

Port Dalhousie Wastewater Treatment Plant Annual Performance Summary Report Treatment and Collection Reporting Year: 2024



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PD-T-1 Wastewater Treatment Process Description

The Port Dalhousie Wastewater Treatment Plant (WWTP) is located at 40 Lighthouse Road in the City of St. Catharines and provides wastewater treatment to the City of St. Catharines, and portions of the City of Thorold. The Port Dalhousie WWTP is a class IV conventional activated sludge treatment facility and has recently been designed and upgraded to fully treat all flows up to 122,700 m³/d from the previous design flow rate of 100,000 m³/d.

The Port Dalhousie WWTP operates under the following Ministry of Environment, Conservation and Parks (MECP) approvals:

Environmental Compliance Approval (ECA) - Sewage: 8135-B8XS6U, Issued June 19, 2019 Environmental Compliance Approval (ECA) - Air: 2155-BEBHK9, Issued July 25, 2019

The Port Dalhousie WWTP uses the following processes to treat wastewater:

- Imported Sewage Receiving
- Screening
- Grit Removal
- Primary Treatment
- Phosphorus Removal
- Secondary Treatment (Aeration and Settling)
- Disinfection (Chlorination and Dechlorination)
- Solids Handling sludge digestion and transportation
- Storm Treatment

Imported Sewage Receiving Station: To provide service to Niagara Region residents outside the wastewater servicing area, the Port Dalhousie WWTP accepts imported sewage from commercial haulers. Receiving stations are situated to ensure all imported sewage receives full treatment.

Screening: Mechanically cleaned screens remove rags and large debris that could harm pumps and process equipment. Screenings are sent for disposal in landfill.

Grit Removal: Grit tanks equipped with coarse bubble diffusers are used to remove grit from wastewater. 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 pass through the tanks for further treatment. The grit removed is dewatered for landfill disposal.

Primary Treatment: Primary clarifiers are large tanks that allow the incoming wastewater to slow down. The slower speed allows heavier solids to fall from the wastewater to the bottom of the tank. Sludge collected at the bottom of the primary clarifiers is removed and sent to the solids handling process.

Phosphorus Removal: A coagulant, ferric chloride, is added to the treatment process to aid in phosphorus and suspended solids removal.

Secondary Treatment:

Aeration Tank: Large tanks are equipped with air diffusers to add fine bubbles into the wastewater. This oxygen-enriched environment encourages microorganisms (or "bugs") to remove dissolved and suspended organics and nutrients. Activated sludge is returned to the aeration process to ensure enough bugs are present to provide adequate wastewater treatment.

Secondary Clarifiers: Secondary clarifiers receive effluent from the aeration tanks which separates the microorganism population and remaining solids. Solids settle as activated sludge on the bottom of the clarifier while a clean effluent flows from the clarifiers to be disinfected and discharged to the environment. A portion of the activated sludge collected on the bottom of the clarifier is pumped back to the front of the aeration tanks to ensure a healthy microbial population. Excess activated sludge is 'wasted' or removed from the process and sent to the primary clarifiers for thickening.

Disinfection (chlorination/dechlorination):

Chlorine in the form of liquid sodium hypochlorite is added into the effluent stream for pathogen control from April 1 to October 31 each year. Adequate contact time is provided by the chlorine contact chamber. As chlorine can be toxic to aquatic species, disinfected effluent is dechlorinated with a sodium bisulphite solution before being discharged to the lower Twelve Mile Creek.

Solids Handling

Anaerobic Digestion: Sludge from the primary clarifiers is pumped to one of three (3) primary anaerobic digesters, which overflow into one (1) secondary digester for thickening. Anaerobic digestion allows a further breakdown of pollutants and pathogens in the collected sludge. The digested sludge is transported from site for further treatment such as land application or dewatering at the Garner Road Biosolids Facility.

Storm Treatment: Flows greater than 122,700 m³/d are diverted from the treatment plant to a storm treatment system. Storm flows are screened, chlorinated and dechlorinated prior to discharge to the environment. This is called a plant overflow.

PD-T-2 Review of Plant Flows, Influent and Imported Sewage Sampling and Monitoring

Review of 2024 Plant Flows

Table PD-T-1 below outlines the volume of sewage treated at the Port Dalhousie WWTP during the reporting year. It also outlines how much Imported Sewage was received at site for treatment.

Table PD-T-1: Table of Port Dalhousie WWTP Design Flows, 2024 Treated Flows and Reported Imported Sewage Volumes

Flow Statistic	Value
Design Average Daily Flow (ML/d)	61.350
Design Peak Flow Rate (ML/d)	122.700
Total Volume Processed (ML)	10,006.977
Annual Average Daily Flow (ML/d)	27.341
% Annual Average Daily Flow Utilization	45%
% Increase/Decrease over prior year	-6%
Volume Imported Sewage Received (ML)	0.000
% Increase/Decrease Imported Sewage over prior year	No Change
Imported Sewage as % of Flow	0.00%

Reviewing the treated flows in 2024, it was observed that, on average, the plant is utilizing 45% of its design Average Daily Flow capacity. This indicates that the facility has the hydraulic capacity to meet the needs of the collection system with room for additional future flows that may be added from development. Where the utilization becomes greater than 80%, plant expansion should be considered.

Daily flows to the plant were reviewed. In 2024, there were 19 instances where the flow to the plant was greater than the design Average Daily Flow, amounting to approximately 5% of the year. These instances occurred during times of wet weather or heavy snow melt. The Port Dalhousie WWTP collection system receives flow from a portion of combined sewers and is impacted by wet weather.

A review of the monthly average daily flow rate for the prior 10-year period was also completed. This can be observed below in Figure PD-T-1 below. There is a slight downward trend in average daily flow, but this may correlate to changes in precipitation amounts. Spikes during typical wet weather seasons further support increased flows are occurring due to remaining combined sewers and Inflow and Infiltration present in the collection system.

Section: Port Dalhousie WWTP – Treatment (PD-T)

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Figure PD-T-1: Graph displaying the Monthly Average Daily Flow Rate in Megalitres per Day (MLD)

Imported Sewage was not received at the Port Dalhousie WWTP in 2024.

Review of Influent Sampling and Monitoring Activities

In 2024, there were 105 samples of influent collected and tested. An annual summary of influent sampling can be observed in Table PD-T-3 below.

Although the volume of sewage is an important consideration for the effective operation of a wastewater treatment plant, another important factor to monitor is plant loading. Plant loading displays if the strength of the sewage received at the plant is getting stronger or weaker. Stronger sewage may impact the amount of sewage the plant can treat effectively.

Plant loading is calculated by measuring the average strength of a pollutant per liter of influent sewage and multiplying it by the average volume of sewage received. This is displayed as kilograms of pollutant per day or kg/d. Below in Figure PD-T-2, is a graph depicting four commonly monitored pollutant loadings to the plant for the period of 2022-2024.



Figure PD-T-2: Figure of monthly plant loadings to the Port Dalhousie WWTP for Total Biochemical Oxygen Demand (TBOD), Total Suspended Solids (TSS), Total Kjeldahl Nitrogen (TKN) and Total Phosphorus (TP), in kg/d, for the period 2022 to 2024.

Reviewing the calculated loadings for TBOD, TSS, TKN and TP shows no significant changes in loadings. Centrate is being received at this facility from the Niagara Falls WWTP. Peaks in loading correlate with centrate receipt.

Review of Imported Sewage Sampling and Monitoring

No imported sewage was received at the Port Dalhousie WWTP in 2024. No sampling or monitoring activities were undertaken.

Review of Final Effluent Sampling and Monitoring Activities

In 2024, 105 samples of final effluent were collected and tested. Individual as well as monthly average results are reviewed and compared to the objective and compliance limits stated in the facility ECA. Table PD-T-2 below summarizes the number of monthly objective and compliance limit exceedances at the Port Dalhousie WWTP in the reporting year.

Table PD-T-2: Evaluation of Final Effluent sample results to ECA objectives and compliance limits

Pollutant	ECA Monthly Concentration Objective	ECA Monthly Concentration Limit	Number of Objective Concentration Exceedances	Number of Monthly Limit Concentration Exceedances	Monthly Loading Objective	Monthly Loading Limit	Number of Monthly Loading Objectives Exceeded	Number of Monthly Loading Limits Exceeded
pH ¹	6.0-9.5	6.0-9.5	0	0	-	-	-	-
Carbonaceous Biochemical Demand (CBOD)	15 mg/L	25 mg/L	0	0	920 kg/d	1,534 kg/d	0	0
Total Suspended Solids (TSS)	15 mg/L	25 mg/L	2	0	920 kg/d	1,534 kg/d	0	0
Total Phosphorus (TP)	0.5 mg/L	1.0 mg/L	5	0	30.7 kg/d	61.5 kg/d	0	0
Total Residual Chlorine (TRC) ²	Non-detect	0.02 mg/L	0	0	-	-	-	-
E.Coli (<i>geomean</i>) ³	200 MPN/100 mL	200 MPN/100 mL	0	0	-	-	-	-

¹ pH must meet objectives/limits at all times (inclusive)

² Total Residual Chlorine monitoring only required April 01 to October 31 inclusive

³ E.Coli monitoring only required April 01 to October 31 inclusive

Section: Port Dalhousie WWTP – Treatment (PD-T)

The Port Dalhousie WWTP achieved all ECA compliance limits in 2024.

Port Dalhousie WWTP did not achieve the monthly average compliance objective for TP on five (5) occasions, June through September, as well as the month of November. The monthly average objective for TSS was not met on two (2) occasions in July and September.

The new secondary treatment system commissioned in 2023 continues to perform well. Objective exceedances at the plant correlate with the receipt of centrate from the Niagara Falls WWTP.

A review of individual results against ECA objectives was also complete. Below summarizes the percentage of individual samples that were over the ECA objective for a compliance parameter:

- CBOD 0%
- TSS 15%
- TP 29%
- E.Coli 3%

Final Effluent sample results did not exceed the ECA objective greater than 50% of the time.

An annual summary of monthly average final effluent sample results can be observed in Table PD-T-3 below.

Table PD-T-3: Annual Summary of Port Dalhousie Plant and Imported Sewage Flows, Influent and Effluent Sampling and Monitoring Results

Measured Parameter	January	February	March	April	May	June	Julv	August	September	October	November	December	Total / Average	Samples Collected
Influent - Monthly Average TSS (mg/L)	271	294	221	187	213	233	266	193	253	318	253	280	249	
Number of Influent TSS Samples	10	8	8	10	8	8	10	8	9	9	8	9		105
Influent - Monthly Average TBOD5 (mg/L)	165	203	185	157	171	178	200	165	171	197	204	187	182	
Number of Influent TBOD5 Samples	10	8	8	10	8	8	10	8	9	9	8	9		105
Influent - Monthly Average TP (mg/L)	3.4	4.9	4.8	3.8	4.2	4.4	4.7	4.4	5.0	3.9	4.8	4.1	4.4	
Number of Influent TP Samples	10	8	8	10	8	8	10	8	9	9	8	9		105
Influent - Monthly Average TKN (mg/L)	31.40	43.79	40.81	36.92	40.41	40.18	43.14	42.21	48.22	43.64	50.15	39.90	41.73	
Number of Influent TKN Samples	10	8	8	10	8	8	10	8	9	9	8	9		105
Total Plant Flows (ML)	1,323.498	718.990	751.307	1,240.284	686.062	944.205	826.301	694.050	718.025	638.899	655.624	809.732	10,006.977	
Daily Average (MLD)	42.693	24.793	24.236	41.343	22.131	31.474	26.655	22.389	23.934	20.610	21.854	26.120	27.341	
Maximum Flow (ML)	116.138	36.567	33.672	102.454	38.064	76.106	70.244	62.466	48.833	44.646	53.835	51.248	MAX	116.138
Minimum Flow (ML)	20.896	19.691	19.220	20.209	18.289	18.894	15.802	15.059	18.440	15.854	16.122	18.830	MIN	15.059
Volume Imported Sewage Received (ML)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Final Effluent - Monthly Average TSS (mg/L)	8.1	11.9	8.9	8.4	9.0	13.5	17.6	6.5	23.4	6.8	8.4	6.4	10.7	
Final Effluent - Average Daily TSS Loading (kg/d)	346	295	216	347	199	425	469	146	560	140	184	167	294	
Number of Final Effluent TSS Samples	10	8	8	10	8	8	10	8	9	9	8	9		105
Final Effluent - Monthly Average CBOD5 (mg/L)	4.1	4.5	4.0	4.0	4.0	4.9	4.9	4.0	4.6	4.0	4.0	4.2	4.3	
Final Effluent - Average Daily CBOD5 Loading (kg/d)	175	112	97	165	89	154	131	90	110	82	87	110	117	
Number of Final Effluent CBOD5 Samples	10	8	8	10	8	8	10	8	9	9	8	9		105
Final Effluent - Monthly Average TP (mg/L)	0.20	0.31	0.35	0.32	0.44	0.64	0.75	0.51	0.87	0.39	0.52	0.24	0.46	
Final Effluent - Average Daily TP Loading (kg/d)	8.54	7.69	8.48	13.23	9.74	20.14	19.99	11.42	20.82	8.04	11.36	6.27	12.62	
Number of Final Effluent TP Samples	10	8	8	10	8	8	10	8	9	9	8	9		105
Final Effluent - Monthly Average TKN (mg/L)	2.74	3.59	2.38	2.36	4.50	2.49	4.48	3.76	4.33	4.23	3.14	3.28	3.44	
Number of Final Effluent TKN Samples	10	8	8	10	8	8	10	8	9	9	8	9		105
Final Effluent - Monthly Average NH3 (mg/L)	1.13	1.16	0.50	0.53	2.12	0.35	1.82	1.61	0.84	1.26	0.92	1.77	1.17	
Number of Final Effluent NH3 Samples	10	8	8	10	8	8	10	8	9	9	8	9		105
Final Effluent - Monthly Average NO3 (mg/L)	13.12	16.23	17.33	15.96	16.61	11.98	16.00	18.20	18.66	18.84	20.64	14.84	16.53	
Number of Final Effluent NO3 Samples	10	8	8	10	8	8	10	8	9	9	8	9		105
Final Effluent - Monthly Average NO2 (mg/L)	0.54	0.44	0.43	0.40	0.55	0.40	0.52	0.40	0.60	0.48	0.40	0.40	0.46	
Number of Final Effluent NO2 Samples	10	8	8	10	8	8	10	8	9	9	8	9		105
Final Effluent - Monthly Geomean E.Coli				3	6	5	30	7	26	15			10	
(MPN/100mL) Number of Final Effluent E Coli Samples				8	Q	8	10	8	٥	Q				61
				0	3	0	10	0	9	3				01

Section: Port Dalhousie WWTP – Treatment (PD-T)

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													Total /	Samples
Measured Parameter	January	February	March	April	Мау	June	July	August	September	October	November	December	Average	Collected
Final Effluent - Monthly Average TRC (mg/L)				0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00	
Number of Final Effluent TRC Samples				30	31	30	31	31	30	31				214
Final Effluent - Monthly Average Temperature (°C)	9.74	12.00	12.91	14.76	17.64	19.28	22.05	22.86	21.57	19.27	17.93	14.23	17.02	
Number of Final Effluent Temperature Samples	10	8	8	10	8	8	10	8	9	9	8	9		105
Final Effluent - Monthly Average pH	7.11	6.88	6.86	6.93	6.84	6.78	6.86	6.83	6.76	6.74	6.65	6.84	6.84	
Number of Final Effluent pH Samples	10	8	8	10	8	8	10	8	9	9	8	9		105

Effluent Quality Assurance Measurements and Control Measures

To ensure Port Dalhousie WWTP continues to produce a high-quality effluent the following measures have been implemented:

- Development and implementation of a Wastewater Quality Management System (WWQMS) program
 - This program promotes an environment of continuous improvement for all staff impacting the quality of wastewater
- Development of an ISO 14001:2015 Environmental Management System
- Compliance samples are analyzed by an ISO 17025:2017 accredited laboratory unless sample results are required to be collected in the field at the time of sampling
- Standard Operating Procedures (SOPs) are in place to support proper sampling and field measurements
- A compliance sampling schedule is created each year to ensure regulatory requirements are being met, as a minimum
- Equipment used in the monitoring and measurement of Final Effluent quality are calibrated annually

Deviations from Scheduled Sampling Days

Compliance sampling activities at the Port Dalhousie WWTP are scheduled to ensure all provincial and federal requirements are met. A schedule is prepared for the upcoming year and is submitted to the MECP as part of the annual reporting requirement.

In 2024, two (2) deviation from the scheduled sampling days occurred. Table PD-T-4 below provides the instances where a deviation occurred and a reason for the deviation.

The 2025 sampling schedule is available upon request.

 Table PD-T-4: Table of 2024 sampling schedule deviations

Sampling Date Deviation	Sample Type(s)	Reason
2024-02-05	Digested Sludge	Submitted the following day.
2024-12-23	Digested Sludge	No sample submitted.

PD-T-3 Description of Operating Problems Encountered and Corrective Actions Taken

There were no operational issues encountered in 2024.

PD-T-4 Summary of Major Maintenance Activities and Capital Works

Summary of Maintenance Carried out on Major Equipment

Niagara Region works to keep wastewater infrastructure in a state of good repair. Maintenance activities completed include regular preventative maintenance (PM) activities and normal and emergency equipment repair or replacement. Where a substantial amount of upgrade is required, this work is carried out under the capital works program.

Below is a summary of normal and emergency repairs carried out on major equipment at the Port Dalhousie WWTP:

• Replacement of Primary Sludge pump

This list does not include Preventative Maintenance (PM) activities. PMs are completed and tracked in a computerized maintenance management system. PM activities completed during the reporting year are available upon request.

Planned Capital Upgrades

The following is a list of capital upgrades forecasted for the Port Dalhousie WWTP:

- Secondary treatment upgrades project completion in 2024
- Digester clean out and instrumentation upgrade
- Waste gas burner replacement construction anticipated in 2025,
- Improvements to chlorination/dechlorination pumping systems

Summary and Update of Notice of Modifications Completed

Through the facility ECA, MECP has given System Owners the ability to complete low risk changes to a treatment plant without requiring approval from the MECP. These modifications are documented on a Notice of Modification form and are signed off by the Owner or delegate of the system. Any pre-authorized modifications must be reported on annually to the MECP.

During the reporting year 2024, no Notice of Modification were completed.

No Notice of Modification forms were completed in previous reporting years. No status update is required.

Proposed Works – Status Update

All Proposed Works were completed in 2024.

PD-T-5 Summary Calibration Activities

Flow Meter Calibration – Influent, Effluent and Imported Sewage

Flow meters measuring discharges to the environment are calibrated at minimum, once per calendar year. Below in Table PD-T-5 provides a summary of flow meter calibration.

Table PD-T-5: Summary of Flow Meter Calibration

Meter Name	Date Calibrated	Comments
Port Dalhousie Storm Flow Meter	2024-04-18	Passed
Port Dalhousie Final Effluent Meter	2024-12-10	Passed

Calibration certificates are available upon request.

The volume of Imported Sewage received at site is reported by the sewage hauler on submitted paper manifests. No calibration required.

Effluent Monitoring Equipment Calibration/Verification

It is a requirement to calibrate, or, where unable to calibrate, verify equipment that is used to measure effluent quality.

Some effluent monitoring equipment calibration or verification is completed daily or as used by operations staff such as pH meter calibration or verification of the Total Residual Chlorine colorimeter.

Once annually, calibration or verification on all effluent monitoring equipment is completed. A summary of annual calibration/verification activities are available in Table PD-T-6 below.

Table PD-T-6: Summary of Calibration/Verification of Effluent Monitoring Equipment

Equipment Description	Date Calibrated	Comments
Balance – 204TS	2024-09-12	Passed
COD Reactor (Hach DRB 200)	2024-09-16	Passed
Spectrophotometer (Hach DR2700)	2024-09-16	Passed
HQ40D Portable Meter with pH Probe	2024-09-16	Passed
HQ40D Portable Meter with DO Probe	2024-09-16	Passed
Pocket Chlorine Colorimeter	2024-09-16	Passed
Benchtop pH meter - Thermo	2024-09-16	Passed

Calibration certificates are available upon request.

PD-T-6 Solids Handling

Processed Organics Received

780 m³ of waste activated sludge were trucked from Anger Avenue WWTP to Port Dalhousie between May 17 and May 30 due to the gravity belt thickener being out of service for repair. Port Dalhousie WWTP does not typically receive processed organics.

47.2 ML of centrate was received from the Niagara Falls WWTP for further treatment.

Volumes Sludge Generated and Removed From Site

Solids removed from the treatment process are digested and transported from site for further processing and beneficial re-use. All sludge removed from the Port Dalhousie WWTP is taken to Niagara Region's Garner Road Biosolids Facility where it is stored, further thickened and either sent for land application or for dewatering and conversion to a pelletized fertilizer. Table PD-T-7 provides a summary of 2023 and 2024 sludge volumes removed from site.

Month	2024 Volume Sludge Hauled (ML)	Prior Year Volume Sludge Hauled (ML)
January	6.938	4.900
February	6.027	5.420
March	6.721	5.940
April	6.200	5.854
May	5.507	7.198
June	6.721	5.767
July	5.854	4.770
August	6.070	6.504
September	4.900	5.203
October	6.591	6.200
November	9.322	6.374
December	7.284	6.244
TOTAL	78.135	70.373

Table PD-T-7: Summary of Sludge Removed from Site 2024

An 11% increase in sludge removed from site in 2024 versus reporting year 2023 was observed. Receipt of centrate and waste activated sludge from Anger Avenue to the site are considered to be a contributing factors to the increased sludge removed in 2024.

No changes are anticipated for sludge handling in 2025 at the Port Dalhousie WWTP.

Section: Port Dalhousie WWTP – Treatment (PD-T)

Sludge Quality Monitoring

Digested sludge is sampled and analyzed bi-weekly to meet regulatory requirements of the Garner Road Biosolids Facility and Port Dalhousie WWTP ECA and maintain our ability to beneficially re-use biosolids. Results are trended and compared to Nutrient Management Act (NMA) limits. Where a trend is detected, investigations are initiated to identify potential sources of the pollutant and correct any issue identified. Average monthly results for 2024 biosolids analysis from the Port Dalhousie WWTP is included in Table PD-T-8.

PD-T-7 Complaints

Two (2) complaints were received in 2024 regarding the operation of the Port Dalhousie WWTP. When a complaint is received, operations staff attend the site to verify the complaint. Corrective actions are taken if required based on the site verification. All complaints and corrective actions are logged in a complaint tracking system.

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Table PD-T-8: Summary of Monthly Average Sludge Results

Analyte	Units	NMA Limits	January	February	March	April	Мау	June	July	August	September	October	November	December
Total Solids	%	-	1.70	1.70	1.80	2.77	1.95	3.25	1.85	1.95	1.80	2.65	1.80	2.30
Ammonia as N	mg/kg	-	850	895	780	747	965	885	885	760	773	800	645	780
Nitrate+Nitrite	mg/kg	-	1.00	0.99	1.00	0.99	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Phosphorus	mg/kg	-	31,800	27,450	26,300	14,513	29,200	28,950	27,700	26,100	25,000	30,850	30,000	34,800
Arsenic	mg/kg	170	4.17	5.14	3.02	3.17	3.25	3.35	3.80	3.15	3.03	3.15	1.50	2.60
Cadmium	mg/kg	34	0.70	0.50	0.50	0.44	0.65	0.70	0.90	0.55	0.73	1.00	0.75	0.50
Chromium	mg/kg	2,800	58.45	57.15	44.85	29.20	46.65	44.20	55.15	51.75	58.83	74.80	64.20	62.20
Cobalt	mg/kg	340	3.25	2.20	2.20	1.84	3.40	2.65	2.60	2.05	3.17	3.30	3.10	2.80
Copper	mg/kg	1,700	552	453	451	302	501	493	482	469	507	557	504	441
Lead	mg/kg	1,100	74.50	127.50	93.50	57.44	62.50	44.50	38.50	27.50	31.33	27.00	24.50	27.00
Mercury	mg/kg	11	0.37	0.38	0.42	0.29	0.18	0.32	0.27	0.29	0.22	0.32	0.23	0.13
Molybdenum	mg/kg	94	7.50	6.00	7.50	4.28	6.50	5.50	8.50	8.50	8.33	9.50	8.50	7.00
Nickel	mg/kg	420	43.60	14.85	11.10	12.03	19.20	17.00	21.25	16.55	18.07	20.25	16.90	15.40
Potassium	mg/kg	-	7,465	8,025	7,755	5,035	6,560	4380	6120	6870	5050	3650	4505	3910
Selenium	mg/kg	34	2.92	2.48	2.56	2.69	3.35	2.35	3.05	2.95	2.90	3.00	0.65	3.10
Zinc	mg/kg	4,200	654	571	514	367	620	517	640	653	706	732	637	550

PD-T-8 Bypasses, Overflows, other situations outside Normal Operating, Spills and Abnormal Discharge Events

Bypasses and Overflows

There were 11 plant overflow events at the Port Dalhousie WWTP in 2024. Plant overflows from this facility receive preliminary treatment prior to discharge to the environment including screening, chlorination and dechlorination (between April 1 and October 31). Table PD-T-9 provides a monthly breakdown of overflow events occurring at the Port Dalhousie WWTP during the reporting period.

Month	Number of Plant	Total Volume
	Overnow Events	
January	2	65.629
February	0	0.000
March	0	0.000
April	2	30.671
May	1	0.427
June	2	25.196
July	1	9.805
August	2	5.096
September	1	2.410
October	0	0.000
November	0	0.000
December	0	0.000
Total	11	139.234

Table PD-T-9: Annual Summary of Plant Overflow Events by Month

Overflow events are sampled and submitted for analysis. Overflow samples are collected at the start of each event and every eight hours for the duration of the event. Results for overflow samples are shown in **Error! Not a valid bookmark self-reference.** below.

Date	T BOD (mg/L)	Total Suspended Solids (mg/L)	Phosphorus (total) (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Ammonia as N (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	E. Coli⁴ (MPN/ 100 mL)
2024-01-09/ Event Start	64	116	1.80	12.80	5.60	0.50	0.10	-
2024-01-10/ Event 8 Hour	27	48	0.50	7.70	3.50	2.70	0.10	-
2024-01-26/ Event Start	40	98	0.97	6.60	3.00	1.30	0.10	-
2024-01-26/ Event 8 Hour	40	38	1.00	6.40	4.00	2.90	0.10	-
2024-04-03/ Event Start	83	129	2.30	16.20	11.50	0.60	0.10	2,000
2024-04-04/ Event 8 Hour	46	53	1.90	6.40	3.70	1.70	0.10	8,000
2024-04-11/ Event Start	30	935	1.00	7.20	2.90	7.90	0.70	10,000
2024-04-12/ Event 8 Hour	30	43	1.70	7.40	3.14	1.70	0.10	310,000
2024-05-25/ Event Start	91	116	2.80	27.00	13.40	0.20	0.10	4,350,000
2024-06-06/ Event Start	40	74	1.10	7.40	3.20	0.50	0.20	550,000
2024-06-09/ Event Start	50	168	1.30	9.90	3.80	0.50	0.10	1,610,000
2024-07-10/ Event Start	56	135	1.80	12.60	8.00	0.50	0.10	1,270,000
2024-08-17/ Event Start	34	42	1.90	7.90	3.30	0.80	0.10	5,480,000
2024-08-18/ Event 8 Hour	80	77	3.10	17.10	8.30	0.20	0.10	1,790,000
2024-08-31/ Event Start	70	105	2.10	17.60	7.80	0.30	0.10	720,000
2024-09-09/ Event Start	53	90	2.00	15.70	5.40	0.40	0.10	10,000

Table PD-T-10: 2024 Port Dalhousie WWTP Plant Overflow Sampling Results

⁴ Sampling and analysis of E.Coli is required April 01 to October 31 annually Section: Port Dalhousie WWTP – Treatment (PD-T)

Situations Outside of Normal Operating Conditions

The MECP defines "Normal Operating Condition" as when all unit process(es), excluding Preliminary Treatment System, in a treatment train is operating within its design capacity.

There were no situations outside of Normal Operating Conditions during the reporting year.

Spills

Niagara Region strives to maintain and operate wastewater infrastructure so spills to the environment do not occur. However, circumstances arise where a spill occurs due to equipment malfunction, failure or other reasons. Occasionally, a spill is required to safely complete required maintenance to critical equipment. If this is necessary, approval from the MECP is obtained in advance.

All spills are reported to the MECP Spills Action Centre upon discovery and follow up written reports are completed and submitted to the MECP and Environment and Climate Change Canada as required by regulation. Below in Table PD-T-11 summarizes spills that occurred at the Port Dalhousie WWTP in 2024.

Table PD-T-11: Summary of spills occurring at the Port Dalhousie WWTP during the reporting year

Spill Date	MECP Incident Number	Short Description of Spill	Link to Public Spill Report
No spills			
occurred in			
2024.			

Abnormal Discharges

An abnormal discharge is a discharge to the environment that is abnormal in quality or quantity.

There were no instances of abnormal discharges at Port Dalhousie WWTP in the reporting year.

PD-T-9 Summary of Efforts to Achieve Conformance with F-5-1 and/or F-5-5

Summary of Efforts – Procedure F-5-1 – Secondary Treatment Equivalent

Procedure F-5-1 states wastewater treatment facilities are to provide treatment of wastewater to a minimum of secondary treatment equivalence. This means the WWTP should be designed to meet objectives of 15 mg/L for CBOD and TSS and 1.0 mg/L for TP.

Port Dalhousie WWTP achieved secondary treatment equivalent MECP design objectives in 2024.

Summary of Efforts – Procedure F-5-1 and F-5-5 – Bypassing from Combined Sewer Systems

The Port Dalhousie WWTP receives sewage from portions of the City of Port Dalhousie where combined sewer systems still exist. Procedure F-5-1 and F-5-5 require that a staged program be developed for the ultimate goal of total containment and treatment of all sewage flows.

Being a two-tier system, Niagara Region works closely with the City of St. Catharines, and the City of Thorold to reduce bypasses at the wastewater treatment plant. Pollution Prevention and Control Plans (PPCP) are undertaken by area municipalities with support and participation from Niagara Region. As well, Niagara Region undergoes a Master Servicing Plan every five years to identify areas that require I&I reduction or capacity increases based on expected development growth in the area. Both studies take into consideration impacts from wet weather and provide recommended actions to reduce wet weather overflows/bypasses.

Niagara Region participates in a cost sharing strategy with lower tier municipalities to fund overflow reduction projects and pollution prevention and control plan updates. In 2024, Niagara Region had an approved budget totaling \$2.0M for the overflow reduction cost sharing program. One project was approved for cost sharing in the City of St. Catharines with Niagara Region contributing \$480,000 to support sewer separation activities.

Upon commissioning of the new secondary treatment process in 2023, the Port Dalhousie WWTP is now capable of providing full secondary treatment up to 122,700 m³/d. Prior to this project, flows between 100,000 m³/d, up to a maximum flow of 122,700 m³/d received only primary treatment, chlorination and dechlorination prior to discharging to the environment.

Excess Primary Treatment Capacity

F-5-1 allows for excess primary treatment where it is impractical or uneconomical to provide secondary treatment to wet weather flow. Port Dalhousie WWTP is not equipped with excess primary treatment capacity.

Industrial Waste

Industrial waste can contain material that can have negative impacts on collection system infrastructure as well as the wastewater treatment process itself. Upsets to the treatment process can cause a plant to become non-compliant with ECA objectives and limits. To protect our infrastructure, the Niagara Region has a Sewer Use By-law in place. Environmental Enforcement Officers conduct industry inspections as well as sampling and monitoring of industrial discharges on a routine basis to ensure that they meet the Sewer Use By-law limits.

In 2024, an update to the Sewer Use By-law was approved by Council. Sewer Use By-law 2024-51 is now in place ensuring better protection of Niagara Region wastewater infrastructure.

PD-C-1 Overview of the Port Dalhousie WWTP Collection System

The Port Dalhousie WWTP collection system is a class IV system that collects wastewater from domestic, commercial and industrial sources from portions of the City of St. Catharines, and portions of the City of Thorold. The collection system consists of the following:

- Local sanitary sewers
- 17.7 kilometres of regional gravity mains
- 7.9 kilometres of regional force mains
- 14 pumping stations:
 - Cole Farm Sewage Pumping Station
 - Lighthouse Road Sewage Pumping Station
 - Lakeside Sewage Pumping Station
 - Eastchester Sewage Pumping Station
 - Argyle Sewage Pumping Station
 - Renown Sewage Pumping Station
 - Glendale Sewage Pumping Station
 - Wellandvale Sewage Pumping Station
 - Riverview Sewage Pumping Station
 - Beaverdams Sewage Pumping Station
 - St. Georges Point Sewage Pumping Station
 - Snug Harbour Sewage Pumping Station
 - October Village Sewage Pumping Station
 - o Confederation Heights Sewage Pumping Station
- Three Combined Sewer Overflows (CSOs) on Niagara Region infrastructure and four CSOs upstream of Niagara Region infrastructure.

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Figure PD-C-1: Map of Port Dalhousie WWTP Collection System

The collection system is operated under a two-tier system, where the area municipalities owns and operates local gravity sanitary sewers and Niagara Region owns and operates sewage pumping stations, forcemains, larger gravity sanitary sewers or trunk sewers and some sewage detention facilities. It is classified as a combined sewer system. This means there are

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a small portion of pipes still remaining in the system that were designed to collect sanitary sewage and storm water in a single pipe. Combined sewers are no longer allowed to be constructed in Ontario and are being replaced with separate sewer systems as funding allows. Combined systems are heavily impacted during wet weather and snow melt events. While the majority of the collection system is separated, the separated system may still be impacted by inflow and infiltration from sources such as roof leaders, foundation drains, leaky pipes and joints and maintenance holes.

The collection system operates under the following Consolidated Linear Infrastructure ECA:

• Port Dalhousie Wastewater Catchment System, 007-W605, issue number 1

Annual reporting has been prepared to meet the requirements of this approval.

PD-C-2 Summary and Interpretation of Collection System Monitoring Data

Monitoring of Pump Station Operations

Pump stations operate through automatic control and are monitored continuously using Supervisory Control and Data Acquisition (SCADA). Stations alarms are programmed to alert the operations staff at the Port Dalhousie WWTP 24 hours a day of potential issues including but not limited to high wet well levels, pump faults, communication failures and standby generator status. Operators will respond to station alarms as required to ensure proper station operation.

Station operation is trended in SCADA. SCADA trends are reviewed daily by operations staff to evaluate station performance. Operators will look at pump cycle times, station discharge flow and pump duty rotation to identify potential issues. Where potential issues are identified, work orders are generated for follow up by maintenance staff.

In addition to SCADA monitoring, monthly station inspections are completed by operations staff. This includes inspection of the station and testing of standby generator equipment. In addition, starting in 2024, operations staff conducted seven (7) visual inspections of sanitary sewer overflow locations.

Sanitary Sewer Closed-Circuit Television Inspection Program

Niagara Region owns and maintains 145 kilometers of trunk sanitary gravity sewers, 161 kilometers of sanitary forcemains, and 2,093 sanitary access chambers across 11 municipalities. Approximately 85% of its conventional trunk sanitary gravity system is inspected using closed-circuit television (CCTV) once every three years. The remaining 15% is large

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diameter trunk sewers which are inspected once every 10 to 15 years due to the necessity for specialized equipment to access and inspect sewers that have continuous high flow levels.

The table below details the total length of sewers inspected over the past four years.

Table PD-C-1- CCTV Program Summary

Measurement in	2021 ^[1]	2022	2023	2024
Kilometers (km)				
Inspection Length (km)	18.5	59.3	33.0	31.3

Observations from the inspections are recorded for structural and operational deficiencies of the pipes. Operational deficiencies (blockage from grease, roots, debris) are addressed through the cleaning/flushing program. Structural deficiencies (broken, fractured, surface damage, holes) as well as Inflow and Infiltration are forwarded for consideration in the asset management plan and capital upgrade program.

Flow Monitoring

Niagara Region monitors sewer flows at 158 locations. Flow monitoring information is used for municipal Pollution Prevention and Control Plans (PPCPs), Master Servicing Plans (MSPs) including the 2021 Water and Wastewater MSP, Inflow and Infiltration studies, billing, development planning, and capital project design.

PD-C-3 Summary of Operating Issues Encountered and Corrective Actions Taken

Pump Stations and Forcemains

Operational issues were experienced at the Beaverdams SPS during the 2024 reporting year. Instances of high flows to the station were observed both during wet and dry weather. A standard operating procedure was established for staff to respond to high level alarms at the station. The Region is working with the City of Thorold to identify and resolve sources of Inflow and Infiltration impacting this station and continue to follow the established response procedure as required. This station is pending a capital upgrade including an increase to the station capacity.

 ^[1] 2021 marked the end of one inspection contract and the start of a new contract. Delays in the procurement process due to competing priorities resulted in a gap in inspection contracts. As a result, the length of sewers inspected in 2021 was less than in prior years.
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A break occurred in the forcemain servicing the Lakeside SPS. This is included in Section PD-C-7 Collection System Spills below.

No other operational issues were experienced at the pump stations or associated forcemains in 2024.

Gravity Trunk Sewers

The overflow outfall pipe from the gravity trunk sewer combined sewer overflow located near Riverview Boulevard and Oakridge Avenue failed in 2024. Sink holes were reported to Niagara Region. Staff inspected the area and found the overflow outfall pipe had failed causing soil washout around the points of failure. The pipe was assessed and found to require replacement. Replacement of the overflow pipe was completed in 2024.

No operational issues were experienced in the gravity trunk sewers in 2024.

PD-C-4 Summary of Major Maintenance, Capital Projects and Pre-Authorized Alterations

Summary of Maintenance Carried out on Major Equipment

Niagara Region works to keep wastewater infrastructure in a state of good repair. Maintenance activities completed include regular preventative maintenance (PM) activities and normal and emergency equipment repair or replacement. Where a substantial amount of upgrade is required, this work is carried out under the capital works program.

Below is a summary of normal and emergency repairs carried out on major equipment in the Port Dalhousie Collection System:

- Repair of Lakeside SPS forcemain break and site remediation
- Replacement of the outfall pipe from the Riverview Boulevard/Oakridge Avenue Combined Sewer Overflow (Asset 54000225) discharging to the 12 Mile Creek

This list does not include PM activities. PMs are completed and tracked in a computerized maintenance management system. PM activities completed during the reporting year are available upon request.

Planned Capital Upgrades

The following is a list of capital upgrades forecasted for the Port Dalhousie Collection System:

- Beaverdam SPS upgrades and forcemain replacement Construction 2025
- Cole Farm SPS upgrades Commissioning 2025

Summary of Pre-Authorized Alterations Undertaken

Through collection system ECAs, MECP has given System Owners the ability to complete low risk changes to a sewage pumping station, forcemain or gravity main without requiring further approval from the MECP. These modifications are documented on an applicable MECP form and signed off by the Owner or delegate of the system. Any pre-authorized modifications must be reported on annually to the MECP.

During the reporting year 2024, no pre-authorized modifications were completed.

No pre-authorized works were completed and therefore, there were no alterations that would pose a significant threat to drinking water.

PD-C-5 Summary of Calibration Activities

Collection system overflow meters are calibrated at minimum once per year. Other instrumentation used in process control is calibrated on an as needed basis. Table PD-C-2 below provides a summary of calibrations completed in the collection system in 2024.

Table PD-C-2 - Summary of Calibration Activities Undertaken in the Port Dalhousie Collection System

Equipment Description	Date Calibrated	Comments
No system calibrations required.		

Calibration certificates are available upon request.

PD-C-6 Summary of Complaints

One (1) complaint was received in 2024 regarding the operation of the Port Dalhousie collection system. When a complaint is received, operations staff attend the site to verify the complaint. Corrective actions are taken if required based on the site verification. All complaints and corrective actions are logged in a complaint tracking system.

PD-C-7 Summary of Collection System Overflows and Spills

Collection System Overflows

The Port Dalhousie wastewater collection system is classified as a combined sewer system. This means the collection systems consists of a small portion of sewers that are designed to collect both sanitary and storm water while most sewers are separated. Collection system Section: Port Dalhousie – Collection (PD-C) Page 29 of 33 overflows occur during wet weather events due to combined sewers but also because of inflow and infiltration of storm water into sections of the sewage collection system that are separate. Overflows are necessary to prevent basement flooding and to protect downstream infrastructure and wastewater treatment processes.

Table PD-C-3 provides a summary of collection system overflows that occurred during the reporting year. The table includes volume discharge, overflow durations as well as pollutant loading to the environment.

More <u>information on sewage overflows and inflow and infiltration</u>, is available on the Region's website (www.niagararegion.ca/living/sewage/cso).

Table PD-C-3: Collection System Overflow Event Details

Overflow Location	Overflow Date	Overflow Volume (ML)	Overflow Duration (hhh:mm)	BOD Loading (kg)	TSS Loading (kg)	TP Loading (kg)	TKN Loading (kg)	E.Coli (MPN/100 mL)	Was the Overflow Disinfected (Yes/No)	Were Any Adverse Impacts Observed (Yes/No)	Corrective Actions Taken
No Collection System Overflow Events in 2024											

Collection System Spills

Niagara Region strives to maintain and operate wastewater infrastructure so spills to the environment do not occur. However, circumstances arise where a spill occurs due to equipment malfunction, failure or other reasons. Occasionally, a spill is required to safely complete required maintenance to critical equipment. If this is necessary, approval from the MECP is obtained in advance.

All spills are reported to the MECP Spills Action Centre upon discovery and follow up written reports are completed and submitted to the MECP and Environment and Climate Change Canada as required by regulation. Below in Table PD-C-4 summarizes spills that occurred in the Port Dalhousie collection system in 2024.

Spill Date	MECP Incident Number	Description of Spill	Link to Public Spill Report
2024-02-09	1-4N9WU7	Lakeside SPS Forcemain Break	CWCD 2024-24 (https://www.niagararegion.ca/council/ Council%20Documents/2024/council- correspondence-march-01-2024.pdf)
2024-04-01	1-5CF3QZ	Spill During Chamber Cleaning – Riverview Boulevard and Oakridge Avenue	CWCD 2024-64 (https://www.niagararegion.ca/council/ Council%20Documents/2024/council- correspondence-april-26-2024.pdf)

Table PD-C-4: Summary of Spills Occurring in the Port Dalhousie Collection System

PD-C-8 Summary of Efforts to Reduce WWTP Bypasses/Overflows and Collection System Overflows

Projects Undertaken to Reduce Bypasses or Overflows

Being a two-tier system, Niagara Region works closely with the City of St. Catharines, and the City of Thorold to reduce overflows at the wastewater treatment plant. Niagara Region participates in a cost sharing strategy with lower tier municipalities to fund overflow reduction projects. In 2024, Niagara Region had an approved budget totaling \$2.0M for the overflow reduction cost sharing program. One project was approved for cost sharing in the City of St. Catharines with Niagara Region contributing \$480,000 to support sewer separation activities.

There were no overflows from the Niagara Region portion of the Port Dalhousie collection system in 2024.

The Niagara Region undertook a capital project to reline approximately 700 m of trunk sewer along a portion of Richmond Street and Tupper Drive in Thorold as well as rehabilitate up to five maintenance holes. This section of sewer was identified to have significant levels of hydrogen sulphide corrosion through CCTV inspection and confirmed through a condition assessment of the sewer and maintenance holes. Relining of the sewer will help prolong the life and structural integrity of the sewer and prevent I&I from entering the collection system

Public Reporting of Bypasses and Overflows

Niagara Region reports all <u>bypass and overflow events</u> publicly on the Niagara Region website (https://www.niagararegion.ca/living/sewage/CSO/Reporting/CSOLocations.aspx)

Niagara Region updates the data on recent overflows four times a year and displays any overflows that may have occurred in the past 12 months.

A <u>listing of overflow data back to 2008</u> is available through the Niagara Open Data website (https://niagaraopendata.ca/dataset/combined-sewage-overflow)

An active project is underway to improve public reporting of bypasses and overflows including making the data available in near real time.

In 2024, Niagara Region posted signs at publicly accessible sites close to overflow locations that warn about potential hazards and precautions on water use following wet weather. These precautions are not in place at all times but are recommended after wet weather when overflows may affect water quality and safety.



Figure PD-C- 2 - Image of Sanitary Sewer Overflow Public Signage

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