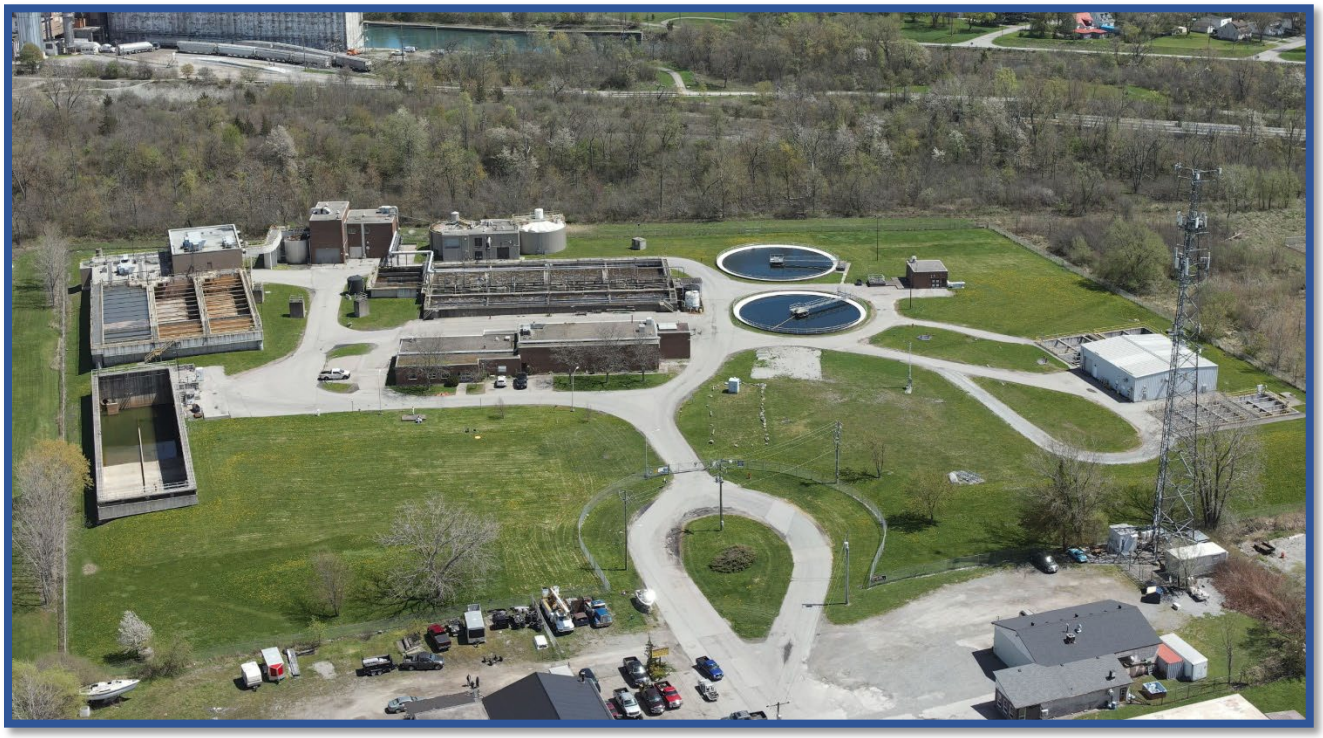

Seaway (Port Colborne) Wastewater Treatment Plant

Annual Performance Report – Treatment and Collection

Reporting Year: 2024

Niagara Region

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SW-T-1 Wastewater Treatment Process Description

The Seaway (Port Colborne) Wastewater Treatment Plant (WWTP) is located at 30 Prosperity Avenue in the City of Port Colborne and provides wastewater treatment to areas within the City of Port Colborne. The Seaway WWTP is a class III conventional activated sludge treatment facility designed to treat an average daily flow (ADF) of 19,600 cubic meters per day (m^3/d). This facility has a design peak flow rate up to 45,360 m^3/d. Flows more than 45,360 m^3/d are diverted to a storm water tank to be reintroduced later for treatment or in cases of excessive flows, to overflow to the environment in order to protect WWTP assets.

The Seaway WWTP operates under the following MECP approvals:

Environmental Compliance Approval (Sewage): 8325-AWPRYR, Issued June 13, 2018
Environmental Compliance Approval (Air): 8-2080-95-006, Issued June 19, 1995

The Seaway WWTP uses the following processes to treat wastewater:

- Imported Sewage Receiving
- Screening
- Grit Removal
- Primary Treatment
- Phosphorus Removal
- Secondary Treatment
- Disinfection (Chlorination/Dechlorination)
- Solids Handling – sludge digestion, storage and transportation
- Storm Treatment

Imported Sewage Receiving Station: To provide service to Niagara Region residents and businesses outside of the wastewater collection system servicing area, the Seaway WWTP accepts imported sewage from commercial haulers as well as recreational vehicle holding tank disposals. Receiving stations are situated to ensure all received sewage receives full treatment.

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

Grit Removal: Grit vortex tanks each equipped with a mixer separate heavy suspended materials such as sand and gravel (grit) from lighter organic particles that are kept in suspension and pass through the tanks with the wastewater for further treatment. The grit is collected, dewatered and sent for disposal at landfill.

Primary Treatment: Large rectangular clarifiers cause the flow of wastewater to slow down, allowing lighter solids to settle to the bottom or float to the surface. A raking system (flights and

chains) rakes the solids (sludge) settled at the bottom of the tanks into a hopper where it is pumped to the primary digester for further treatment. The raking system also pushes floating solids such as oils and grease into a collection trough where it is also pumped to the primary digester. The remaining clarified wastewater flows over a weir and onto secondary treatment and phosphorous removal processes.

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

Secondary Treatment:

Aeration Tank: Aeration tanks are used to remove dissolved solids, nutrients and suspended organics. Diffused air is bubbled throughout the wastewater to encourage microorganisms (or “bugs”) to consume material in the wastewater. The mixture of wastewater and microorganisms is known as mixed liquor and moves on to secondary clarification.

Secondary Clarifiers: Secondary clarifiers receive effluent from the aeration tanks in the form of mixed liquor. The flow of wastewater is slowed allowing solids to settle quickly leaving a clear clarified effluent on top. The clarified effluent water flows over a weir and onto further treatment. The solids settled at the bottom of the clarifier is a mixture of microorganisms and settled solids and is called activated sludge. Activated sludge is pumped back to the front of the aeration tanks to ensure a large healthy microbial population exists for continuous treatment. 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 year-round. Adequate contact time is provided in 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 is pumped from the primary clarifiers to the primary digesters. Sludge undergoes anaerobic digestion to break down wastes and to form a thicker digested sludge. Digested sludge from site is transported to the Garner Road Biosolids Facility for dewatering and further treatment to produce a product which can be used for land application or as fertilizer.

Storm Treatment: During times of wet weather, inflow and infiltration (I&I) can occur in the collection system resulting in high flows of sewage and storm water to the treatment plant. To protect the plant processes from high flows, flows greater than the design peak flow of 45,360 m^3/d are diverted to a storm water system. Storm flows diverted to the storm treatment system receive screening, grit removal, settling (solids removal), chlorination and dechlorination prior

to discharge to the Welland Canal via the WWTP outfall. The storm system includes a storage tank that, during wet weather, can hold approximately 5,670 m^3. This volume is returned to the plant for full treatment when wet weather events are over.

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

Review of 2024 Plant Flows

Table SW-T-1 below outlines the volume of sewage treated at the Seaway WWTP during the reporting year. It also outlines the volume of Imported Sewage that was received at the site for treatment.

Table SW-T-1: Table of Seaway WWTP 2024 Treated and Imported Sewage Flows

Flow Statistic	Value
Design Average Daily Flow (ML/d)	19.600
Design Peak Flow Rate (ML/d)	45.360
Total Volume Processed (ML)	3,474.337
Annual Average Daily Flow (MLD)	9.493
% Annual Average Daily Flow Utilization	48%
% Increase/Decrease over prior year	-16%
Volume Imported Sewage Received (ML)	24.575
% Increase/Decrease Imported Sewage over prior year	-6%
Imported Sewage as % of Flow	0.71%

Reviewing the treated flows in 2024, it was observed that, on average, the plant utilized 48% of its design Average Daily Flow (ADF). This indicates that the facility has the hydraulic capacity to meet the needs of the collection system with room for additional flows that may be added from future developments. Where the average becomes greater than 80%, plant expansion should be considered.

Daily flows to the plant were reviewed. In 2024, there were 19 instances where the flow to the plant was greater than the design Average Daily Flow, amounting to approximately 5% of the year. These instances occurred during times of wet weather or heavy snow melt suggesting increased flows are occurring due to Inflow and Infiltration.

A review of the monthly average daily flow rate for the prior 10-year period was completed. This can be observed below in Figure SW-T-1 below. There has been a small decline in average daily flows over the 10-year period possibly the result of improvements in the

collection system or changes in weather patterns. Spikes during typical wet weather seasons further support increased flows are occurring due to Inflow and Infiltration.

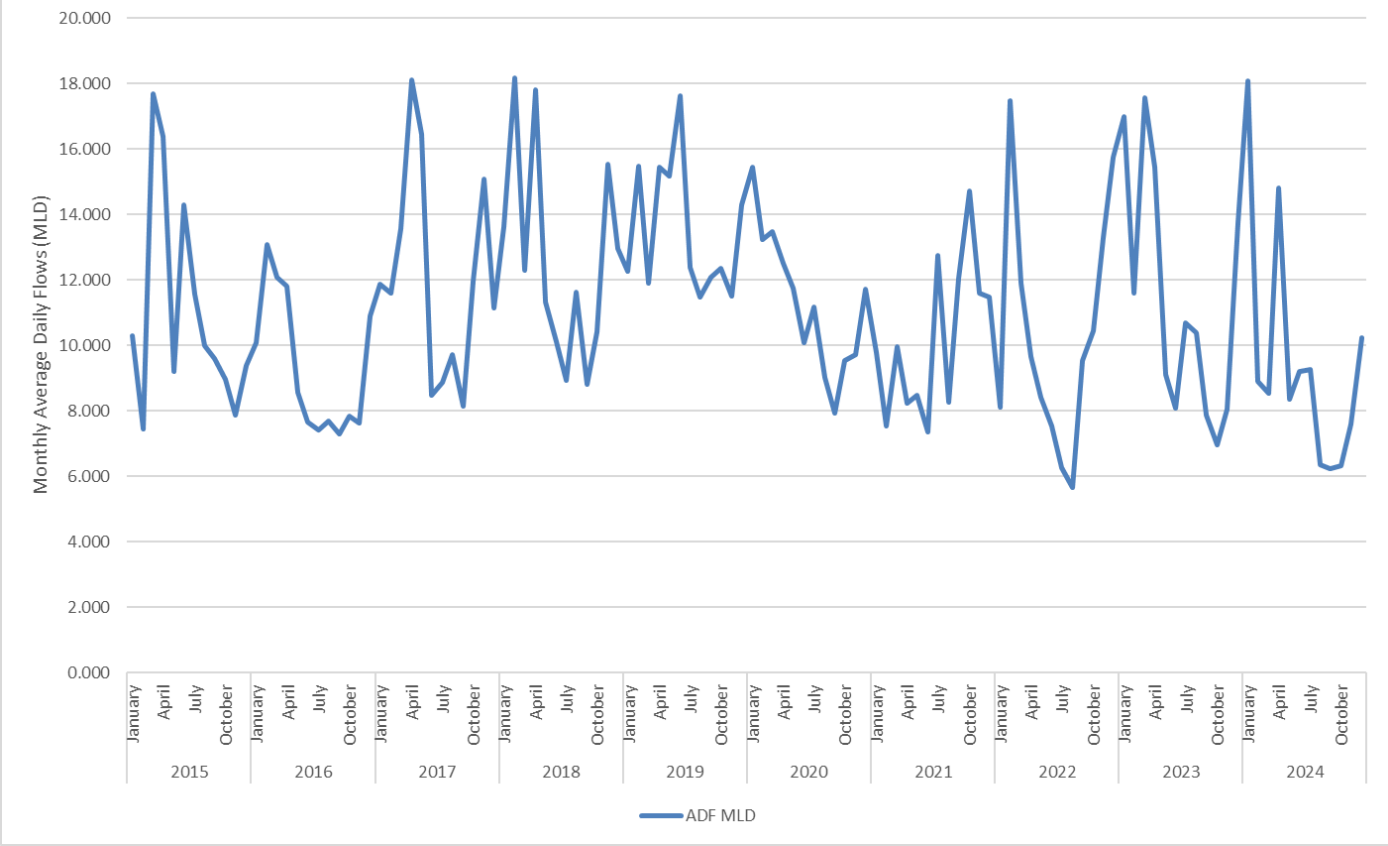

Figure SW-T-1: Graph displaying the Monthly Average Daily Flow Rate in MLD

The volume of Imported Sewage received at this facility did not significantly change in 2024 with a decrease of 6% observed over the prior reporting period. The imported sewage received at Seaway WWTP largely originates from rural residential sources in Port Colborne and the surrounding municipalities.

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 SW-T-4.

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 generally

displayed as kilograms of pollutant per day or kg/d. Below in Figure SW-T-2, is a graph depicting four commonly monitored pollutant loadings to the plant for the period of 2022-2024.

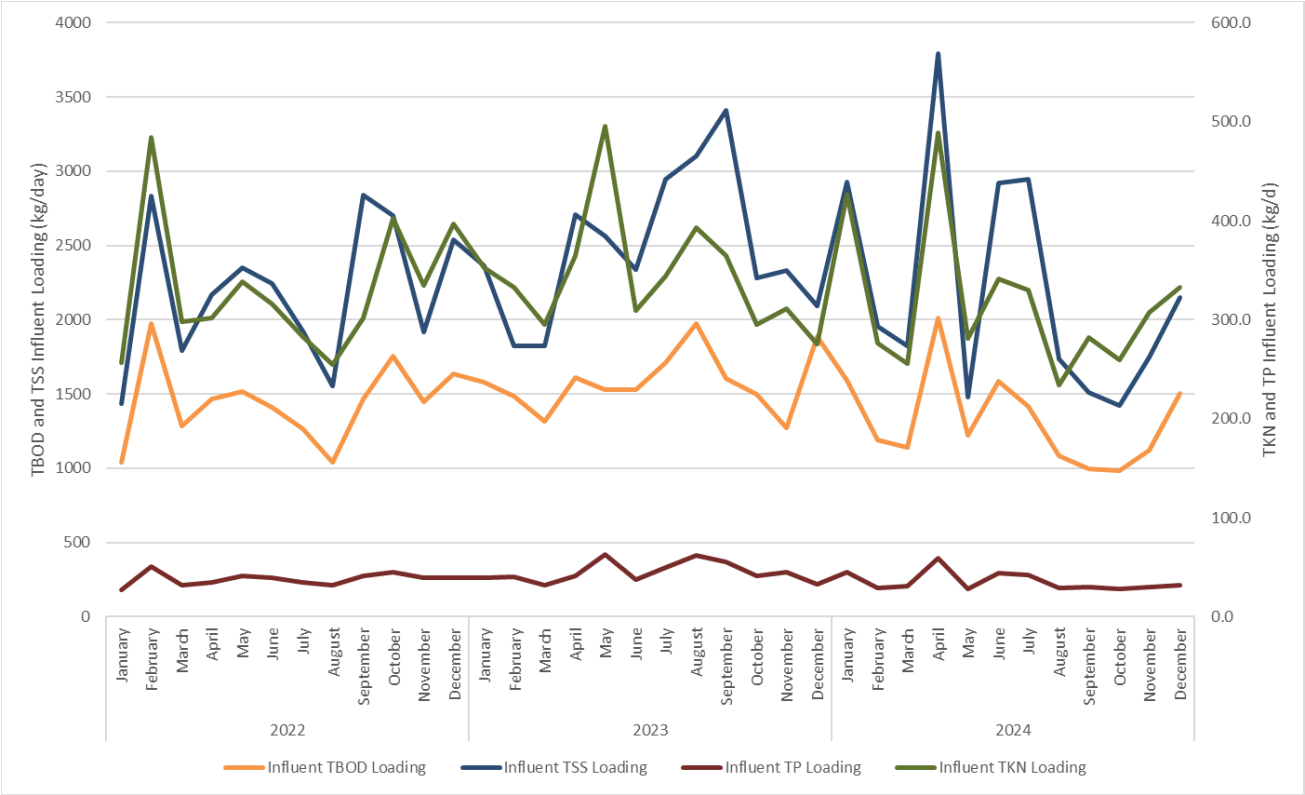

Figure SW-T-2: Figure of monthly plant loadings to the Seaway WWTP for Total Biological Oxygen Demand (TBOD), Total Suspended Solids (TSS), Total Kjeldahl Nitrogen (TKN) and Total Phosphorus (TP), in kilograms per day (kg/d), for the period 2022 to 2024.

Reviewing the calculated loadings for TBOD, TSS, TKN and TP for the past 3 years, influent loadings are up slightly indicating a minor increase in the strength of sewage being received at the site. Peaks in loading coincide with periods of increased imported sewage receipt at the plant. A slight increase in the loading has been observed and could be attributed to inflow and infiltration efforts ongoing in the City of Port Colborne. Loading trends will continue to be monitored.

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 re-use of biosolids resulting from the wastewater treatment process. In 2024, 24 samples of Imported Sewage were collected and submitted for testing. 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, COD, TP, TSS, TKN, and pH) are allowable under the SUBL.

Table SW-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
T BOD	mg/L	300	440	137	2,799	188	245	3,498	2,870	3,675	186	1,760	630	600
Total Suspended Solids	mg/L	350	269	140	5,648	202	660	5,459	3,856	17,300	91	2,351	1,717	230
Total Kjeldahl Nitrogen	mg/L	100	135.0	67.7	1,190	116.4	103.0	1,531	1,489	427.5	140.5	763.3	209.5	310.0
Phosphorus	mg/L	10	17.8	7.4	125.5	12.5	16.3	132.5	118.5	95.3	14.0	66.3	24.0	38.0
Total Solids	mg/L	-	900	880	15,930	995	1,470	8,045	6,870	16,310	940	4,530	2,655	1,370
Total Volatile Solids	mg/L	-	425	290	5,845	405	760	5,265	4,350	11,975	425	2,780	1,805	460
Arsenic	mg/L	1	0.04	0.02	0.11	0.02	0.03	0.06	0.06	0.10	0.01	0.20	0.28	0.05
Cadmium	mg/L	0.7	0.01	0.00	0.04	0.00	0.01	0.02	0.02	0.03	0.00	0.08	0.11	0.02
Chromium	mg/L	3	0.04	0.02	0.11	0.02	0.03	0.06	0.06	0.20	0.01	0.20	0.28	0.05
Cobalt	mg/L	5	0.01	0.00	0.04	0.00	0.01	0.02	0.02	0.03	0.00	0.08	0.11	0.02
Copper	mg/L	3	0.12	0.21	0.31	0.10	0.16	0.15	0.62	5.81	0.05	0.19	0.83	0.07
Lead	mg/L	1	0.04	0.03	0.11	0.02	0.03	0.06	0.06	0.40	0.01	0.20	0.28	0.05
Mercury	ug/L	10	0.06	0.05	0.31	0.27	0.28	0.05	0.55	2.93	0.08	0.69	0.88	0.61
Molybdenum	mg/L	5	0.02	0.01	0.06	0.01	0.01	0.03	0.03	0.10	0.01	0.09	0.11	0.02
Nickel	mg/L	2	0.01	0.01	0.04	0.00	0.01	0.02	0.02	0.20	0.00	0.08	0.11	0.02
Selenium	mg/L	1	0.04	0.02	0.11	0.02	0.03	0.06	0.06	0.10	0.01	0.20	0.28	0.05
Zinc	mg/L	3	0.30	0.27	2.15	0.38	0.81	1.29	1.95	26.15	0.22	1.42	4.10	0.40
Aluminum	mg/L	-	0.92	1.03	3.08	0.55	2.60	1.85	2.15	33.40	0.48	2.65	8.20	0.70
Antimony	mg/L	5	0.07	0.03	0.27	0.03	0.06	0.11	0.12	0.20	0.02	0.41	0.55	0.10
Barium	mg/L	-	0.05	0.04	0.13	0.07	0.12	0.15	0.18	1.25	0.02	0.43	1.05	0.05
Beryllium	mg/L	-	0.04	0.02	0.11	0.02	0.03	0.06	0.06	0.10	0.01	0.20	0.28	0.05
Boron	mg/L	-	0.70	0.30	2.70	0.30	0.60	1.10	1.20	2.00	0.20	4.07	5.50	1.00
COD	mg/L	600	793	419	9,447	589	1,255	11,909	7,890	22,200	516	5,227	3,700	581
Conductivity	us/cm	-	1,760	1,545	19,945	1,775	1,585	10,595	9,935	1,393	1,935	6,427	2,130	4
Iron	mg/L	-	2.13	1.82	5.49	1.92	4.29	4.04	5.55	100.75	0.76	4.01	6.48	1.14
Manganese	mg/L	-	0.10	0.14	0.50	0.10	0.27	0.37	0.42	1.35	0.07	0.44	0.55	0.30
pH		6-11	7.6	7.7	8.0	7.7	7.2	8.2	8.2	6.9	7.4	7.9	7.4	7.7
Silver	mg/L	5	0.04	0.02	0.11	0.02	0.03	0.06	0.06	0.10	0.01	0.20	0.28	0.05
Tin	mg/L	5	0.07	0.03	0.27	0.03	0.06	0.11	0.12	0.25	0.02	0.41	0.55	0.10
Vanadium	mg/L	-	0.02	0.01	0.06	0.01	0.01	0.03	0.03	0.08	0.01	0.09	0.11	0.02

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's ECA.

Table SW-T-3 below summarizes the number of monthly objective and compliance limit exceedances at the Seaway WWTP during the reporting year.

Table SW-T-3: Evaluation of Final Effluent sample results to ECA objectives and compliance limits

Parameter	ECA Monthly Concentration Objective	ECA Monthly Concentration Limit	ECA Annual Concentration Limit	Number of Objective Concentration Exceedances	Number of Monthly Limit Concentration Exceedances	Annual Average Concentration (mg/L)	Monthly Loading Limit (kg/d)	Annual Loading Limit (kg/d)	Number of Monthly Loading Limits Exceeded	Annual Average Loading (kg/d)
pH [1]	6.0-9.5	6.0-9.5	-	0	0	-	-	-	-	-
Carbonaceous Biochemical Oxygen Demand (CBOD)	15 mg/L	-	25 mg/L	0	-	4.0	-	490	-	38
Total Suspended Solids (TSS)	15 mg/L	-	25 mg/L	0	-	4.0	-	490	-	38
Total Phosphorus (TP)	0.5 mg/L	0.77 mg/L	-	0	0	-	15.1	-	0	-
Total Residual Chlorine (TRC)	0.01 mg/L	0.02 mg/L	-	0	-	-	-	-	-	-
E-Coli (geomean)	200 MPN/100 mL	200 MPN/100 mL	-	0	0	-	-	-	-	-

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

Seaway WWTP did not have any instances where the monthly average for a pollutant exceeded the ECA objective or limits. The annual average concentrations and loadings were also achieved in 2024.

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

- CBOD – 0%
- TSS – 0%
- TP – 3%
- E.Coli – 0%

Final effluent sample results did not exceed the ECA objectives greater than 50% of the time. The plant continues to effectively treat all wastewater received for treatment. An annual summary of monthly average final effluent sample results can be observed in Table SW-T-4 below.

Effluent Quality Assurance Measurements and Control Measures

To ensure Seaway 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 SW-T-4: Annual Summary of 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)	162	220	214	256	177	317	318	273	243	225	231	210	237	
Number of Influent TSS Samples	10	8	8	10	8	8	9	8	9	9	8	10		105
Influent - Monthly Average TBOD5 (mg/L)	88	134	134	136	146	172	153	170	160	155	148	147	145	
Number of Influent TBOD5 Samples	10	8	8	10	8	8	9	8	9	9	8	10		105
Influent - Monthly Average TP (mg/L)	2.5	3.3	3.6	4.0	3.4	4.8	4.6	4.6	4.9	4.4	4.0	3.1	3.9	
Number of Influent TP Samples	10	8	8	10	8	8	9	8	9	9	8	10		105
Influent - Monthly Average TKN (mg/L)	23.62	31.11	29.98	33.04	33.69	37.03	35.60	36.85	45.32	41.02	40.48	32.52	35.02	
Number of Influent TKN Samples	10	8	8	10	8	8	9	8	9	9	8	10		105
Total Plant Flows (ML)	560.534	257.901	264.239	444.191	259.038	276.109	287.357	197.126	186.518	196.251	227.466	317.607	3474.337	
Daily Average (MLD)	18.082	8.893	8.524	14.806	8.356	9.204	9.270	6.359	6.217	6.331	7.582	10.245	9.493	
Maximum Flow (ML)	47.457	17.057	12.266	42.835	13.877	21.400	19.490	9.417	8.948	11.239	14.121	24.481	**MAX**	47.457
Minimum Flow (ML)	7.620	6.933	6.926	7.631	7.008	6.809	4.930	4.980	5.565	5.535	5.722	6.397	**MIN**	4.930
Volume Imported Sewage Received (ML)	1.690	1.283	1.567	2.230	2.685	2.676	3.316	2.088	1.770	2.206	1.811	1.255	24.575	
Final Effluent - Monthly Average TSS (mg/L)	4.0	3.6	3.6	3.6	3.1	3.6	3.1	5.9	3.8	5.2	4.9	3.9	4.0	
Final Effluent - Average Daily TSS Loading (kg/d)	72	32	31	53	26	33	29	38	24	33	37	40	38	
Number of Final Effluent TSS Samples	10	8	8	10	8	8	9	8	9	9	8	10		105
Final Effluent - Monthly Average CBOD5 (mg/L)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Final Effluent - Average Daily CBOD5 Loading (kg/d)	72	36	34	59	33	37	37	25	25	25	30	41	38	
Number of Final Effluent CBOD5 Samples	10	8	8	10	8	8	9	8	9	9	8	10		105
Final Effluent - Monthly Average TP (mg/L)	0.09	0.14	0.20	0.18	0.15	0.23	0.24	0.37	0.41	0.27	0.26	0.13	0.22	
Final Effluent - Average Daily TP Loading (kg/d)	1.63	1.25	1.70	2.67	1.25	2.12	2.22	2.35	2.55	1.71	1.97	1.33	2.11	
Number of Final Effluent TP Samples	10	8	8	10	8	8	9	8	9	9	8	10		105
Final Effluent - Monthly Average TKN (mg/L)	0.82	0.91	0.95	0.92	0.94	1.05	1.30	1.34	1.24	0.94	1.16	0.78	1.03	
Number of Final Effluent TKN Samples	10	8	8	10	8	8	9	8	9	9	8	10		105
Final Effluent - Monthly Average NH3 (mg/L)	0.06	0.07	0.06	0.05	0.07	0.09	0.31	0.11	0.07	0.07	0.07	0.14	0.10	
Number of Final Effluent NH3 Samples	10	8	8	10	8	8	9	8	9	9	8	10		105
Final Effluent - Monthly Average NO3 (mg/L)	11.35	12.96	11.56	12.22	15.36	13.15	14.22	17.54	31.69	19.98	15.93	13.45	15.78	
Number of Final Effluent NO3 Samples	10	8	8	10	8	8	9	8	9	9	8	10		105
Final Effluent - Monthly Average NO2 (mg/L)	0.40	0.48	0.40	0.37	0.40	0.40	0.40	0.36	0.47	0.40	0.40	0.40	0.41	
Number of Final Effluent NO2 Samples	10	8	8	10	8	8	9	8	9	9	8	10		105
Final Effluent - Monthly Geomean E.Coli (cfu/100mL)	4	2	5	2	3	2	2	2	3	4	2	3	3	

Measured Parameter	January	February	March	April	May	June	July	August	September	October	November	December	Total / Average	Total Samples Collected
Number of Final Effluent E.Coli Samples	10	8	8	8	9	8	9	8	9	9	8	10		104
Final Effluent - Monthly Average TRC (mg/L)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Number of Final Effluent TRC Samples	31	29	31	30	31	30	31	31	30	31	30	31		366
Final Effluent - Monthly Average Temperature (°C)	13.55	13.58	13.61	12.62	17.18	19.61	22.48	21.38	21.27	18.52	16.75	12.35	16.91	
Number of Final Effluent Temperature Samples	10	8	8	10	8	8	9	8	9	9	8	10		105
Final Effluent - Monthly Average pH	7.37	7.06	7.09	7.29	7.40	7.18	7.01	6.94	6.82	6.86	6.89	6.95	7.07	
Number of Final Effluent pH Samples	10	8	8	10	8	8	9	8	9	9	8	10		105

Deviations from Scheduled Monitoring Program

Compliance sampling activities at the Seaway WWTP follow a scheduled monitoring program 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, five (5) deviations occurred from the scheduled sampling days. Table SW-T-5 below provides the instances where a deviation occurred and a reason for the deviation.

The 2025 sampling schedule is available upon request.

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

Sampling Date Deviation	Sample Type(s)	Reason
2024-01-15	Digested sludge	Sample not available for submission.
2024-05-01	Hauled Waste	Sample not submitted.
2024-07-02	Influent, Final Effluent, Final Effluent E.Coli, Digested sludge	Sample not submitted.
2024-07-29	Digested sludge	Samples not submitted.
2024-12-27	Hauled Waste	Sample not available for submission.

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

There were no operating problems encountered in 2024.

SW-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 Seaway WWTP:

- Storm bypass actuator replacement
- Imported sewage receiving tank - cleaning and pump replacement

- North primary clarifier repairs
- South primary clarifier repairs

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

Planned Capital Upgrades

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

- Standby generator upgrades
- Ferric system upgrades (tank and piping replacement)
- Influent channel repairs

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.

Ferric Chloride Storage Upgrades – October 2021

A Notice of Modification was submitted under ECA 8325-AWPRYR for the Seaway WWTP in October 2021 for the replacement of two ferric chloride storage tanks and all associated process piping with equivalent tanks and piping. At the end of 2022, one tank and associated process piping was put in place. A different tank manufacturer was used for the project and the tank size is a bit wider than the previous tanks. As a result, both tanks cannot fit into the existing spill containment area and a larger spill containment area needs to be constructed. The project is expected to conclude in 2025.

No new Notice of Modification forms were completed in the 2024 calendar year.

Proposed Works – Status Update

There were no Proposed Works to be reported on for the 2024 reporting period.

SW-T-5 Summary Calibration Activities

Flow Meter Calibration – Influent, Effluent and Imported Sewage

Flow meters measuring flows discharging to the environment are calibrated at minimum, once per calendar year. Below in Table SW-T-6 provides a summary of flow meter calibration.

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

Meter Name	Date Calibrated	Comments
Seaway Final Effluent Meter	2024-12-13	Pass
Seaway Storm Flow Meter	2024-12-13	Pass

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, a third-party contractor performs calibration or verification on all effluent monitoring equipment. A summary of third-party calibration/verification activities are available in Table SW-T-7**.** below. Calibration certificates are available upon request.

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

Equipment Description	Date Calibrated	Comments
DR 1900 Spectrophotometer	2024-09-18	Pass
Chlorine Portable Pocket Colorimeter	2024-09-18	Pass
Symphony VWR Meter with pH	2024-09-18	Pass
HQ40D with DO probe	2024-09-18	Pass
COD Reactor (Hach DRB 200)	2024-09-18	Pass
Balance – Sartorius	2024-09-11	Pass
Balance – Mettler Toledo	2024-09-11	Pass

SW-T-6 Solids Handling

Processed Organics Received

No processed organics were received at the Seaway WWTP during the reporting period. Seaway does not typically receive processed organics.

Volumes of Sludge Generated and Removed From Site

Solids removed from the treatment process are thickened, digested and transported from site for further processing and beneficial re-use. All sludge removed from the Seaway 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 SW-T-8 provides a summary of 2023 and 2024 sludge volumes removed from site.

Table SW-T-8: Summary of Sludge Removed from Site

Month	2024 Volume Sludge Hauled (ML)	Prior Year Volume Sludge Hauled (ML)
January	1.648	2.038
February	1.388	1.908
March	2.125	2.125
April	1.995	2.038
May	2.298	2.515
June	2.255	2.385
July	2.255	2.211
August	2.602	2.558
September	2.428	2.081
October	2.385	2.211
November	1.995	2.125
December	2.385	0.954
TOTAL	**25.756**	**25.149**

There was no significant change in the volume of sludge hauled from the facility in 2024. Seaway WWTP is equipped with two primary digesters that provide anaerobic digestion and storage of solids. The WWTP is currently operating with one primary digester in-service allowing for maintenance to take place on the other digester unit.

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

Sludge Quality Monitoring

Sludge is sampled and analyzed bi-weekly to meet the regulatory requirements of the Garner Road Biosolids Facility ECA and to 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 sludge analysis from the Seaway WWTP is included in Table SW-T-9 below.

Table SW-T-9: Summary of Monthly Average Sludge Results

Analyte	Units	NMA Limits	January	February	March	April	May	June	July	August	September	October	November	December
Total Solids	%	-	2.00	2.05	1.80	2.10	1.70	1.55	1.50	2.00	1.55	1.30	1.65	1.40
Ammonia as N	mg/kg	-	495	470	460	400	440	405	290	190	260	140	305	310
Nitrate+Nitrite	mg/kg	-	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.96	0.98	1.00	1.00
Phosphorus	mg/kg	-	22,000	19,950	19,550	18,000	22,900	21,350	24,800	20,750	23,350	12,675	26,400	26,100
Arsenic	mg/kg	170	9.60	10.45	9.01	6.50	6.60	6.15	6.50	5.30	5.20	5.10	3.20	6.85
Cadmium	mg/kg	34	0.50	0.50	0.50	0.85	0.85	0.50	0.70	0.70	0.85	0.70	0.90	0.75
Chromium	mg/kg	2,800	69.65	62.30	57.30	52.85	48.15	49.15	59.50	40.40	50.90	50.95	52.10	69.45
Cobalt	mg/kg	340	9.65	5.50	4.30	4.40	4.65	4.35	5.70	3.65	4.55	3.00	3.90	5.30
Copper	mg/kg	1,700	522	429	419	520	518	540	588	522	574	317	512	609
Lead	mg/kg	1,100	72.00	49.50	52.00	68.25	33.50	35.00	43.00	23.50	26.50	13.00	16.50	24.00
Mercury	mg/kg	11	0.37	0.42	0.69	0.31	0.51	0.40	0.31	0.29	0.74	0.34	0.17	0.22
Molybdenum	mg/kg	94	11.50	9.50	10.50	12.10	6.50	9.50	12.00	11.50	13.00	7.00	11.00	13.50
Nickel	mg/kg	420	66.90	75.80	54.25	60.00	61.20	57.80	85.80	77.20	68.60	32.10	50.25	63.25
Potassium	mg/kg	-	3,390	4,245	4,155	3,280	3,510	3,165	3,100	2,165	2,510	2,445	2,535	3,200
Selenium	mg/kg	34	3.75	3.45	3.40	4.70	4.30	3.60	4.50	3.30	3.60	3.25	1.30	4.15
Zinc	mg/kg	4,200	659	580	563	736	726	721	800	778	804	441	741	793

SW-T-7 Complaints

There were no complaints received in 2024 regarding the operation of the Seaway WWTP.

SW-T-8 Bypasses, Overflows, Other Situations Outside Normal Operating, Spills and Abnormal Discharge Events

Bypasses and Overflows

There were two (2) overflow event at the Seaway WWTP in 2024. Plant overflows from this facility receive preliminary treatment prior to discharge including screening, grit, settling (solids removal), chlorination and dechlorination. Table SW-T-10 provides a monthly breakdown of overflow events occurring at the Seaway WWTP during the reporting period.

Table SW-T-10: Annual Summary of Overflow Events by Month

Month	Number of Overflow Events	Total Volume (ML)
January	2	13.340
February	0	0.000
March	0	0.000
April	0	0.000
May	0	0.000
June	0	0.000
July	0	0.000
August	0	0.000
September	0	0.000
October	0	0.000
November	0	0.000
December	0	0.000
Total	**2**	**13.340**

Overflow events are sampled and submitted for analysis. Overflow events are to be sampled at the start of an event and every 8 hours during an event. Results for plant overflow event samples collected in 2024 are shown in Table SW-T-11 below. Overflow records are available upon request.

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Table SW-T-11: 2024 Seaway WWTP Overflow Sampling Results

Date	TBOD (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 (MPN/100 mL)
2024-01-27/ 24 Hour Sample	9	7	0.20	3.40	1.40	2.90	0.10	4
2024-01-28/ Event Start Sample	7	12	0.40	3.00	1.30	2.70	0.10	6000

There was a plant overflow event on January 26, 2024, where a sample of the overflow was not collected and tested every 8 hours as required by the ECA. This was reported to the MECP and corrective actions have been taken to prevent reoccurrence in the future.

Situations Outside of Normal Operating Conditions

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

The Seaway WWTP did not operate outside of Normal Operating Conditions during the reporting year.

Spills

Niagara Region strives to maintain and operate wastewater infrastructure so spills to the environment do not occur. However, circumstances arise where a spill occurs due to equipment malfunction, failure or other reasons. Occasionally, a 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 SW-T-12 summarizes spills that occurred at the Seaway WWTP in 2024.

Table SW-T-12: Summary of spills occurring at the Seaway WWTP during the reporting year

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

Abnormal Discharges

An abnormal discharge is a discharge to the environment that is abnormal in quality or quantity. There was one (1) abnormal discharge that occurred on March 24, 2024.An electrical failure of the disinfection pumps occurred. The operator was unable to reset the pumps to resume disinfection of the final effluent. Continuous disinfection is a requirement of the plant ECA. The on-call electrician responded to site to rectify the issue, however, continuous disinfection did not occur for approximately one hour 10 minutes. This was reported to the MECP.

SW-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 SW-T-1 and Table SW-T-4, Seaway consistently achieved effluent quality that met or exceeded design objectives. The Final Effluent annual average quality achieved in 2024 was equivalent with the MECP design objectives for advanced treatment plants. The observed annual averages for both CBOD and TSS were less than 5 mg/L while the annual average TP concentration of the Final Effluent was less than 0.3 mg/L.

Summary of Efforts – Procedure F-5-1 – Sewage Bypass/Overflow from Nominally Separated System

Procedure F-5-1 states that bypasses and overflows from nominally separated systems are not allowed except in emergency situations. Emergency situations include protection from basement flooding, preventing damage to WWTP equipment or pumping stations or to prevent treatment process washout.

The Seaway WWTP experiences high flow conditions that require overflows to occur due to inflow and infiltration in the collection system to prevent emergency situations. Being a two-tier system, Niagara Region works closely with the City of Port Colborne 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 (1) project was approved for cost sharing in the City of Port Colborne with Niagara Region contributing $25,000 to support inflow and infiltration reduction.

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. Seaway is equipped with one storm tank that provides excess primary treatment to wet weather flow. Flows greater than the plant design peak flow of 45,360 m^3/d are diverted to the storm systems. Storm flows diverted to the storm treatment system receive screening, grit removal, settling (solids removal), chlorination and dechlorination prior to discharge to the Welland Canal via the plant outfall.

The storm system also acts as a storage tank during wet weather and can hold approximately 5,670 m^3 in the tank prior to an overflow occurring. This volume is returned to the plant for full treatment when the wet weather event is over.

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, 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.

Summary of Efforts – Procedure F-5-5

The MECP Procedure F-5-5 applies to combined sewage systems. The Seaway wastewater collection system is considered nominally separated. This procedure does not apply.

SW-C-1 Overview of the Seaway WWTP Collection System

The Seaway WWTP collection system is a class II system that collects wastewater from domestic, commercial and some industrial sources from the municipality of Port Colborne. The collection system consists of the following:

- Local sanitary sewers
- 1.2 kilometres of regional gravity mains
- 18.2 kilometres of regional force mains
- 17 pumping stations:
    - Arena Sewage Pumping Station
    - City Hall Sewage Pumping Station
    - Clark Street Sewage Pumping Station
    - East Side Sewage Pumping Station
    - Elm Street Sewage Pumping Station
    - Fares Street Sewage Pumping Station
    - Fretz Street Sewage Pumping Station
    - Industrial Park Sewage Pumping Station
    - Main Street Sewage Pumping Station
    - Nickel Street Sewage Pumping Station
    - Omer Avenue Sewage Pumping Station
    - Oxford Road Sewage Pumping Station
    - Rosemount North Sewage Pumping Station
    - Rosemount South Sewage Pumping Station
    - Steele Street Sewage Pumping Station
    - Sugarloaf Sewage Pumping Station
    - Union Street Sewage Pumping Station
- A total of five Sanitary Sewage Outfalls (SSO) at five of the seventeen pumping stations

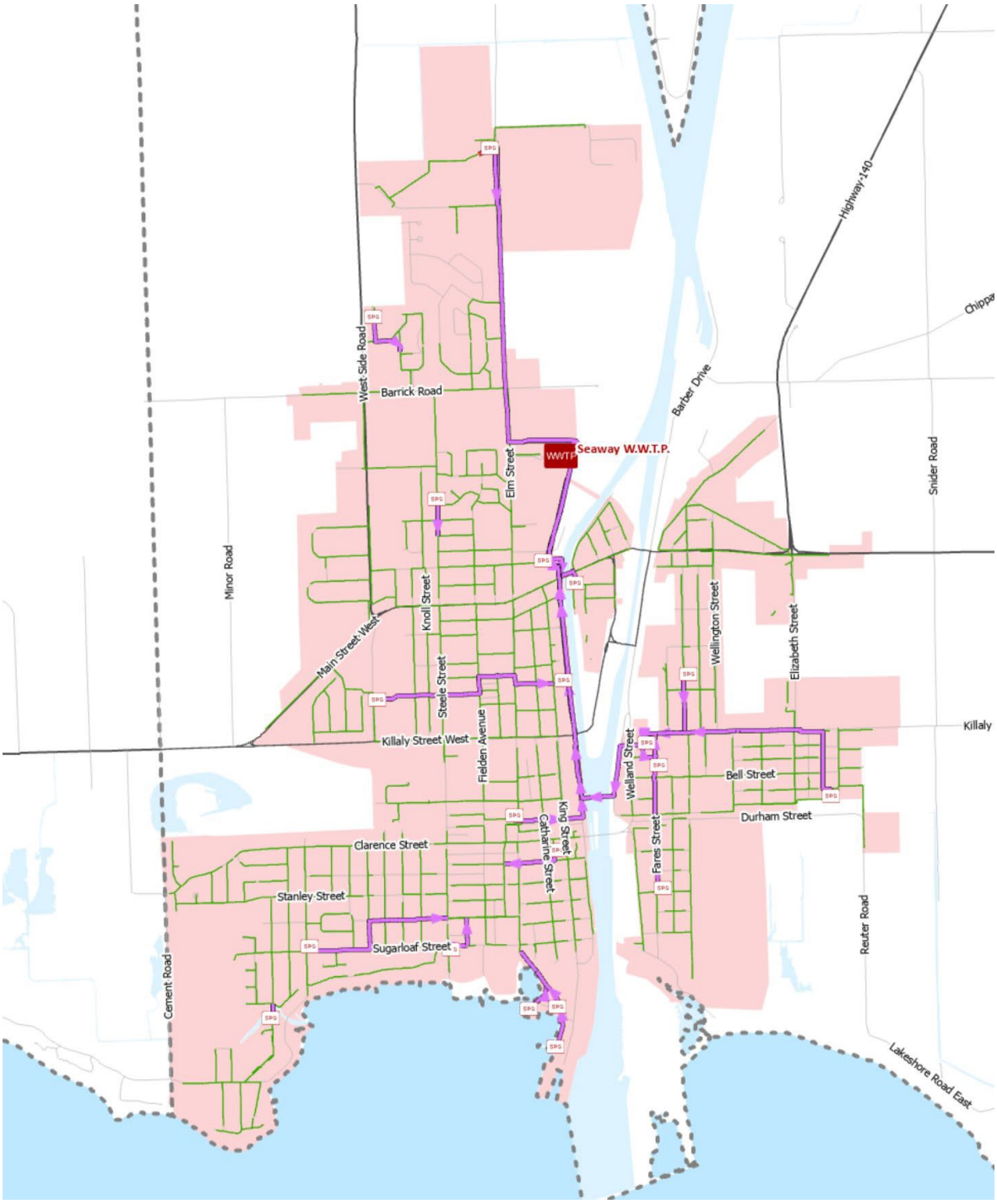

Figure SW-C-1: Map of Seaway WWTP Collection System

The collection system is operated under a two-tier system, where the City of Port Colborne owns and operates local gravity sanitary sewers and Niagara Region owns and operates sewage pumping stations, forcemains and larger gravity sanitary sewers or trunk sewers. It is classified as a nominally separated system meaning that storm water is collected separately from sanitary sewage but the 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 Colborne Trunk Wastewater Collection System, 007-W601, issue number 1

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

SW-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 Seaway 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 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 SW-C-1 details the total length of sewers inspected over the past four years.

Table SW-C-1: CCTV Program Summary

Measurement in Kilometers (km)	2021[2]	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.

SW-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 2024.

Gravity Trunk Sewers

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

SW-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

[2] 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.

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 Seaway Collection System:

- Rosemount North SPS pump replacement
- Nickel Street SPS pump replacement
- Rebuild of Elm Street SPS biobed odour control system
- Installation of overflow meter at Omer SPS (commissioning December 2024)

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

Planned Capital Upgrades

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

- City Hall SPS and forcemain upgrades
- East Side SPS and forcemain upgrades
- Oxford SPS capacity and sustainability upgrades
- Arena SPS Upgrades
- Sugarloaf SPS forcemain replacement
- Union Street SPS upgrades

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.

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

Table SW-C-2: Summary of Collection System Calibration Activities

Equipment Description	Date Calibrated	Comments
Omer Avenue Overflow Meter	2024-11-26	Passed

Calibration certificates are available upon request.

SW-C-6 Summary of Complaints

One (1) odour complaint was received in 2024 regarding the operation of the Seaway collection system. When a complaint is received, Operations staff investigate the complaint and try to identify any source of odour. Where odours are confirmed and related to the operation of the collection system, corrective actions are taken as needed. All complaints are recorded along with corrective actions taken.

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

Collection System Overflows

Although the Seaway wastewater collection system is nominally separated, collection system overflows occur during wet weather events due to inflow and infiltration of storm water into the sewage collection system. Overflows are necessary to prevent basement flooding and to protect downstream infrastructure and wastewater treatment processes.

Table SW-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. An overflow report is available upon request.

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

Table SW-C-3: Collection System Overflow Event Details, where no sample results are available, NS is indicated.

Overflow Location	Overflow Date	Overflow Volume[3] (ML)	Overflow Duration (hhh:mm)	BOD Loading (kg)	TSS Loading (kg)	TP Loading (kg)	TKN Loading (kg)	E.Coli (MPN/100 mL)	Was the Overflow Disinfected (Yes/No)	Were Any Adverse Impacts Observed (Yes/No)	Corrective Actions Taken
Omer Street SPS	2024-01-26	0.026	014:21	0.00	1.1	0.03	0.11	250,000	No	No	Awaited End of Event
Union Street SPS	2024-01-26	1.356	035:02	54.2	59.7	0.68	5.83	240,000	No	No	Awaited End of Event
Eastside SPS	2024-01-26	1.061	005:30	NS	NS	NS	NS	NS	No	No	Awaited End of Event
Eastside SPS	2024-01-28	2.122	001:20	NS	NS	NS	NS	NS	No	No	Awaited End of Event
Union Street SPS	2024-04-12	0.507	012:50	15.2	9.1	0.20	2.38	313,000	No	No	Awaited End of Event

[3] Overflows are not metered. Volumes provided are estimates.

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 SW-C-4 summarizes spills that occurred in the Seaway collection system in 2024.

Table SW-C-4: Summary of Spills Occurring in the Seaway Collection System

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

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

Projects Undertaken to Reduce Bypasses or Overflows

The Seaway WWTP experiences high flow conditions that require overflows to occur due to inflow and infiltration in the collection system to prevent emergency situations. Being a two-tier system, Niagara Region works closely with the City of Port Colborne 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 (1) project was approved for cost sharing in the City of Port Colborne with Niagara Region contributing $25,000 to support overflow reduction.

The Seaway collection system had five (5) overflow events occurred in 2024.

Public Reporting of Bypasses and Overflows

Niagara Region reports all bypass and overflow events 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 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 SW-C- 2 - Image of Sanitary Sewer Overflow Public Signage