



Port Weller Wastewater Treatment Plant
Annual Performance Summary Report
Treatment and Collection
Reporting Year: 2023

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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 (m³/d). This facility can fully treat all flows up to 112,360 m³/d and provides primary treatment for flows greater than 112,360 m³/d up to a maximum flow rate of 136,200 m³/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 (hailed 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 hailed 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.

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 m³/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 m³/d to a maximum flow of 136,200 m³/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 m³/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 2023 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, 2023 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)	13,878.622
Annual Average Daily Flow (MLD)	38.024
% Annual Average Daily Flow Utilization	68%
% Increase/Decrease over prior year	5%
Volume Imported Sewage Received (ML)	15.534
% Increase/Decrease Imported Sewage over prior year	10%
Imported Sewage as % of Flow	0.11%

Reviewing the treated flows in 2023, it was observed that, on average, the plant is utilizing 68% 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 2023, there were 45 instances where the flow to the plant was greater than the design Average Daily Flow, amounting to approximately 12% 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.

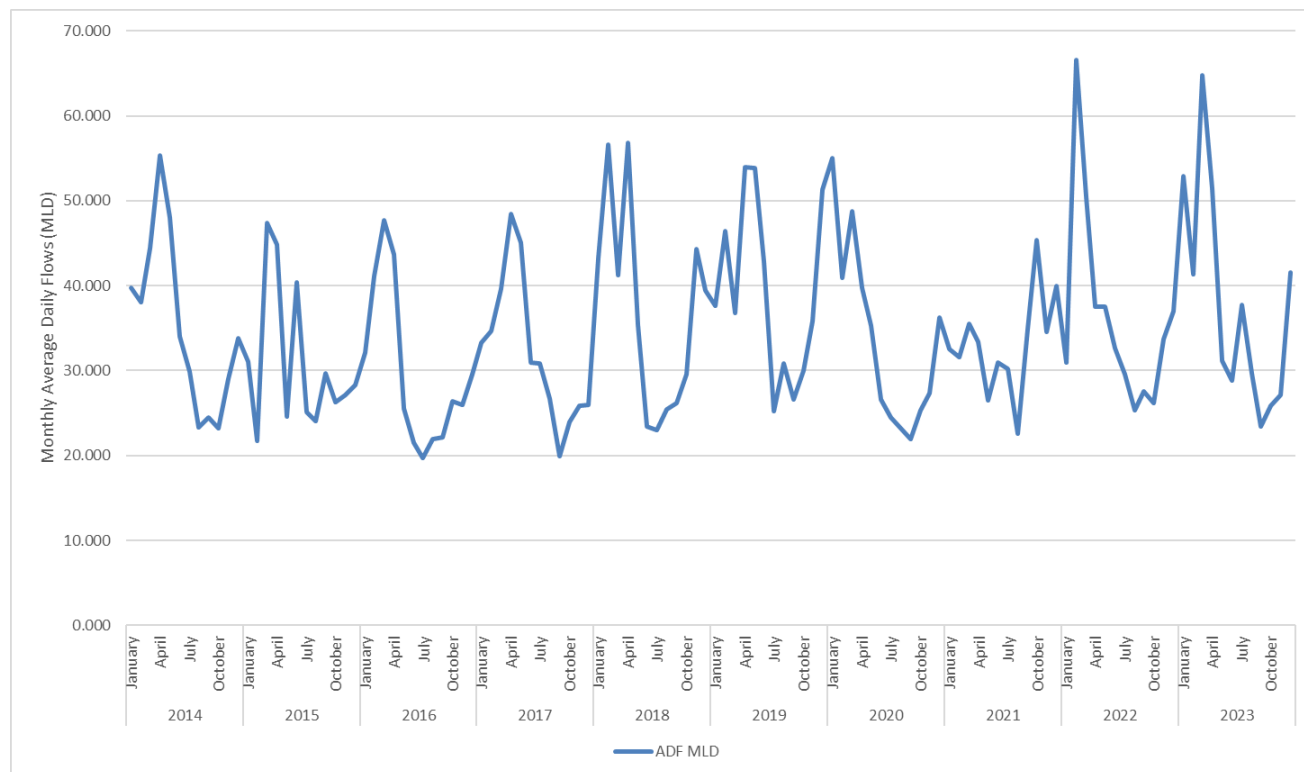


Figure PW-T-1: Graph displaying the Monthly Average Daily Flow Rate in Megalitres per Day (MLD)

The volume of imported sewage received at this facility increased by 10%. The volume of imported sewage has increased at Port Weller WWTP as Port Dalhousie WWTP was closed to the receipt of hauled sewage in 2023. No operational issues were encountered with receipt and treatment of imported sewage in 2023.

Review of Influent Sampling and Monitoring Activities

In 2023, 102 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 2021-2023.

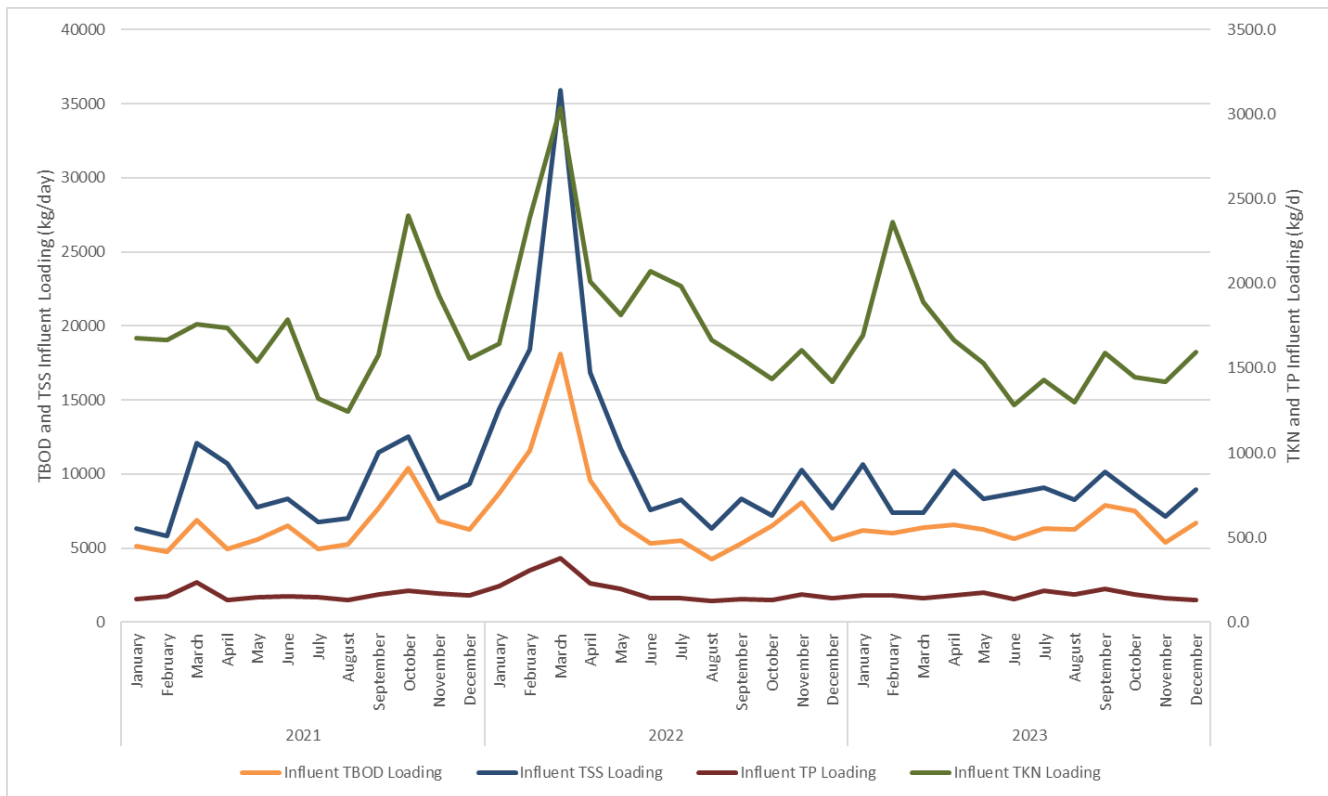


Figure PW-T-2: Figure of monthly plant loadings to the Port Weller WWTP for Total Biochemical Oxygen Demand (TBOD), Total Suspended Solids (TSS), Total Kjeldahl Nitrogen (TKN) and Total Phosphorus (TP), in kg/d, for the period 2021 to 2023.

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. 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 2023, 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	May	June	July	August	September	October	November	December
Total Solids	mg/L	-	10,410	3,835	4,725	5,340	5,512	5,718	1,528	8,650	10,025	30,881	18,643	21,665
Phosphorus	mg/L	10	50.35	20.45	40.28	13.11	56.70	31.19	28.72	31.97	63.00	111.44	34.26	52.70
Arsenic	mg/L	1	0.09	0.02	0.05	0.17	0.05	0.06	0.03	0.03	0.08	0.32	0.04	0.04
Cadmium	mg/L	0.7	0.03	0.01	0.02	0.07	0.02	0.02	0.01	0.01	0.02	0.13	0.01	0.02
Chromium	mg/L	3	0.09	0.03	0.05	0.17	0.05	0.06	0.03	0.06	0.08	0.32	0.09	0.14
Cobalt	mg/L	5	0.03	0.01	0.02	0.07	0.02	0.02	0.01	0.01	0.02	0.13	0.01	0.02
Copper	mg/L	3	2.87	0.82	1.72	0.50	1.20	2.94	0.96	3.34	1.93	3.44	1.41	2.06
Lead	mg/L	1	0.15	0.05	0.09	0.17	0.11	0.24	0.05	0.15	0.18	0.40	0.07	0.09
Mercury	ug/L	10	0.05	0.11	0.35	0.42	0.16	0.10	0.16	0.11	0.05	0.32	8.48	0.82
Molybdenum	mg/L	5	0.06	0.01	0.01	0.04	0.02	0.01	0.01	0.01	0.02	0.07	0.01	0.05
Nickel	mg/L	2	0.04	0.03	0.03	0.07	0.04	0.08	0.03	0.07	0.04	0.14	0.04	0.09
Selenium	mg/L	1	0.14	0.02	0.05	0.17	0.05	0.06	0.03	0.02	0.08	0.32	0.04	0.05
Zinc	mg/L	3	4.59	0.97	2.90	1.05	1.46	5.74	1.19	4.03	1.84	4.40	1.01	3.70
Aluminum	mg/L	-	13.03	12.50	6.81	2.15	6.01	8.62	8.22	12.51	5.01	11.61	3.60	14.05
Antimony	mg/L	5	0.21	0.04	0.09	0.35	0.10	0.12	0.07	0.04	0.16	0.64	0.08	0.07
Barium	mg/L	-	0.15	0.27	0.11	0.20	0.11	0.14	0.09	0.26	0.14	0.39	0.08	0.36
Beryllium	mg/L	-	0.09	0.02	0.05	0.17	0.05	0.06	0.03	0.02	0.08	0.32	0.04	0.04
Boron	mg/L	-	2.05	0.35	0.91	3.47	1.12	1.20	0.70	0.75	1.55	6.45	0.86	0.70
COD	mg/L	300	15,361	11,745	9,834	12,463	10,252	15,909	7,280	16,258	18,800	63,235	46,180	37,165
Conductivity	us/cm	-	2,178	2,453	2,080	4,797	2,804	2,435	2,218	3,032	2,178	2,048	1,830	2,070
Iron	mg/L	-	7	9	9	5	13	23	13	17	6	19	4	19
Manganese	mg/L	-	0.34	0.24	0.47	0.70	0.59	0.55	0.46	0.65	0.36	1.00	0.61	0.62
pH		6-11	3.90	6.98	6.85	7.87	5.36	4.69	6.18	5.38	4.18	3.66	4.59	4.58
Silver	mg/L	5	0.09	0.02	0.05	0.17	0.05	0.06	0.03	0.02	0.08	0.32	0.04	0.04
Tin	mg/L	5	0.21	0.04	0.09	0.35	0.10	0.13	0.07	0.06	0.16	0.64	0.08	0.10
Total Volatile Solids	mg/L	-	8,118	2,015	3,319	3,363	3,616	3,789	766	5,150	7,633	21,105	5,074	6,450

Review of Final Effluent Sampling and Monitoring Activities

In 2023, there were 103 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 ¹	6.5-9.0	6.0-9.5	0	0
Carbonaceous Biochemical Oxygen Demand (CBOD)	15 mg/L	25 mg/L	0	0
Total Suspended Solids (TSS)	15 mg/L	25 mg/L	6	0
Total Phosphorus (TP)	1.0 mg/L	1.0 mg/L	0	0
Total Residual Chlorine (TRC) ²	0.5 mg/L	-	0	-
E-Coli (<i>geomean</i>) ³	200 MPN/100 mL	200 MPN/100 mL	0	0

Port Weller WWTP met all ECA monthly compliance limits in the 2023.

The monthly objective for Total Suspended Solids (TSS) was not achieved for six (6) months of the year. 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.

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

- CBOD – 10%
- TSS – 23%
- TP – 7%
- E.Coli – 8%

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

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
- 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

Measured Parameter	January	February	March	April	May	June	July	August	September	October	November	December	Total / Average	Total Samples Collected
Influent - Monthly Average TSS (mg/L)	202	179	114	199	267	302	240	279	434	335	263	215	252	
Number of Influent TSS Samples	10	8	7	9	9	8	9	8	8	9	9	8		102
Influent - Monthly Average TBOD5 (mg/L)	117	146	99	128	200	195	167	211	337	291	198	161	188	
Number of Influent TBOD5 Samples	10	8	7	9	9	8	9	8	8	9	9	8		102
Influent - Monthly Average TP (mg/L)	3.0	3.8	2.2	3.1	5.7	4.8	4.9	5.5	8.4	6.3	5.2	3.2	4.7	
Number of Influent TP Samples	10	8	7	9	9	8	9	8	8	9	9	8		102
Influent - Monthly Average TKN (mg/L)	32.00	57.10	29.16	32.40	49.09	44.59	37.97	43.80	67.94	55.96	52.41	38.38	45.07	
Number of Influent TKN Samples	10	8	7	9	9	8	9	8	8	9	9	8		102
Total Plant Flows (ML)	1,639.058	1,157.904	2,009.207	1,542.658	967.037	863.945	1,169.888	920.979	702.776	801.278	814.268	1,289.624	13,878.622	
Daily Average (MLD)	52.873	41.354	64.813	51.422	31.195	28.798	37.738	29.709	23.426	25.848	27.142	41.601	38.024	
Maximum Flow (ML)	105.063	82.856	137.162	127.155	64.233	65.172	101.883	46.033	47.195	54.782	67.671	103.324	MAX	137.162
Minimum Flow (ML)	32.837	30.301	42.162	28.982	24.614	23.093	21.585	19.656	20.054	20.468	18.051	26.814	MIN	18.051
Volume Imported Sewage Received (ML)	1.090	0.606	1.296	1.402	1.118	1.388	1.171	1.331	1.673	1.862	1.557	1.039	15.534	
Final Effluent - Monthly Average TSS (mg/L)	7.8	9.6	11.7	15.9	10.2	19.3	24.8	21.9	10.0	11.0	17.8	15.5	14.6	
Final Effluent - Average Daily TSS Loading (kg/d)	412	397	758	818	318	556	936	651	234	284	483	645	556	
Number of Final Effluent TSS Samples	10	8	7	9	9	8	9	9	8	9	9	8		103
Final Effluent - Monthly Average CBOD5 (mg/L)	5.4	4.8	5.9	4.7	4.4	11.6	8.9	7.0	9.8	10.6	10.6	7.6	7.6	
Final Effluent - Average Daily CBOD5 Loading (kg/d)	286	198	382	242	137	334	336	208	230	274	288	316	289	
Number of Final Effluent CBOD5 Samples	10	8	7	9	9	8	9	9	8	9	9	8		103
Final Effluent - Monthly Average TP (mg/L)	0.19	0.27	0.32	0.34	0.39	0.65	0.67	0.66	0.68	0.42	0.50	0.37	0.46	
Final Effluent - Average Daily TP Loading (kg/d)	10.05	11.17	20.74	17.48	12.17	18.72	25.28	19.61	15.93	10.86	13.57	15.39	17.30	
Number of Final Effluent TP Samples	10	8	7	9	9	8	9	9	8	9	9	8		103
Final Effluent - Monthly Average TKN (mg/L)	14.22	35.24	18.26	14.23	17.99	28.83	20.33	14.44	26.61	32.08	34.03	25.20	23.46	
Number of Final Effluent TKN Samples	10	8	7	9	9	8	9	9	8	9	9	8		103
Final Effluent - Monthly Average NH3 (mg/L)	10.71	31.61	14.79	12.02	14.41	24.25	16.12	11.82	24.08	31.91	32.24	23.99	20.66	
Number of Final Effluent NH3 Samples	10	8	7	9	9	8	9	9	8	9	9	8		103
Final Effluent - Monthly Average NO3 (mg/L)	6.64	3.55	4.37	6.91	7.32	2.06	1.84	2.17	2.80	0.97	0.23	0.88	3.31	
Number of Final Effluent NO3 Samples	10	8	7	9	9	8	9	9	8	9	9	8		103
Final Effluent - Monthly Average NO2 (mg/L)	0.53	0.43	0.37	0.96	1.41	0.79	1.98	1.87	1.05	0.53	0.29	0.44	0.89	
Number of Final Effluent NO2 Samples	10	8	7	9	9	8	9	9	8	9	9	8		103

Niagara Region – Port Weller Wastewater System
2023 Annual Performance and Summary Report - Treatment

Measured Parameter	January	February	March	April	May	June	July	August	September	October	November	December	Total / Average	Total Samples Collected
Final Effluent - Monthly Geomean E.Coli (mpn/100mL)				19	5	4	18	3	4	3			6	
Number of Final Effluent E.Coli Samples				13	14	16	18	14	16	14				105
Final Effluent - Monthly Average TRC (mg/L)				0.00	0.00	0.00	0.00	0.00	0.00	0.01			0.00	
Number of Final Effluent TRC Samples				30	31	30	31	31	30	31				214
Final Effluent - Monthly Average Temperature (°C)	11.18	11.53	11.53	14.01	16.63	19.53	20.53	20.76	20.56	17.97	14.23	12.51	15.91	
Number of Final Effluent Temperature Samples	10	8	7	9	9	8	9	9	8	9	9	8		103
Final Effluent - Monthly Average pH	7.61	7.69	7.50	7.61	7.49	7.68	7.49	7.52	7.50	7.54	7.47	7.85	7.58	
Number of Final Effluent pH Samples	10	8	7	9	9	8	9	9	8	9	9	8		103

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 2023, 11 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 2024 sampling schedule is available upon request.

Table PW-T-5: Table of 2023 sampling schedule deviations

Sampling Date Deviation	Sample Type(s)	Reason
2023-01-04 2023-01-12 2023-01-18	Primary Effluent	Autosampler out of service – sample for process control only
2023-01-10	Digested Sludge	Failure of hatch on primary digester – no sample available
2023-01-24	Digested Sludge	Sample submitted the following day
2023-03-21	Final Effluent	Autosampler malfunction. Sample submitted the following day.
2023-03-23	Imported Sewage	No imported sewage received this day. Sample submitted the following day.
2023-07-27	Primary Effluent	Autosampler malfunction – insufficient sample volume collected.
2023-08-22	Influent	Autosampler malfunction – no sample available for submission
2023-10-31	Final Effluent	Autosampler malfunction. Sample submitted the following day.
2023-11-28	Final Effluent	Autosampler malfunction. Sample submitted the following day.

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

In 2023, Port Weller did not meet the ECA objectives for TSS for six (6) months. Several issues contributed to the reduced solids removal efficiency of the plant in 2023.

One of two primary clarifiers was out of service for structural issues. The concrete in both primary clarifiers is failing. Secondary clarifier #2 has been patched and repaired. The concrete

failure occurring in primary clarifier #1 is interfering with the operation of the traveling bridge mechanism which runs on a rail system on the edge of the tank. The traveling bridge removes solids and scum from the clarifier. Since the traveling bridge cannot be operated and solids cannot be removed, this tank is out of service reducing solids removal efficiency in the primary treatment process.

The primary digester remained out of service in 2023 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.

In 2023, there were several failures of the aeration mixers. Typically, two (2) mixers were out of service at a given time over 2023. Maintenance and repair efforts have been significant in 2023 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.

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:

- Repair and rebuild of east influent screw gearbox
- Locate and repair of potable water leak at plant
- Rebuild of primary digester mixer #3
- Cleanout of primary digester, replace failed access hatch
- Install piping and valves for future instrumentation upgrade of primary digester #1

- Repair and rebuild of digested sludge pump
- Rebuild of return activated sludge pump for secondary clarifiers #5 and 6
- Removal of primary digester mixer #4 for rebuild (in progress)
- Refurbishment of waste activated sludge pump #1 motor

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 WWTP:

- Chlorine/Dechlorination System Upgrades – In 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 2023, 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.

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

Meter Name	Date Calibrated	Comments
Port Weller Influent Meter	2023-06-05	Passed
Port Weller Final Effluent Meter	2023-04-24	Passed
Port Weller Final Effluent Meter	2023-11-16	Passed
Port Weller Secondary Bypass Meter	2023-05-26	Passed

Meter Name	Date Calibrated	Comments
Port Weller Secondary Bypass Meter	2023-11-29	Passed
Port Weller Plant Overflow Meter	2023-06-06	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 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	2023-08-10	Passed
HQ40D Portable Meter with pH Probe	2023-08-10	Passed
COD Reactor (Hach DRB 200)	2023-08-10	Passed
Hach DR 1900	2023-08-04	New instrument – factory calibrated
Balance (ML204/03)	2023-09-13	Passed
Balance (ML204/03)	2023-09-13	Passed
Balance (ML204/03)	2023-09-13	Passed

Calibration certificates are available upon request.

PW-T-6 Solids Handling

Processed Organics Received

3.4 ML of processed organic waste was received at the Port Weller WWTP in 2023 from the Queenston WWTP. 2.3 ML of water treatment plant residuals were received from Decew Water Treatment Plant (WTP). 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 91.5 ML of centrate for further treatment from the Niagara Falls WWTP in 2023.

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 2022 and 2023 sludge volumes removed from site.

Table PW-T-8: Summary of Sludge Removed from Site 2023

Month	2023 Volume Sludge Hauled (ML)	Prior Year Volume Sludge Hauled (ML)
January	9.409	4.423
February	7.675	5.071
March	7.111	6.244
April	5.680	8.195
May	8.585	6.331
June	6.938	6.070
July	8.455	7.068
August	8.368	7.458
September	9.062	8.932
October	10.493	10.493
November	7.892	7.501
December	8.282	6.504
TOTAL	97.950	84.290

A 16% increase in sludge removed from site in 2023 versus reporting year 2022 was observed. The primary digester was out of service in 2023 for emergency repairs and inspection. The secondary digester was utilized as a primary digester during this time resulting in no secondary digestion process. This results in a thinner sludge, more volume of sludge to be trucked from site, and no ability to supernate. It is anticipated that the primary digester will return to service after the installation of instrumentation, and it will return to typical operation in 2024.

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 2023 biosolids analysis from the Port Weller WWTP is included in Table PW-T-9.

PW-T-7 Complaints

Two (2) complaints regarding noise and one (1) odour complaint were received in 2023 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.

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	%	2.20	2.35	2.30	2.65	2.33	2.15	1.95	1.90	1.55	1.73	1.75	1.90
Ammonia as N	mg/Kg	840.00	955.00	805.00	880.00	900.00	935.00	720.00	695.00	555.00	513.33	640.00	740.00
Nitrate+Nitrite	mg/Kg	0.99	1.00	1.00	0.99	1.00	1.05	1.00	1.00	1.00	0.99	1.00	0.99
Phosphorus	mg/Kg	26,100	14,683	23,350	20,600	25,267	30,000	28,100	25,450	22,700	22,367	23,300	23,400
Arsenic	mg/Kg	3.82	3.77	5.71	4.69	4.17	2.90	2.99	4.08	3.63	3.37	2.77	3.50
Cadmium	mg/Kg	0.60	0.35	0.50	0.55	0.50	0.50	0.50	0.50	0.95	0.63	0.75	0.50
Chromium	mg/Kg	30.10	17.57	32.05	48.70	38.77	29.75	35.10	34.50	38.40	35.17	30.45	33.35
Cobalt	mg/Kg	1.00	1.26	2.55	2.60	2.83	2.95	2.75	3.75	3.30	2.17	1.60	3.20
Copper	mg/Kg	497.00	217.85	442.50	386.50	424.33	443.50	445.00	437.50	430.00	476.00	492.00	455.50
Lead	mg/Kg	9.00	7.56	12.00	14.50	15.00	11.50	11.50	14.00	13.50	27.33	58.00	63.00
Mercury	mg/Kg	0.18	0.14	0.35	0.16	0.19	0.16	0.17	0.19	0.19	0.20	0.21	0.21
Molybdenum	mg/Kg	5.00	2.53	6.50	5.00	6.00	6.00	5.00	5.50	5.00	5.67	7.50	5.50
Nickel	mg/Kg	12.20	7.23	20.05	22.30	16.03	12.65	7.30	15.80	14.20	18.50	20.10	15.00
Potassium	mg/Kg	4,160	2,824	5,490	5,015	5,133	5,755	4,595	4,645	4,935	4,140	4,865	5,570
Selenium	mg/Kg	2.91	2.92	3.07	2.36	6.32	2.55	2.15	2.43	2.77	2.15	2.72	2.64
Zinc	mg/Kg	727.00	341.59	656.50	747.50	654.67	673.00	681.50	703.50	670.50	744.33	850.50	668.00

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

Bypasses and Overflows

There were 18 secondary bypass events and 12 plant overflow events at the Port Weller WWTP in 2023. 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.

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

Month	Number of Secondary Bypass Events	Total Volume of Secondary Bypass (ML)	Number of Plant Overflow Events	Total Volume of Plant Overflow (ML)
January	1	13.220	1	2.201
February	1	7.737	1	0.714
March	3	52.845	2	70.571
April	3	55.627	3	34.135
May	1	1.768	0	0.000
June	1	2.424	0	0.000
July	4	20.525	3	32.435
August	1	0.535	0	0.000
September	0	0.000	0	0.000
October	0	0.000	0	0.000
November	1	2.937	1	1.823
December	2	15.822	1	21.551
Total	18	173.440	12	163.430

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. Coli ⁴ (MPN/100mL)
2023-01-04/ Event Start	470	386	8.60	46.70	25.20	0.20	0.10	
2023-01-05/ Event End	99	77	2.08	13.80	6.79	3.00	0.40	
2023-02-09/ Event Start	187	154	4.90	59.00	34.10	0.20	0.10	
2022/02-09/ Event End	114	102	2.50	28.10	15.70	0.20	0.10	
2022/02/22/ Event Start	233	220	5.00	38.70	17.40	1.10	0.20	
2022/02/23/ Event End	82	60	1.45	15.90	8.30	3.60	0.10	
2023-03-03/ Event Start	171	221	3.90	42.30	29.40	0.20	0.10	
2023-03-06/ Event End	82	78	1.50	11.10	6.50	3.20	0.30	
2023-03-17/ Event Start	187	172	4.30	30.70	11.80	0.40	0.10	
2023-03-17/ Event End	137	119	2.60	19.30	10.60	1.40	0.30	
2023-03-25/ Event Start	300	348	8.30	53.80	22.30	0.20	0.10	
2023-03-25/ Event End	151	130	3.60	32.20	19.40	0.20	0.10	
2023-04-01/ Event Start	230	276	4.60	24.00	6.80	0.30	0.20	70,000
2023-04-02/ Event End	97	90	1.70	16.30	10.00	1.80	0.70	10,000
2023-04-04/ Event Start	250	230	2.80	24.70	14.00	1.50	0.70	10,000
2023-04-04/ Event End	108	98	1.80	26.80	16.40	1.90	0.60	10,000
2023-04-05/ Event Start	136	134	3.00	23.30	14.30	1.70	0.80	1,600,000
2023-04-06/ Event End	108	93	1.90	25.90	18.50	0.30	1.00	1,720,000
2023-05-20/ Event Start	300	436	6.70	45.60	14.60	0.20	0.10	4,350,000
2023-05-20/ Event End	124	158	3.20	23.70	11.50	0.60	0.10	2,610,000
2023-06-12/ Event Start	310	570	9.60	51.30	15.70	0.20	0.10	3,650,000
2023-06-12/ Event End	154	207	3.90	23.30	7.00	0.20	0.10	1,310,000
2023-07-20/ Event Start	410	671	16.20	52.60	12.00	0.20	0.10	3,654,000
2023-07-20/ Event End	48	63	1.70	10.50	6.60	1.70	0.50	1,119,000
2023-07-24/ Event Start	250	267	6.80	40.50	16.10	0.20	0.10	1,790,000
2023-07-24/ Event End	130	242	2.70	15.60	5.70	1.20	0.50	1,350,000
2023-07-27/ Event Start	87	81	2.20	15.30	7.20	1.80	1.90	7,270,000
2023-07-27/ Event End	230	261	4.80	30.40	12.50	0.20	0.10	1,250,000
2023-07-29/ Event Start	260	264	7.00	47.00	19.90	0.20	0.30	8,660,000
2023-07-29/ Event End	76	65	1.60	11.80	3.80	1.10	0.80	3,260,000

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

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. Coli ⁴ (MPN/100mL)
2023-08-15/ Event Start	560	910	14.50	64.00	13.60	0.20	0.10	8,160,000
2023-08-15/ Event End	280	420	8.00	35.40	9.50	0.20	0.10	5,790,000
2023-11-09/ Event Start	1490	3440	142.00	335.00	62.00	0.20	0.10	
2023-11-09/ Event End	126	295	6.30	21.80	5.10	1.70	0.10	
2023-12-09/ Event Start	360	529	11.30	45.20	11.30	0.20	0.10	
2023-12-10/ Event End	350	554	14.10	62.20	16.00	0.20	0.10	
2023-12-27/ Event Start	410	585	15.90	69.00	12.40	0.20	0.10	
2023-12-28/ Event End	98	160	2.80	17.90	5.20	2.30	0.20	

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. Coli ⁵ (MPN/100mL)
2023-01-04/ Event Start	85	160	2.39	20.60	9.40	1.10	0.10	
2023-01-05/ Event End	30	34	0.77	8.10	3.30	4.10	0.10	
2023-02-09/ Event Start	72	88	1.70	19.60	12.60	0.20	0.10	
2022/02-09/ Event End	73	127	2.00	18.70	13.40	0.40	0.10	
2022/02/22/ Event Start	72	122	1.90	32.40	22.50	2.80	0.60	
2022/02/23/ Event End	22	31	0.68	10.40	6.10	3.40	0.20	
2023-03-17/ Event Start	60	81	2.10	21.20	14.10	0.20	0.10	
2023-03-17/ Event End	40	68	1.70	15.40	10.30	2.00	0.30	
2023-04-01/ Event Start	92	427	1.20	9.20	4.50	2.60	0.90	330,000
2023-04-01/ Event End	41	42	1.20	14.30	8.90	2.60	0.50	10,000
2023-04-04/ Event Start	77	81	1.00	9.40	4.00	2.20	0.50	10,000
2023-04-04/ Event End	47	65	1.00	19.10	12.60	2.50	0.70	30,000
2023-04-05/ Event Start	81	153	1.60	18.90	11.00	2.40	0.70	100,000
2023-04-06/ Event End	20	19	0.40	4.90	3.80	3.90	0.20	3,000
2023-07-20/ Event Start	60	148	1.60	10.50	10.30	1.00	0.50	100,000
2023-07-20/ Event End	44	50	0.80	8.00	9.50	2.10	0.30	1,467,000
2023-07-27/ Event Start	38	69	0.40	4.60	1.60	2.10	1.40	60,000
2023-07-27/ Event End	93	404	3.60	15.90	2.70	1.60	0.20	10,000
2023-07-29/ Event Start	62	141	2.50	13.80	3.30	1.80	0.30	10,000

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

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. Coli ⁵ (MPN/100mL)
2023-07-29/ Event End	40	53	0.90	8.80	3.40	2.20	0.90	10,000
2023-11-09/ Event Start	95	213	2.40	15.60	6.70	1.20	0.30	
2023-11-09/ Event End	40	73	1.20	9.30	4.80	1.90	0.10	
2023-12-27/ Event Start	61	137	1.90	20.40	7.10	1.40	0.10	
2023-12-27/ Event End	40	59	0.60	9.00	2.40	2.50	0.10	

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 is out of service as described above in section PW-T-3 above, the tank is opened during times of high flow to treat up to the plant rated capacity. No situations outside of Normal Operating Conditions existed in 2023.

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 2023.

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

Spill Date	MECP Incident Number	Description of Spill
2023-07-20	1-3NPKB8	<p>Unplanned Spill – Loss of Power to Raw Sewage Pumps</p> <p>During an intense wet weather event, the utility power to the Port Weller WWTP was interrupted. The facility was then operating on the standby generator. During the transfer back from generator to utility power, a fluctuation occurred the resulted in the loss of power to two (2) raw sewage submersible pumps. One screw pump was still in service but the plant was not pumping up to the peak rated capacity of 136,200 m³/d. Operations staff tried to reset the pumps but this was unsuccessful. The on-call electrician responded to site and was able to restore power to the influent pumps.</p> <p>A spill report was completed and submitted to the MECP.</p>

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 2023 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 2023, Niagara Region had an approved budget totaling \$4.0M for the overflow reduction cost sharing program. One project was approved for cost sharing in the City of St. Catharines with Niagara Region contributing \$445,486 to support overflow reduction activities.

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 m³/d, up to a maximum flow of 136,200 m³/d. Flows greater than the peak secondary treatment design flow of 112,360 m³/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.

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
- 3 Combined Sewer Overflows (CSOs) on Niagara Region infrastructure

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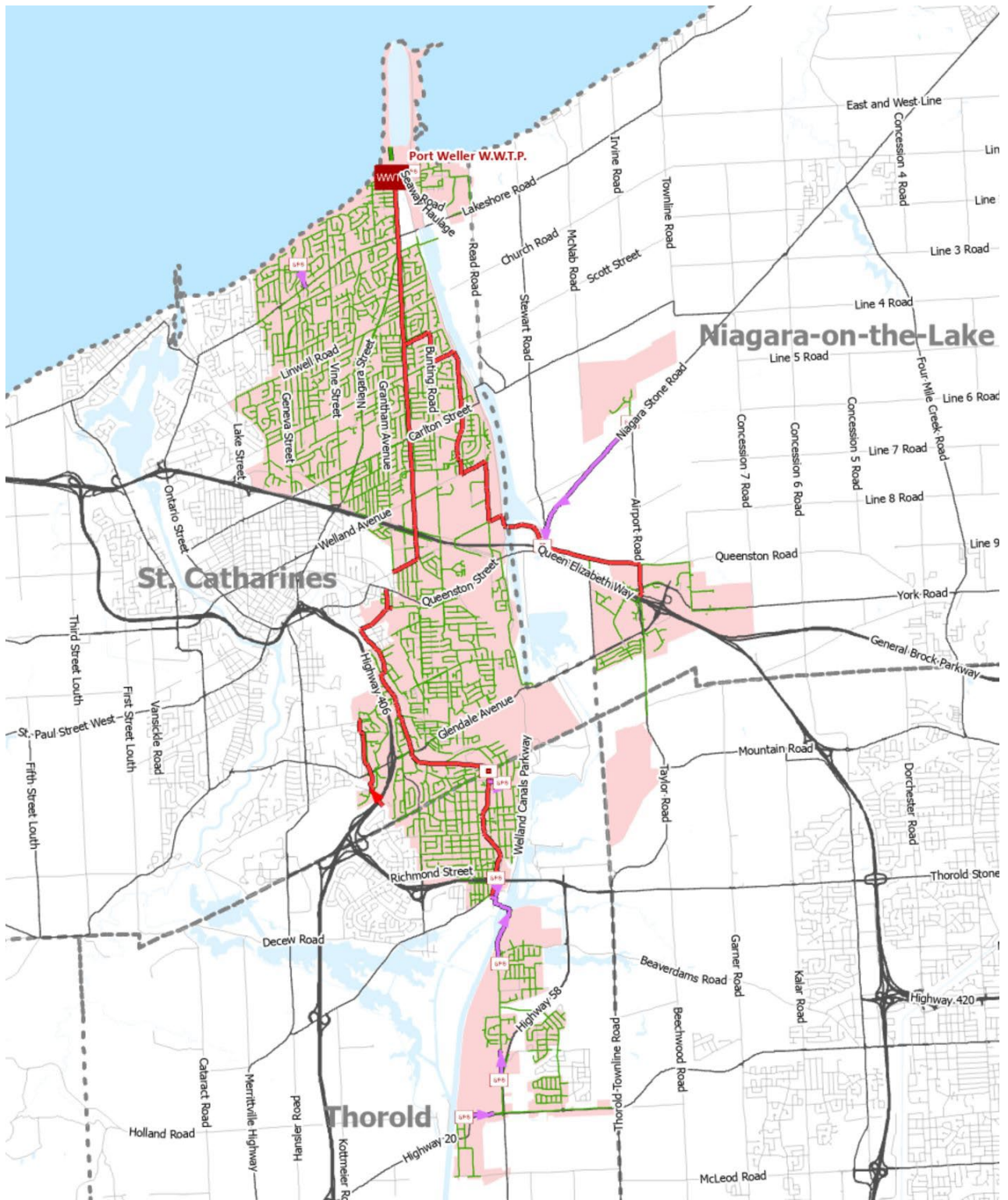


Figure PW-C-1: Map of Port Weller WWT.P. Collection System

The collection system is operated under a two-tier system, where the area municipalities own and operate local gravity sanitary sewers and some sewage detention facilities and Niagara Section: Port Weller – Collection (PW-C)

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.

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

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)	2020	2021 ⁶	2022	2023
Inspection Length (km)	37.9	18.5	59.3	33.0

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

No operational issues were experienced at the pump stations or associated forcemains in 2023.

Gravity Trunk Sewers

No operational issues were experienced in the gravity trunk sewers in 2023.

⁶ 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.

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:

- No major maintenance was required in the Port Weller collection system.

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:

- The Carleton Street SPS forcemain replacement was completed in 2023
- Construction at Beaverdams SPS is anticipated to start in 2024
- Sustainability upgrades for the Spring Garden SPS are 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 2023, 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.

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 2023.

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	2023-04-23	Passed
Glendale Flume	2023-04-24	Passed
Glendale Flume	2023-11-16	Passed
Thorold Townline Flume	2023-05-26	Passed
Thorold Townline Flume	2023-11-29	Passed

Calibration certificates are available upon request.

PW-C-6 Summary of Complaints

No complaints were received in 2023 regarding the operation of the Port Weller collection 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. 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 [information on sewage overflows and inflow and infiltration](http://www.niagararegion.ca/living/sewage/cso), is available on the Region's website (www.niagararegion.ca/living/sewage/cso).

Table PW-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 ⁷ (MPN/100 mL)	Was the Overflow Disinfected (Yes/No)	Were Any Adverse Impacts Observed (Yes/No)	Corrective Actions Taken
Peel Street SPS	2023-07-29	0.624	11:00	25	178	0.6	4.9	580,000	No	No	Awaited End of Event

⁷ E.Coli sampling and analysis is required April 01 to October 31 annually.
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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 2023.

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

Spill Date	MECP Incident Number	Description of Spill
2023-05-24	1-3H4CY1	<p>Unplanned Spill of Sewage– Peel Street SPS Forcemain Break</p> <p>The Niagara Region was contacted by City of Thorold staff of a possible forcemain break. Niagara Region staff responded to site and determined a forcemain break was likely as the spill would stop when the Peel Street SPS pumps were turned off.</p> <p>Upon excavation, a forcemain break was confirmed. The pump station flow was diverted from the forcemain to tanker trucks to stop the spill of sewage. Trucked sewage was discharged to the Port Weller system to receive full treatment. A vacuum truck was used to clean up spilled material around the excavation site. The spilled material was contained to the roadway, driveway and to a storm catch basin.. There was no evidence the spill entered a body of water nor caused any adverse environmental impacts.</p> <p>The forcemain was repaired, tested and the station was returned to normal service. The spill was reported to the MECP.</p>

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 2023, Niagara Region had an approved budget totaling \$4.0M for the overflow reduction cost sharing program. One project was approved for cost sharing in the City of St. Catharines with Niagara Region contributing \$445,486 to support overflow reduction activities.

There were one (1) overflow from the Niagara Region portion of the Port Weller collection system in 2023.

Public Reporting of Bypasses and Overflows

Niagara Region reports all [bypass and overflow events](https://www.niagararegion.ca/living/sewage/CSO/Reporting/CSOLocations.aspx) 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 [listing of overflow data back to 2008](https://niagaraopendata.ca/dataset/combined-sewage-overflow) 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.