

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



# Table of Contents:

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Table of Contents:	1
List of Tables:	2
List of Figures:	2
PW-T-1 Wastewater Treatment Process Description	4
PW-T-2 Review of Plant Flows, Influent and Imported Sewage Sampling and Monitoring	6
Review of 2024 Plant Flows	6
Review of Influent Sampling and Monitoring Activities	8
Review of Imported Sewage Sampling and Monitoring	9
Review of Final Effluent Sampling and Monitoring Activities	11
Effluent Quality Assurance Measurements and Control Measures	12
Deviations from Scheduled Sampling Days	15
PW-T-3 Description of Operating Problems Encountered and Corrective Actions Taken	15
PW-T-4 Summary of Major Maintenance Activities and Capital Works	16
Summary of Maintenance Carried out on Major Equipment	16
Planned Capital Upgrades	17
Summary and Update of Notice of Modifications Completed	17
Proposed Works – Status Update	17
PW-T-5 Summary Calibration Activities	17
Flow Meter Calibration – Influent, Effluent and Imported Sewage	17
Effluent Monitoring Equipment Calibration/Verification	18
PW-T-6 Solids Handling	18
Processed Organics Received	18
Volume Sludge Generated and Removed From Site	18
Sludge Quality Monitoring	19
PW-T-7 Complaints	19
PW-T-8 Bypasses, Overflows, situations outside Normal Operating, Spills and Abnormal	
Discharges	22
Bypasses and Overflows	22
Situations Outside of Normal Operating Conditions	26
Spills	26
Abnormal Discharges	27
PW-T-9 Summary of Efforts to Achieve Conformance with F-5-1 and/or F-5-5	27
Summary of Efforts – Procedure F-5-1 – Secondary Treatment Equivalent	27
Summary of Efforts – Procedure F-5-1 and F-5-5 – Bypassing from Combined Sewer	
Systems	27
Excess Primary Treatment Capacity	28
Industrial Waste	28

## List of Tables:

Table PW-T-1: Table of Port Weller WWTP Design Flows, 2024 Treated Flows and Reported	
Imported Sewage Volumes	6
Table PW-T-2: Table of Imported Sewage monthly average analysis results	0
Table PW-T-3: Evaluation of Final Effluent sample results to ECA objectives and compliance	
limits 1	1
Table PW-T-4: Annual Summary of Port Weller Plant and Imported Sewage Flows, Influent	
and Effluent Sampling and Monitoring Results 1	3
Table PW-T-5: Table of 2024 sampling schedule deviations	5
Table PW-T-6: Summary of Flow Meter Calibration1	7
Table PW-T-7: Summary of Calibration/Verification of Effluent Monitoring Equipment 1	8
Table PW-T-8: Summary of Sludge Removed from Site 2024         1	9
Table PW-T-9: Summary of Monthly Average Biosolids Results         2	21
Table PW-T-10: Annual Summary of Secondary Bypass and Plant Overflow Events by Month	
	22
Table PW-T-11- Annual Summary of Port Weller WWTP Secondary Bypass Sampling Results	5
	23
Table PW-T-12: Annual Summary of Port Weller WWTP Plant Overflow Sampling Results 2	24
Table PW-T-13: Summary of spills occurring at the Port Weller WWTP during the reporting	
year	26

# List of Figures:

Figure PW-T-1: Graph displaying the Monthly Average Daily Flow Rate in Megalitres per Day	
(MLD)	7
Figure PW-T-2: Figure of monthly plant loadings to the Port Weller WWTP for Total	
Biochemical Oxygen Demand (TBOD), Total Suspended Solids (TSS), Total Kjeldahl Nitrogen	n
(TKN) and Total Phosphorus (TP), in kg/d, for the period 2022 to 2024	8

#### Port Weller Wastewater Collection System Annual Performance Report (PW-C)

List of Tables	3
List of Figures	3
PW-C-1 Overview of the Port Weller WWTP Collection System	29
PW-C-2 Summary and Interpretation of Collection System Monitoring Data	31
Monitoring of Pump Station Operations	.31
Sanitary Sewer Closed-Circuit Television Inspection Program	.31
Flow Monitoring	.32
PW-C-3 Summary of Operating Issues Encountered and Corrective Actions Taken	32
Pump Stations and Forcemains	.32
Gravity Trunk Sewers	.33
PW-C-4 Summary of Major Maintenance, Capital Projects and Pre-Authorized Alterations	33
Summary of Maintenance Carried out on Major Equipment	.33
Planned Capital Upgrades	.33
Summary of Pre-Authorized Alterations Undertaken	.33
PW-C-5 Summary of Calibration Activities	34
PW-C-6 Summary of Complaints	34
PW-C-7 Summary of Collection System Overflows and Spills	34
Collection System Overflows	.34
Collection System Spills	.37
PW-C-8 Summary of Efforts to Reduce WWTP Bypasses/Overflows and Collection System	
Overflows	37
Projects Undertaken to Reduce Bypasses or Overflows	.37
Public Reporting of Bypasses and Overflows	.38

### **List of Tables**

Table PW-C-1- CCTV Program Summary	32
Table PW-C-2 - Summary of Calibration Activities Undertaken in the Port Weller Collection	
System	34
Table PW-C-3- Collection System Overflow Event Details.	36
Table PW-C-4: Summary of Spills Occurring in the Port Weller Collection System	37

## **List of Figures**

Figure PW-C-1: Map of Port Weller WWTP Collection System	30
Figure PW-C- 2 - Image of Sanitary Sewer Overflow Public Signage	38

# **PW-T-1 Wastewater Treatment Process Description**

The Port Weller Wastewater Treatment Plant (WWTP) is located at 27 Lombardy Street in the City of St. Catharines and provides wastewater treatment to the City of St. Catharines, City of Thorold and portions of the Town of Niagara-on-the-Lake. The Port Weller WWTP is a class IV conventional activated sludge treatment facility and has been designed to treat an average daily flow (ADF) of 56,180 cubic metres per day (m<sup>3</sup>/d). This facility can fully treat all flows up to 112,360 m<sup>3</sup>/d and provides primary treatment for flows greater than 112,360 m<sup>3</sup>/d up to a maximum flow rate of 136,200 m<sup>3</sup>/d.

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

Environmental Compliance Approval (ECA) - Sewage: 6014-9QMLZL, issued December 9, 2014

Environmental Compliance Approval (ECA) - Air: 8-2081-92-998, issued February 2, 1999

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

- Imported Sewage (hauled sewage) Receiving
- Screening
- Raw Influent Pumping
- 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 Weller WWTP accepts imported sewage, or more commonly known as hauled 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.

Raw Influent Pumping: Wastewater from the collection system enters the wastewater treatment plant into a wet well, equipped with raw sewage pumps. The wet well provides a low point for the collection system to discharge to. The raw sewage pumps then lift the wastewater from the well (low point) to the beginning of the treatment process (high point) to allow the remainder of the treatment process to occur by gravity.

Section: Port Weller WWTP - Treatment (PW-T)

Grit Removal: Vortex grit tanks equipped with mechanical mixers 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.

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

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.

For flows up to 112,360 m<sup>3</sup>/d, wastewater flows from the primary clarifiers to the secondary treatment process to receive full treatment. Under high flow or wet weather conditions, flows greater than 112,360 m<sup>3</sup>/d to a maximum flow of 136,200 m<sup>3</sup>/d are diverted (bypassed) around the secondary treatment process and go directly to disinfection.

#### Secondary Treatment:

Aeration Tank: Large tanks are equipped with mechanical mixers that churn the surface of the wastewater in order to mix air 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 Welland Canal.

Solids Handling:

Anaerobic Digestion: Sludge from the primary clarifiers is pumped to one (1) primary anaerobic digesters which overflows 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 the peak wet weather capacity of 136,200 m<sup>3</sup>/d are diverted from the treatment plant to protect downstream processes during times of wet weather. Storm flows are screened, chlorinated and dechlorinated (April 01 to October 31) prior to discharge to the Welland Canal.

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

### **Review of 2024 Plant Flows**

Table PW-T-1 below outlines the volume of sewage treated at the Port Weller WWTP during the reporting year. It also outlines how much imported sewage was received at site for treatment.

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

Flow Statistic	Value
Design Average Daily Flow (ML/d)	56.180
Design Peak Dry Weather Flow Rate (ML/d)	112.360
Design Peak Wet Weather Flow Rate (ML/d)	136.200
Total Volume Processed (ML)	13,296.765
Annual Average Daily Flow (ML/d)	36.330
% Annual Average Daily Flow Utilization	65%
% Increase/Decrease over prior year	-4%
Volume Imported Sewage Received (ML)	17.494
% Increase/Decrease Imported Sewage over prior year	13%
Imported Sewage as % of Flow	0.13%

Reviewing the treated flows in 2024, it was observed that, on average, the plant is utilizing 65% 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 39 instances where the flow to the plant was greater than the design Average Daily Flow, amounting to approximately 11% of the year. These instances occurred during times of wet weather or heavy snow melt. The Port Weller 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 PW-T-1 below. A slight increase in the trending has been noted and will continue to be monitored. 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.



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

The volume of imported sewage received at this facility increased by 13%. The volume of imported sewage has increased at Port Weller WWTP as Port Dalhousie WWTP was closed to the receipt of hauled sewage in 2024. No operational issues were encountered with receipt and treatment of imported sewage in 2024.

# **Review of Influent Sampling and Monitoring Activities**

In 2024, 105 samples of influent were collected and tested. An annual summary of influent sampling can be observed in Table PW-T-4 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 PW-T-2, is a graph depicting four commonly monitored pollutant loadings to the plant for the period of 2022-2024.



Figure PW-T-2: Figure of monthly plant loadings to the Port Weller 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 for the past three years shows no trends of concern. The increasing TKN trend observed in reporting year 2022 has returned to more typical levels as some centrate from the Niagara Falls WWTP has been diverted from

Section: Port Weller WWTP – Treatment (PW-T)

Port Weller WWTP to Port Dalhousie or Niagara-on-the-Lake WWTP. Influent loading will continue to be monitored to observe if the trend continues.

### **Review of Imported Sewage Sampling and Monitoring**

Imported Sewage is sampled bi-weekly to ensure sewage being received will not have an adverse impact to the treatment process or the beneficial-use of biosolids resulting from the wastewater treatment process. In 2024, there were 27 samples of imported sewage collected and submitted for testing by an ISO 17025:2017 accredited laboratory. Results were reviewed and compared to the Niagara Region Sewer Use By-law. Where exceedances of the by-law were noted, the source of the imported sewage is investigated. Exceedances of treatable parameters (BOD, TP, TSS, and pH) are allowable under the SUBL.

Table PW-T-2: Table of Imported Sewage monthly average analysis results

Analyte	Units	SUBL Limit	January	February	March	April	Мау	June	July	August	September	October	November	December
Total Solids	mg/L	-	25,290	107,400	34,145	1,960	7,460	1,445	3,677	8,663	37,200	16,200	2,660	11,425
Phosphorus	mg/L	10	98.10	225.60	286.35	52.42	46.35	6.34	29.89	41.21	668.50	82.15	25.10	97.70
Arsenic	mg/L	1	0.19	0.15	0.06	0.06	0.06	0.02	0.04	0.07	0.30	0.10	0.28	0.50
Cadmium	mg/L	0.7	0.07	0.08	0.04	0.02	0.02	0.00	0.01	0.02	0.12	0.03	0.11	0.20
Chromium	mg/L	3	0.19	0.15	0.06	0.06	0.08	0.02	0.07	0.07	0.30	0.10	0.28	0.50
Cobalt	mg/L	5	0.07	0.06	0.03	0.02	0.02	0.00	0.02	0.02	0.12	0.03	0.11	0.20
Copper	mg/L	3	1.15	7.57	0.78	0.39	1.73	0.50	0.51	1.86	6.42	7.92	0.92	1.60
Lead	mg/L	1	0.19	0.40	0.14	0.06	0.09	0.03	0.08	0.07	0.35	0.95	0.28	0.50
Mercury	ug/L	10	0.23	0.43	0.61	0.67	0.05	0.05	3.10	1.78	1.26	0.51	0.11	0.53
Molybdenum	mg/L	5	0.08	0.08	0.03	0.03	0.03	0.01	0.02	0.04	0.13	0.05	0.11	0.20
Nickel	mg/L	2	0.07	0.07	0.04	0.02	0.05	0.02	0.08	0.05	0.14	0.09	0.11	0.20
Selenium	mg/L	1	0.19	0.15	0.06	0.06	0.06	0.02	0.04	0.07	0.30	0.10	0.28	0.50
Zinc	mg/L	3	2.84	7.85	4.30	1.41	1.90	1.08	2.72	2.94	11.15	7.90	1.15	2.50
Aluminum	mg/L	-	5.75	19.55	6.67	2.95	4.41	2.03	32.10	8.93	31.75	4.95	1.85	6.00
Antimony	mg/L	5	0.37	0.35	0.12	0.11	0.12	0.03	0.08	0.14	0.60	0.20	0.55	1.00
Barium	mg/L	-	0.21	0.25	0.20	0.08	0.14	0.06	0.35	0.11	0.50	0.20	0.28	0.50
Beryllium	mg/L	-	0.19	0.15	0.06	0.06	0.06	0.02	0.04	0.07	0.30	0.10	0.28	0.50
Boron	mg/L	-	3.73	3.50	1.35	1.10	1.20	0.30	0.80	1.40	6.00	2.00	5.50	10.00
COD	mg/L	600	20,033	28,100	14,720	2,510	11,790	962	3,695	12,713	19,080	22,000	4,550	19,210
Conductivity	us/cm	-	2,147	49,635	28,080	2,145	2,450	895	1,505	2,773	25,350	2,715	2,205	2,760
Iron	mg/L	-	5	19	12	6	7	7	45	7	31	5	3	9
Manganese	mg/L	-	0.42	1.35	1.07	0.31	0.31	0.17	1.54	0.29	2.70	0.25	0.55	1.00
рН		6-11	3.90	6.30	7.40	6.30	5.10	7.15	7.00	7.27	8.50	3.60	5.95	5.35
Silver	mg/L	5	0.19	0.15	0.06	0.06	0.06	0.02	0.04	0.07	0.30	0.10	0.28	0.50
Tin	mg/L	5	0.37	0.35	0.12	0.11	0.12	0.04	0.08	0.14	0.60	0.25	0.55	1.00
Total Volatile Solids	mg/L	-	20,267	71,220	18,210	990	5,650	730	1,907	5,787	26,150	12,500	1,575	9,425

# Niagara Region – Port Weller Wastewater System 2024 Annual Performance and Summary Report - Treatment

## **Review of Final Effluent Sampling and Monitoring Activities**

In 2024, there were 105 samples of final effluent 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 PW-T-3 below summarizes the number of monthly objective and compliance limit exceedances at the Port Weller WWTP in the reporting year.

Table PW-T-3: 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
pH <sup>1</sup>	6.5-9.0	6.0-9.5	0	0
Carbonaceous Biochemical Oxygen Demand (CBOD)	15 mg/L	25 mg/L	1	0
Total Suspended Solids (TSS)	15 mg/L	25 mg/L	2	1
Total Phosphorus (TP)	1.0 mg/L	1.0 mg/L	0	0
Total Residual Chlorine (TRC) <sup>2</sup>	0.5 mg/L	-	0	-
E-Coli ( <i>geomean</i> ) <sup>3</sup>	200 MPN/100 mL	200 MPN/100 mL	0	0

Port Weller WWTP did not meet the ECA monthly compliance limit for Total Suspended Solids (TSS) in October 2024. The monthly objective for Total Suspended Solids (TSS) was also not achieved In January 2024. Ongoing maintenance issues with the primary clarifiers were experienced during the reporting year along with restricted solids handling as primary digester #1 remains out of service. This is covered in more detail in section PW-T-3 Operating Issues Encountered below.

The monthly objective for Carbonaceous Biochemical Oxygen Demand (CBOD) was not met in October 2024. Contributing factors to this objective exceedance is failure of mechanical mixers in the aeration system and receipt of centrate. The aerators at the Port Weller WWTP are aging and failures are occurring. Centrate volumes were split between Port Weller, Niagara-on-the-Lake and Port Dalhousie WWTP to reduce impact at any one facility.

<sup>&</sup>lt;sup>1</sup> pH must meet objectives/limits at all times (inclusive)

<sup>&</sup>lt;sup>2</sup> Total Residual Chlorine monitoring only required April 01 to October 31 inclusive

<sup>&</sup>lt;sup>3</sup> E.Coli monitoring only required April 01 to October 31 inclusive Section: Port Weller WWTP – Treatment (PW-T)

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

- CBOD 8%
- TSS 19%
- TP 7%
- E.Coli 6%

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

The plant continues to effectively treat all wastewater received. An annual summary of monthly average final effluent sample results can be observed in Table PW-T-4 below.

### **Effluent Quality Assurance Measurements and Control Measures**

To ensure Port Weller 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

Table PW-T-4: Annual Summary of Port Weller Plant and Imported Sewage Flows, Influent and Effluent Sampling and Monitoring Results

													Total /	Total Samples
Measured Parameter	January	February	March	April	Мау	June	July	August	September	October	November	December	Average	Collected
Influent - Monthly Average TSS (mg/L)	167	247	223	199	226	199	219	242	318	191	282	169	224	
Number of Influent TSS Samples	10	8	8	10	8	8	10	8	9	9	8	9		105
Influent - Monthly Average TBOD5 (mg/L)	135	151	162	159	182	156	149	163	194	247	194	148	170	
Number of Influent TBOD5 Samples	10	8	8	10	8	8	10	8	9	9	8	9		105
Influent - Monthly Average TP (mg/L)	2.9	4.1	4.6	3.6	4.6	4.2	4.8	4.3	4.6	3.7	4.5	3.3	4.1	
Number of Influent TP Samples	10	8	8	10	8	8	10	8	9	9	8	9		105
Influent - Monthly Average TKN (mg/L)	35.87	52.11	48.41	39.53	50.16	39.58	40.07	48.25	48.27	50.00	49.24	38.28	44.98	
Number of Influent TKN Samples	10	8	8	10	8	8	10	8	9	9	8	9		105
Total Plant Flows (ML)	1714.764	911.633	1037.002	1632.776	908.617	1206.461	1083.624	928.816	934.784	869.857	918.445	1149.986	13296.765	
Daily Average (MLD)	55.315	31.436	33.452	54.426	29.310	40.215	34.956	29.962	31.159	28.060	30.615	37.096	36.330	
Maximum Flow (ML)	132.050	45.151	51.223	129.864	43.447	89.210	93.971	78.902	63.613	57.001	65.701	76.538	MAX	132.050
Minimum Flow (ML)	27.777	25.394	26.850	28.474	24.322	25.224	24.559	23.144	24.039	23.196	23.133	24.179	MIN	23.133
Volume Imported Sewage Received (ML)	1.286	1.114	1.063	1.754	1.437	0.973	1.231	1.448	2.106	2.395	1.724	0.964	17.494	
Final Effluent - Monthly Average TSS (mg/L)	15.4	12.1	8.6	8.7	6.8	11.8	5.8	14.4	13.9	26.6	12.6	8.4	12.1	
Final Effluent - Average Daily TSS Loading (kg/d)	852	380	288	474	199	475	203	431	433	746	386	312	439	
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)	6.5	5.5	4.1	4.3	4.4	6.6	4.1	6.6	10.2	15.3	7.6	4.4	6.6	
Final Effluent - Average Daily CBOD5 Loading (kg/d)	360	173	137	234	129	265	143	198	318	429	233	163	241	
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)	0.30	0.48	0.44	0.38	0.39	0.59	0.27	0.71	0.62	0.87	0.48	0.31	0.49	
Final Effluent - Average Daily TP Loading (kg/d)	16.59	15.09	14.72	20.68	11.43	23.73	9.44	21.27	19.32	24.41	14.70	11.50	17.68	
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)	24.23	35.39	27.56	18.75	21.95	17.96	18.27	36.59	29.34	34.33	36.68	31.60	27.72	
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)	22.83	31.26	25.63	16.65	17.38	13.40	13.14	25.95	21.67	23.26	23.44	22.51	21.43	
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)	1.77	1.81	6.68	6.58	3.19	2.91	1.89	0.78	0.60	0.80	0.83	0.92	2.40	
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)	0.23	1.90	0.84	0.47	0.55	0.50	1.01	0.28	1.62	0.59	0.55	0.52	0.76	
Number of Final Effluent NO2 Samples	10	8	8	10	8	8	10	8	9	9	8	9		105

# Niagara Region – Port Weller Wastewater System 2024 Annual Performance and Summary Report - Treatment

													Total /	Total Samples
Measured Parameter	January	February	March	April	Мау	June	July	August	September	October	November	December	Average	Collected
Final Effluent - Monthly Geomean E.Coli (mpn/100mL)				18	3	3	4	3	4	12			5	
Number of Final Effluent E.Coli Samples				12	15	12	15	14	14	16				98
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)	9.40	11.63	11.81	14.38	17.53	18.60	20.93	20.83	20.38	18.16	16.01	11.83	15.96	
Number of Final Effluent Temperature Samples	10	8	8	10	8	8	10	8	9	9	8	9		105
Final Effluent - Monthly Average pH	7.72	7.63	7.46	7.44	7.24	7.34	7.52	7.59	7.63	7.46	7.76	7.79	7.55	
Number of Final Effluent pH Samples	10	8	8	10	8	8	10	8	9	9	8	9		105

# Niagara Region – Port Weller Wastewater System 2024 Annual Performance and Summary Report - Treatment

# **Deviations from Scheduled Sampling Days**

Compliance sampling activities at the Port Weller 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, four (4) deviations from the scheduled sampling days occurred. Table PW-T-5 below provides the instances where a deviation occurred and a reason for the deviation.

The 2025 sampling schedule is available upon request.

Sampling Date Deviation	Sample Type(s)	Reason
2024-06-24	Influent	Autosampler malfunction
2024-06-19	Imported Sewage	No imported sewage received this day.
2024-07-03		Sample submitted the following day.
2024-07-10		

Table PW-T-5: Table of 2024 sampling schedule deviations

# **PW-T-3 Description of Operating Problems Encountered and Corrective Actions Taken**

In 2024, Port Weller did not meet the ECA limit for TSS in October 2024. Several contributing factors resulted in this limit exceedance.

One of two primary clarifiers was out of service for structural issues. The concrete in both primary clarifiers was failing, impacting the operation of the sludge removal equipment. Concrete and structural work was completed on one primary clarifier in 2023. Repairs on the second tank were undertaken in 2024. During this time, only one (1) clarifier was regularly in service, resulting in a reduction in solids removal efficiency in the primary treatment process. The clarifier was returned to service in December 2024.

The primary digester remained out of service in 2024 following the failure of an access hatch in December 2022. Repairs have been completed but the digester remains out of service to accommodate the installation of instrumentation. Completing this work before the digester returns to service will eliminate the need to complete a planned spill of digester biogas to install the instrumentation. This will also save time and money by not having to clean out the digester again before the work could be completed. With this digester remaining out of service, the amount of sludge removed from the primary clarifiers is limited, which can lead to higher sludge levels in the primary clarifiers.

High flows were also experienced in October 2024. Due to the reduced solids removal efficiency of the primary treatment process and increased sludge inventory in the in-service primary clarifier, during increased flows, solids can be picked up by the flow and carryover into the final effluent.

In 2024, there were several failures of the aeration mixers. Up to three (3) mixers were out of service at any given time over 2024. Maintenance and repair efforts are ongoing in 2024 to address the following issues:

- concrete repair
- vibration issues
- motor failures
- structural integrity of mixers

Investigation of the use of temporary jet mixers as a supplement to the mechanical mixers is underway as well as continued maintenance and repairs. A consultant has been retained to review the system and provide contingency options in the event of major system failure.

# PW-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 Weller WWTP:

- Rebuild of aerator #2 motor
- Rebuild of waste activated sludge pump #2
- Replaced wheels and mounting brackets on east and west primary clarifier bridges
- Replacement of primary digester 3-way gas valve
- Rebuild of raw sewage pump #3
- Inspection of all mechanical aerators
- Major repairs and concrete work on east primary clarifier
- Locate and repair of potable water leak at plant

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.

Section: Port Weller WWTP – Treatment (PW-T)

## **Planned Capital Upgrades**

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

- Chlorine/Dechlorination System Upgrades Phase one 2025
- Port Weller digester instrumentation upgrades Design construction anticipated for 2025.
- Port Weller Optimization Study Design

## 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 Notices of Modification were completed.

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

### **Proposed Works – Status Update**

There are no proposed works to be completed under the facility's ECA.

# **PW-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 PW-T-6 provides a summary of flow meter calibration.

Meter Name	Date Calibrated	Comments
Port Weller Influent Meter	2024-12-10	Passed
Port Weller Final Effluent Meter	2024-11-06	Passed
Port Weller Secondary Bypass Meter	2024-12-10	Passed
Port Weller Plant Overflow Meter	2024-12-10	Passed

Table PW-T-6: Summary of Flow Meter Calibration

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.

Section: Port Weller WWTP – Treatment (PW-T)

## 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 PW-T-7 below.

Table PW-T-7: Summary of Calibration/Verification of Effluent Monitoring Equipment

Equipment Description	Date Calibrated	Comments
Chlorine Portable Pocket Colorimeter	2024-09-16	Passed
HQ40D Portable Meter with pH Probe	2024-09-16	Passed
COD Reactor (Hach DRB 200)	2024-09-16	Passed
Hach DR 1900	2024-09-16	Passed
Balance (ML204/03)	2024-09-12	Passed
Balance (ML204/03)	2024-09-12	Passed
Balance (ML204/03)	2024-09-12	Passed

Calibration certificates are available upon request.

# **PW-T-6 Solids Handling**

### **Processed Organics Received**

2.3 ML of processed organic waste was received at the Port Weller WWTP in 2024 from the Queenston WWTP. This transfer of waste was necessary to allow for further anaerobic digestion of sludge waste before transporting it to the Garner Road Biosolids Facility.

Port Weller WWTP also received 40.2 ML of centrate for further treatment from the Niagara Falls WWTP in 2024.

## Volume 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 Weller 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 PW-T-8 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	6.808	9.409
February	6.981	7.675
March	7.024	7.111
April	7.068	5.680
May	7.805	8.585
June	5.160	6.938
July	7.154	8.455
August	8.845	8.368
September	8.368	9.062
October	10.276	10.493
November	8.412	7.892
December	8.325	8.282
TOTAL	92.226	97.950

 Table PW-T-8:
 Summary of Sludge Removed from Site 2024

A 6% decrease in sludge removed from site in 2024 versus reporting year 2023 was observed. In 2024, the plant received a lower volume of centrate, resulting in reduced sludge production and, consequently, a smaller volume of sludge requiring removal.

# Sludge Quality Monitoring

Digested sludge is sampled and analyzed bi-weekly to meet regulatory requirements of the Garner Road Biosolids Facility and Port Weller 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 Weller WWTP is included in Table PW-T-9.

# **PW-T-7 Complaints**

Five (5) complaints regarding noise and seven (7) odour complaints were received in 2024 regarding the operation of the Port Weller 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.

Section: Port Weller WWTP - Treatment (PW-T)

# Niagara Region – Port Weller Wastewater System 2024 Annual Performance and Summary Report - Treatment

Noise complaints were related to issues with the aging mechanical mixers. To resolve the issue, sound attenuation was installed around the mechanical aerators. Noise complaints have decreased since installation of the sound attenuation.

Odour complaints were related to the operational issues encountered with the primary treatment system in 2024.

#### Table PW-T-9: Summary of Monthly Average Biosolids Results

Analyte	Units	January	February	March	April	May	June	July	August	September	October	November	December
Total Solids	%	2.05	2.25	2.00	2.13	2.15	2.55	2.15	1.80	1.87	1.65	1.85	1.90
Ammonia as N	mg/kg	780	930	855	863	850	975	940	550	647	600	725	875
Nitrate+Nitrite	mg/kg	1.00	0.99	0.99	1.00	1.00	1.00	0.99	1.00	0.99	0.99	1.00	1.00
Phosphorus	mg/kg	27,550	23,000	27,500	21,567	28,200	24,950	26,000	23,600	22,133	25,200	24,800	30,150
Arsenic	mg/kg	5.06	4.97	4.09	5.47	3.40	3.20	3.85	2.75	3.00	1.75	2.70	3.60
Cadmium	mg/kg	0.70	0.55	0.80	0.63	0.65	0.85	0.85	0.65	0.63	0.60	0.60	1.00
Chromium	mg/kg	44.10	40.10	29.60	32.63	24.85	25.05	24.65	30.40	29.20	22.85	37.45	33.50
Cobalt	mg/kg	3.60	3.30	2.60	2.83	2.60	2.60	2.95	2.90	3.40	3.05	2.80	2.95
Copper	mg/kg	482	488	460	430	424	449	443	483	433	446	423	476
Lead	mg/kg	30.00	48.50	28.00	53.23	37.00	37.50	23.00	25.50	20.00	13.50	15.00	16.50
Mercury	mg/kg	0.25	0.27	0.19	0.28	0.11	0.22	0.25	0.22	0.15	0.14	0.13	0.25
Molybdenum	mg/kg	5.00	4.00	6.00	7.17	5.50	4.50	5.00	6.00	7.67	8.00	8.50	6.50
Nickel	mg/kg	23.75	18.45	13.10	14.70	14.05	15.15	15.80	16.15	15.67	11.95	17.55	14.50
Potassium	mg/kg	6,500	6,000	6,750	5,847	5,815	5,335	5,150	3,930	4,103	5,225	4,870	5,495
Selenium	mg/kg	2.95	2.65	2.96	2.37	2.70	2.40	2.70	2.00	2.00	1.70	1.50	2.50
Zinc	mg/kg	708	685	691	614	604	603	698	674	612	584	554	629

# PW-T-8 Bypasses, Overflows, situations outside Normal Operating, Spills and Abnormal Discharges

### **Bypasses and Overflows**

There were 25 secondary bypass events and 11 plant overflow events at the Port Weller WWTP in 2024. Secondary bypasses from this facility receive partial treatment prior to discharge to the environment including screening, grit removal, phosphorus removal, settling (solids removal), chlorination and dechlorination (from April 1 to October 31). Plant overflows from this facility receive preliminary treatment prior to discharge to the environment including screening, chlorination and dechlorination. Table PW-T-10 provides a monthly breakdown of bypass events occurring at the Port Weller WWTP during the reporting period.

	Number of	Total Volume	Number of	Total Volume
Month	Secondary	of Secondary	Plant Overflow	of Plant
	<b>Bypass Events</b>	Bypass (ML)	Events	Overflow (ML)
January	5	48.937	2	128.405
February	0	0.000	0	0.000
March	0	0.000	0	0.000
April	4	47.541	3	73.378
May	1	0.555	0	0.000
June	4	26.803	2	23.894
July	2	13.872	2	17.042
August	4	6.018	1	5.353
September	1	3.268	1	0.666
October	1	0.801	0	0.000
November	0	0.000	0	0.000
December	3	0.548	0	0.000
Total	25	150.882	11	248.738

Table PW-T-10: Annual Summary of Secondary Bypass and Plant Overflow Events by Month

Secondary bypass and plant overflow events are sampled and submitted for analysis. Samples are collected at the start of an event and best efforts are used to collect another sample near the end of an event. Secondary bypass analytical results are included in Table PW-T-11 below. Plant overflow sampling results are available in Table PW-T-12 below.

Table PW-T-11- Annual Summary of Port Weller WWTP Secondary Bypass Sampling Results

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/100mL)
2024-01-09/ Event Start	200	207	6.00	71.00	52.50	0.20	0.10	
2024-01-10/ Event End	59	79	2.40	25.60	15.90	3.30	0.20	
2024-01-12/ Event Start	124	159	2.70	23.80	9.90	0.50	0.10	
2024/01-13/ Event End	116	272	2.50	18.40	7.10	1.00	0.20	
2024-01-24/ Event Start	126	153	3.90	34.50	20.60	0.20	0.20	
2024-01-25/ Event End	99	167	2.60	15.90	5.80	1.30	0.20	
2024-01-26/ Event Start	72	117	13.50	84.00	7.00	0.70	0.10	
2024-01-27/ Event End	45	80	1.50	10.40	5.80	2.70	0.20	
2024-01-28/ Event Start	20	27	1.40	13.10	11.00	2.50	0.20	
2024-04-03/ Event End	270	309	5.80	46.50	27.40	0.20	0.10	8,660,000
2024-04-04/ Event Start	151	99	1.80	14.40	9.00	2.50	0.20	380,000
2024-04-11/ Event End	220	244	3.90	28.10	14.80	0.20	0.10	3,260,000
2024-04-13/ Event Start	144	107	1.90	18.50	10.70	0.20	0.70	50,000
2024-04-14/ Event End	42	30	1.00	15.40	10.10	1.50	0.70	3000
2024-04-17/ Event Start	230	218	5.10	29.40	10.10	0.90	0.80	1,990,000
2024-04-18/ Event End	91	65	2.10	15.90	9.10	1.20	0.90	1,660,000
2024-05-28/ Event Start	262	403	6.60	45.80	18.00	0.20	0.10	9,800,000
2024-05-28/ Event End	210	300	4.20	26.00	10.00	0.40	0.10	6,130,000
2024-06-06/ Event Start	300	420	7.40	39.10	10.40	0.20	0.10	1,620,000
2024-06-06/ Event End	108	130	2.10	18.50	8.00	0.70	0.60	2,360,000
2024-06-09/ Event Start	79	84	1.60	10.70	3.90	2.40	0.80	30,000
2024-06-09/ Event End	95	103	2.40	24.00	11.50	0.20	0.10	10,000
2024-06-18/ Event Start	300	242	6.60	52.30	31.00	0.20	0.10	5,170,000
2024-06-18/ Event End	370	390	7.40	43.00	18.50	0.20	0.10	6,130,000
2024-06-29/ Event Start	191	174	5.30	44.90	20.80	0.20	0.10	4,110,000
2024-06-29/ Event End	340	283	5.70	32.00	8.40	0.20	0.10	4,790,000
2024-07-10/ Event Start	130	56	5.50	58.70	35.60	0.20	0.10	3,870,000
2024-07-11/ Event End	77	70	3.30	14.30	6.30	1.30	1.50	5,170,000
2024-07-15/ Event Start	420	472	7.30	43.80	16.20	0.20	0.10	8,660,000
2024-07-15/ Event End	220	295	4.20	26.10	8.50	0.20	0.10	5,170,000

<sup>&</sup>lt;sup>4</sup> Sampling and analysis of E.Coli is required April 01 to October 31 annually Section: Port Weller WWTP – Treatment (PW-T)

# Niagara Region – Port Weller Wastewater System 2024 Annual Performance and Summary Report - Treatment

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/100mL)
2024-08-16/ Event Start	1050	2010	37.00	156.00	38.00	0.20	0.10	5,170,000
2024-08-17/ Event End	177	272	6.10	32.50	10.20	0.20	0.10	4,110,000
2024-08-17/ Event Start	40	100	1.60	9.40	5.80	1.00	0.10	1,420,000
2024-08-17/ Event End	40	87	1.20	6.40	4.00	2.00	0.10	1,420,000
2024-08-18/ Event Start	71	62	1.50	27.60	15.40	0.20	0.10	5,480,000
2024-08-18/ Event End	111	98	2.10	19.10	9.80	0.70	0.80	5,170,000
2024-08-31/ Event Start	510	1000	24.70	101.00	22.10	0.20	0.10	NS
2024-08-31/ Event End	NS	NS	NS	NS	NS	NS	NS	NS
2024-09-09/ Event Start	610	1020	15.00	85.00	21.60	0.20	0.10	910,000
2024-09-09/ Event End	54	79	1.50	12.40	4.00	1.30	1.00	15,500,000
2024-10-29/ Event Start	350	727	14.90	123.00	45.60	0.20	0.10	6,490,000
2024-10-29/ Event End	400	752	12.10	58.50	10.10	0.20	0.10	8,160,000
2024-12-09/ Event Start	154	59	4.30	54.50	39.50	0.20	0.10	
2024-12-19/ Event End	170	60	4.40	53.00	41.10	0.20	0.10	
2024-12-10/ Event Start	192	152	3.10	32.20	16.70	0.20	0.10	
2024-12-10/ Event End	91	73	2.10	24.60	15.50	0.20	0.10	
2024-12-30/ Event Start	123	112	2.50	28.00	11.70	0.20	0.10	
2024-12-30/ Event End	NS	NS	NS	NS	NS	NS	NS	

#### Table PW-T-12: Annual Summary of Port Weller WWTP Plant Overflow Sampling Results

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. Coli⁵ (MPN/100mL)
2024-01-09/ Event Start	81	119	2.70	19.80	9.40	0.70	0.10	
2024-01-10/ Event End	20	22	0.30	7.80	4.50	3.50	0.10	
2024-01-26/ Event Start	52	112	1.66	9.80	3.80	1.00	0.20	
2024/01-27/ Event End	20	19	0.70	7.70	5.60	3.20	0.20	
2024/04/03/ Event Start	163	274	4.60	29.60	17.30	0.30	0.20	6,870,000
2024/04/04/ Event End	126	104	2.10	13.50	8.00	2.60	0.20	610,000
2024-04-11/ Event Start	122	268	3.10	25.20	11.60	0.20	0.10	2,910,000
2024-04-11/ Event End	52	48	1.80	19.90	15.20	1.50	0.50	320,000
2024-04-12/ Event Start	35	42	1.30	16.00	11.50	2.40	0.10	20,000

<sup>&</sup>lt;sup>5</sup> Sampling and analysis of E.Coli is required April 01 to October 31 annually Section: Port Weller WWTP – Treatment (PW-T)

# Niagara Region – Port Weller Wastewater System 2024 Annual Performance and Summary Report - Treatment

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. Coli⁵ (MPN/100mL)
2024-04-13/ Event End	30	25	0.40	13.80	9.00	3.30	0.20	9000
2024-06-06/ Event Start	108	265	2.70	19.00	6.90	1.80	0.50	550,000
2024-06-06/ Event End	40	76	1.40	10.70	5.00	2.90	0.90	50,000
2024-06-09/ Event Start	123	369	2.90	18.00	4.60	0.50	0.30	3,650,000
2024-06-10/ Event End	61	64	1.10	8.20	2.60	2.60	0.70	50,000
2024-07-10/ Event Start	81	167	4.10	26.60	13.70	0.20	0.10	3,650,000
2024-07-10/ Event End	53	70	2.00	15.00	7.70	2.70	1.00	220,000
2024-07-11/ Event Start	26	5	1.70	11.60	7.40	2.80	0.80	3,650,000
2024-07-11/ Event End	33	37	2.00	10.20	5.30	2.60	1.20	540,000
2024-08-17/ Event Start	113	196	3.30	16.20	5.50	0.70	0.10	1,660,000
2024-08-17/ Event End	106	145	3.10	16.80	6.80	0.90	0.10	3,650,000
2024-09-09/ Event Start	122	347	1.90	17.50	5.00	0.90	0.10	20,000
2024-09-09/ Event End	47	78	1.30	10.80	4.60	1.70	0.10	3,440,000

# Niagara Region – Port Weller Wastewater System 2024 Annual Performance and Summary Report - Treatment

## 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.

While one primary clarifier wass out of service as described above in section PW-T-3 above, the tank was available during times of high flow to treat up to the plant rated capacity. No situations outside of Normal Operating Conditions existed in 2024.

# 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 planned spill may be 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 PW-T-13 summarizes spills that occurred at the Port Weller WWTP in 2024.

Table PW-T-13: Summary of spills occurring at the Port Weller WWTP during the reporting year

Spill Date	MECP Incident Number	Short Description of Spill	Link to Public Spill Report
2024-08-27	1-AA7GVJ	Spill of Sewage - Tank Overflow	CWCD 2024-162 (https://www.niagararegion.ca/council/ Council Documents/2024/council- correspondence-oct-04-2024.pdf)
2024-09-29	1-BH5B6G	Improper Gate Position Causing Spill	CWCD 2024-182 (https://www.niagararegion.ca/council/ Council Documents/2024/council- correspondence-nov-01-2024.pdf)

# **Abnormal Discharges**

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

There were no instances of abnormal discharge during the reporting year.

# PW-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 mg/L for TP.

As demonstrated above in section PW-T-2, Port Weller WWTP provides effective secondary treatment. The Final Effluent annual average quality achieved in 2024 were below the secondary treatment equivalent MECP design objectives.

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

The Port Weller WWTP receives sewage from portions of the City of St. Catharines where combined sewer systems still exist. Procedure F-5-1 and F-5-5 require that a staged program be developed for the 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, City of Thorold, and the Town of Niagara-on-the-Lake 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.

Section: Port Weller WWTP – Treatment (PW-T)

# **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. As Port Weller WWTP services a collection system that is impacted by wet weather flow, fully treating the combined sewage and stormwater is not feasible. Port Weller is equipped with excess primary treatment for flows greater than 112,360 m<sup>3</sup>/d, up to a maximum flow of 136,200 m<sup>3</sup>/d. Flows greater than the peak secondary treatment design flow of 112,360 m<sup>3</sup>/d receive screening, grit removal and primary treatment and are then diverted around the secondary treatment process and recombine with the final effluent for seasonal chlorination and dechlorination prior to discharge to the Welland Canal.

### **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.

# PW-C-1 Overview of the Port Weller WWTP Collection System

The Port Weller 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, portion of the City of Thorold and portions of Niagara-on-the-Lake. The collection system consists of the following:

- Local sanitary sewers
- 26.6 kilometres of regional gravity mains
- 7.0 kilometres of regional force mains
- 9 pumping stations:
  - Airport Road Sewage Pumping Station
  - Black Horse Sewage Pumping Station
  - Carleton Street Sewage Pumping Station
  - Centre Street Sewage Pumping Station
  - Spring Gardens Sewage Pumping Station
  - Lombardy Avenue Sewage Pumping Station
  - Thorold Tunnel Sewage Pumping Station
  - Peel Street Sewage Pumping Station (Niagara Region) and Sanitary Storage Facility (City of Thorold)
  - Haulage Road Sewage Pumping Station
- 4 Combined Sewer Overflows (CSOs) on Niagara Region infrastructure

# Niagara Region – Port Weller Wastewater System 2024 Annual Performance and Summary Report - Collection



Figure PW-C-1: Map of Port Weller 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 some sewage detention facilities and Niagara

Section: Port Weller - Collection (PW-C)

Page 30 of 38

Region owns and operates sewage pumping stations, forcemains and larger gravity sanitary sewers or trunk sewers. It is classified as a combined sewer system. This means there are 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 Weller Wastewater Catchment System, 007-W606, issue number 1

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

# PW-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 Weller 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 five (5) visual inspections of sanitary sewer overflow locations and wet weather storage tanks.

## 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

Section: Port Weller – Collection (PW-C)

using closed-circuit television (CCTV) once every three years. The remaining 15% is large 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.

Table PW-C-1 details the total length of sewers inspected over the past four years.

Table PW-C-1- CCTV Program Summary

Measurement in Kilometers (km)	2021 <sup>6</sup>	2022	2023	2024
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.

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

### **Pump Stations and Forcemains**

Operational issues were encountered at the Peel Street SPS in 2024. Major pump failures occurred in two out of three station pumps. Maintenance staff were repairing pumps but as one would be repaired, another would fail. A temporary pump was brought to the site to ensure station capacity was maintained and a spare pump was available. The pumping issues and

<sup>&</sup>lt;sup>6</sup> 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. Section: Port Weller – Collection (PW-C)
Page 32 of 38

temporary pump were in place for approximately 10 months. Pump issues have been resolved and the station has returned to normal operation.

A break in the forcemain serving the Peel Street SPS also occurred in 2024. This is covered in detail in section PW-C-7 below.

## **Gravity Trunk Sewers**

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

# PW-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 Weller Collection System:

- Peel St SPS Rebuild of pump #2 and pump #3
- Peel Street SPS forcemain repair of break in forcemain

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 Weller Collection System:

- Sustainability upgrades for the Spring Gardens SPS construction anticipated for 2025.
- Glendale flume sustainability upgrade in design

### 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.

A Director's notification was submitted to report the discovery of a combined sewer overflow from a regional trunk sewer in the vicinity of Oakdale Avenue and Marren Street. The existence of the overflow was field verified by Niagara Region staff.

# **PW-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 PW-C-2 below provides a summary of calibrations completed in the collection system in 2024.

Table PW-C-2 - Summary of Calibration Activities Undertaken in the Port Weller Collection System

Equipment Description	Date Calibrated	Comments
Peel Street SPS Overflow Meter	2024-07-05	Passed
Glendale Flume	2024-12-12	Passed
Thorold Townline Flume	2024-12-11	Passed

Calibration certificates are available upon request.

# **PW-C-6 Summary of Complaints**

One (1) odour complaint was received in 2024 regarding the operation of the Port Weller 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.

# PW-C-7 Summary of Collection System Overflows and Spills

# **Collection System Overflows**

The Port Weller 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 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.

Section: Port Weller – Collection (PW-C)

Overflows are necessary to prevent basement flooding and to protect downstream infrastructure and wastewater treatment processes.

Table PW-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).

# Niagara Region – Port Weller Wastewater System 2024 Annual Performance and Summary Report - Collection

Table PW-C-3- Collection System Overflow Event Details.

Overflow Location	Overflow	Overflow	Overflow	BOD	TSS	TP	TKN	E.Coli <sup>7</sup>	Was the Overflow	Were Any Adverse	Corrective Actions
	Date	Volume	Duration	Loading	Loading	Loading	Loading	(MPN/100	Disinfected	Impacts Observed	Taken
		(ML)	(hhh:mm)	(kg)	(kg)	(kg)	(kg)	mL)	(Yes/No)	(Yes/No)	
Peel Street SPS	2024-01-09	1.511	06:02	90.7	335.4	1.81	12.69		No	No	Awaited End of Event
Peel Street SPS	2024-01-26	3.761	07:55	199.3	413.7	5.11	37.99		No	No	Awaited End of Event
Peel Street SPS	2024-07-10	3.102	05:27	124.1	1185.0	3.10	14.89	760,000	No	No	Awaited End of Event
Spring Gardens SPS	2024-01-26	0.498 <sup>8</sup>	01:57	119.5	175.3	1.39	6.47		No	No	Awaited End of Event

 <sup>&</sup>lt;sup>7</sup> E.Coli sampling and analysis is required April 01 to October 31 annually.
 <sup>8</sup> Volume is estimated.

Section: Port Weller – Collection (PW-C)

# **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 planned spill may be required in order to safely complete required maintenance to critical equipment. In the event that 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 PW-C-4 summarizes spills that occurred in the Port Weller collection system in 2024.

Table PW-C-4: Summary of Spills Occurring in the Port Weller Collection System

Spill Date	MECP Incident Number	Description of Spill	Link to Public Spill Report
2024-07-13	1-8X23A6	Peel St SPS - Forcemain Break	<u>CWCD 2024-138</u> (https://www.niagararegion.ca/council/Council Documents/2024/council-correspondence- aug-16-2024.pdf)

# PW-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, City of Thorold, City of Niagara Falls and Town of Niagara-on-the-Lake 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 overflow reduction activities.

There were four (4) overflows from the Niagara Region portion of the Port Weller collection system in 2024.

## 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 PW-C-2 - Image of Sanitary Sewer Overflow Public Signage