met	Yes		Yes	Yes	

*Annual Average Concentration

**Total Annual Loading, kilogram per year (kg/year)

Table 4 Final Effluent Analyses continued

Month	Total Ammonia Nitrogen average (avg.) concentration (conc.) milligrams per litre (mg/L)	pH minimum	pH maximum	Temperature Degree Celsius avg.
January				
February				
March				
April				
May	8.79	7.5	7.7	15.7
June				
July				
August				
September				
October				
November	1.13	7.9	8.1	10.0
December				
Average	4.96			12.9
Minimum	1.13	7.5		10.0
Maximum	8.79		8.1	15.7
ECA Limit		6.0	9.5	
ECA Objective		6.5	8.0	
Within Compliance		Yes	Yes	
Sampling Frequency Requirement Met	Yes	Yes	Yes	Yes