Crystal Beach (Fort Erie) Wastewater Treatment Plant
Annual Performance Report – Treatment and Collection
Reporting Year: 2024

Niagara Region

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CB-T-1 Wastewater Treatment Process Description

The Crystal Beach (Fort Erie) Wastewater Treatment Plant (WWTP) is located at 500 Ridgeway Road in the Town of Fort Erie. This facility provides wastewater treatment to areas of Fort Erie. The Crystal Beach WWTP is a class III modified extended air treatment facility. This facility has a rated capacity of 9,100 m^3/d and is designed to treat flows up to 27,300 m^3/d. Flows more than 27,300 m^3/d overflow upstream of the WWTP and are discharged to Lake Erie.

The Crystal Beach WWTP operates under the following MECP approvals:

Environmental Compliance Approval (Sewage): 7162-8G5GVU, Issued June 9, 2011
Environmental Compliance Approval (Air): 8-2101-90-007, Issued May 24, 2011

The Crystal Beach WWTP uses the following processes to treat wastewater:

- Screening
- Raw Influent Pumping
- Grit Removal
- Phosphorus Removal
- Secondary Treatment
- Disinfection (Chlorination/Dechlorination)
- Solids Handling – sludge digestion, storage and transportation

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.

Raw Influent Pumping: After screening, wastewater from the collection system enters a wet well, equipped with raw sewage pumps. The wet well provides a low point for the collection system to discharge to while the raw sewage pumps lift the wastewater to allow the remainder of the treatment process to occur by gravity.

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.

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 removed from the process or ‘wasted’ and is pumped to the solids handling treatment process.

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 chambers. As chlorine can be toxic to aquatic species, disinfected effluent is dechlorinated with a sodium bisulphite solution before being discharged to Lake Erie.

Solids Handling

Waste Activated Sludge Thickening: Waste activated sludge from the secondary treatment process is mixed with a polymer solution and sent to a gravity belt thickener where the polymer acts to bring solids together while water is removed and sent back to the liquid treatment process, producing a thickened sludge.

Anaerobic Digestion: Thickened sludge is pumped to the primary anaerobic digester for thickening and digestion. Anaerobic digestion allows a further breakdown of pollutants and pathogens in the collected sludge. The digested sludge is stored in onsite storage tanks until it is transported from site for further treatment or beneficial reuse such as land application or dewatering at the Garner Road Biosolids Facility.

CB-T-2 Review of Plant Flows, Influent Sampling and Monitoring

Review of 2024 Plant Flows

Table CB-T-1 below outlines the volume of sewage treated at the Crystal Beach WWTP during the reporting year.

Table CB-T-1: Table of Crystal Beach WWTP 2024 Treated Flows

Flow Statistic	Value
Design Average Daily Flow (ML/d)	9.100
Design Peak Flow Rate - Dry Weather (ML/d)	27.300
Total Volume Processed (ML)	1,775.610
Annual Average Daily Flow (MLD)	4.851
% Annual Average Daily Flow Utilization	53%
% Increase/Decrease over prior year	-10%

Reviewing the treated flows in 2024, it was observed that, on average, the plant is utilizing 53% 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 flows that may be added from future development. Where the average becomes greater than 80%, plant expansion should be considered.

Daily flows to the plant were reviewed. In 2024, there were 20 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 CB-T-1 below. No trends were observed indicating that the average daily flow at the plant is increasing or decreasing. Spikes during typical wet weather seasons further support increased flows are occurring due to Inflow and Infiltration.

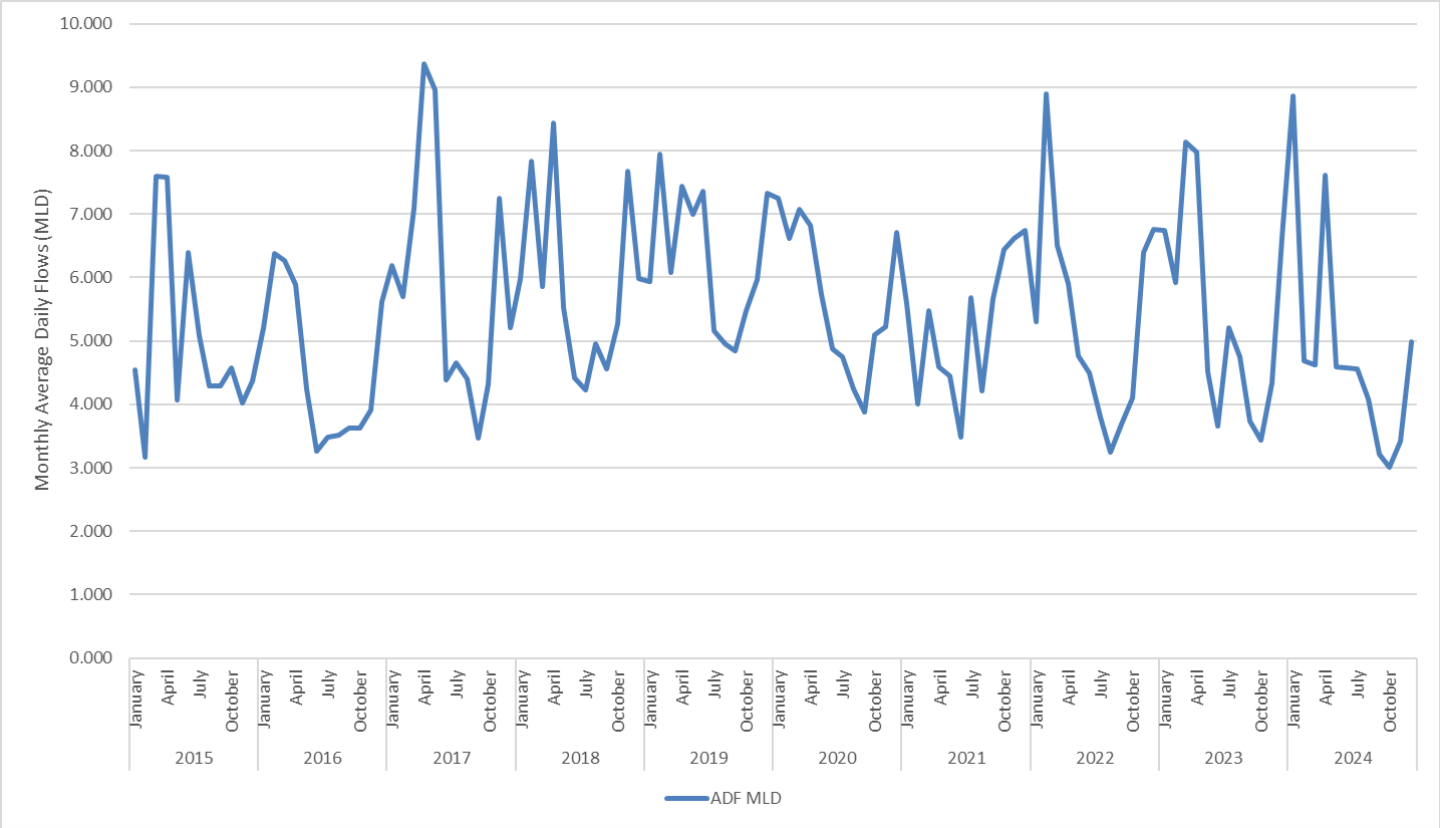

Figure CB-T-1: Graph displaying the Monthly Average Daily Flow Rate in MLD

Review of Influent Sampling and Monitoring Activities

In 2024, 104 samples of influent were collected and tested. An annual summary of influent sampling can be observed in Table CB-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 CB-T-2, is a graph depicting four commonly monitored pollutant loadings to the plant for the period of 2022-2024.

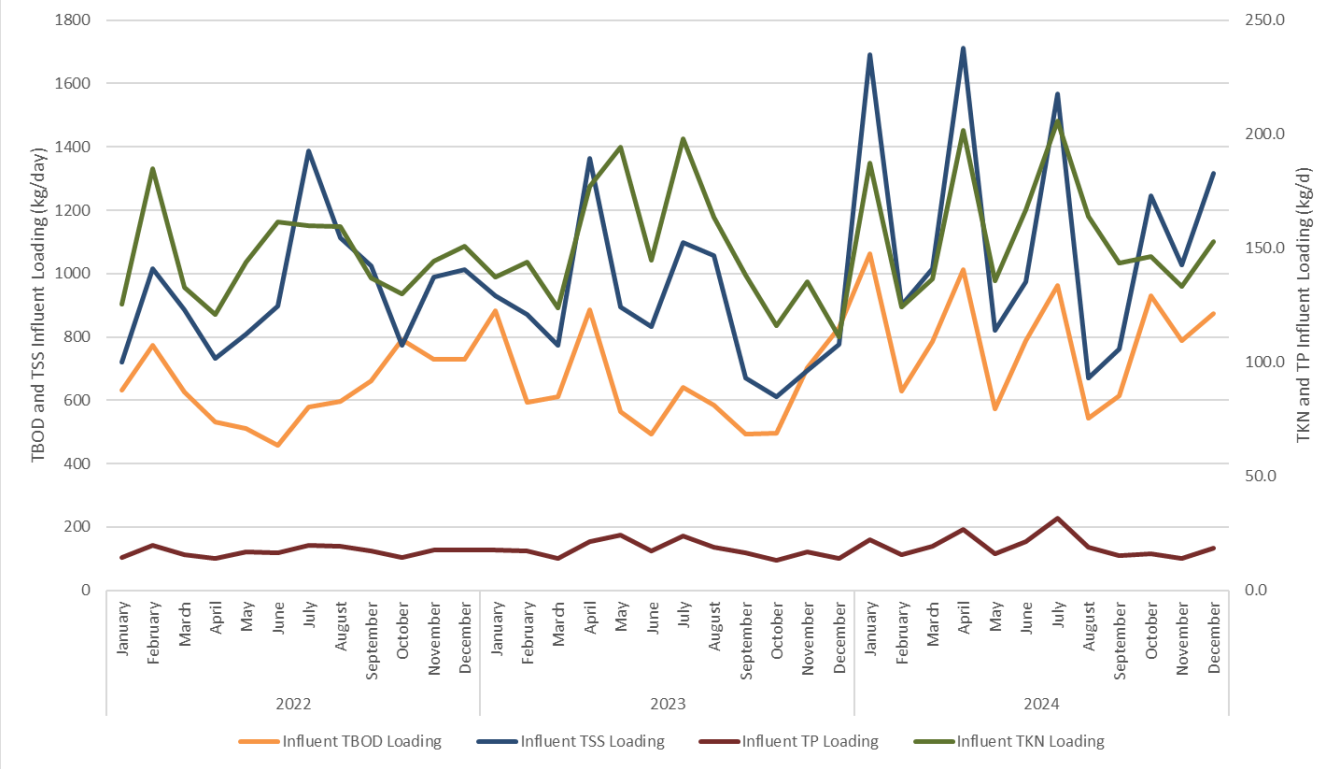

Figure CB-T-2: Figure of monthly plant loadings to the Crystal Beach WWTP for Total Biochemical Oxygen Demand (TBOD), Total Suspended Solids (TSS), Total Kjeldahl Nitrogen (TKN) and Total Phosphorus (TP), in kg/d, for the period 2022 to 2024.

Reviewing the calculated loadings for TBOD, TSS, TKN and TP for the past 3 years shows variable loading to the plant in 2024. Loading trends will continue to be monitored.

Review of Final Effluent Sampling and Monitoring Activities

In 2024, there were 104 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 CB-T-2 below summarizes the number of monthly objective and compliance limit exceedances at the Crystal Beach WWTP in the reporting year.

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

Pollutant	ECA Monthly Concentration Objective	ECA Monthly Concentration Limit	Number of Objective Concentration Exceedances	Number of Monthly Limit Concentration Exceedances	Monthly Loading Limit	Number of Annual Loading Limit Exceeded
Carbonaceous Biochemical Oxygen Demand (CBOD)	15 mg/L	25 mg/L	0	0	228 kg/d	0
Total Suspended Solids (TSS)	15 mg/L	25 mg/L	2	0	228 kg/d	0
Total Phosphorus (TP)	1.0 mg/L	1.0 mg/L	0	0	9.1 kg/d	0
Total Residual Chlorine (TRC)[1]	0.50 mg/L	-	0	-	-	-
E-Coli (geomean)[1]	200 MPN/100 mL	200 MPN/100 mL	0	0	-	-

The Crystal Beach WWTP met all ECA final effluent compliance limits in 2024.

There were two (2) monthly objective exceedances of Total Suspended Solids (TSS) in 2024 that occurred in May and July. The objective exceedance in May was related to high flow events experienced during wet weather. The high flows reduced the settleability of the solids in the secondary clarifiers, causing them to be carried over into the final effluent.

The objective exceedance in July was related to process upset conditions related to a loss of biomass. This is described in more detail in section CB-T-3 Operating Problems Encountered below.

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

- CBOD – 3%
- TSS – 19%
- TP – 5%
- E.Coli – 8%

[1] TRC/E.Coli monitoring only required April 01 to October 31 inclusive

The 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 for treatment. An annual summary of monthly average final effluent sample results can be observed in Table CB-T-4 below.

Effluent Quality Assurance Measurements and Control Measures

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

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

Deviations from Scheduled Monitoring Program

Compliance sampling activities at the Crystal Beach 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, eight (8) deviations from the scheduled sampling days occurred.

Table CB-T-3 below provides the instances where a deviation occurred and a reason for the deviation.

The 2025 sampling schedule is available upon request.

Table CB-T-3: Table of sampling schedule deviations

Sampling Date Deviation	Sample Type(s)	Reason
2024-01-16 2024-01-30 2024-04-09 2024-07-16 2024-10-08 2024-11-05 2024-12-03	Digested Sludge	Sample is collected during loading of tanker. No sample available for submission on scheduled day.
2024-12-05	Influent, Final Effluent	Samples not collected by operations staff.

Table CB-T-4: Annual Summary of Plant Flows, Influent and Effluent Sampling and Monitoring Results

Measured Parameter	January	February	March	April	May	June	July	August	September	October	November	December	Total / Average	Samples Collected
Influent - Monthly Average TSS (mg/L)	191	192	220	225	179	213	344	164	237	415	301	264	245	
Number of Influent TSS Samples	10	8	8	9	9	8	10	8	9	9	8	8		104
Influent - Monthly Average TBOD5 (mg/L)	120	134	170	133	125	172	211	133	191	310	231	175	175	
Number of Influent TBOD5 Samples	10	8	8	9	9	8	10	8	9	9	8	8		104
Influent - Monthly Average TP (mg/L)	2.5	3.3	4.2	3.5	3.5	4.7	6.9	4.6	4.8	5.3	4.1	3.7	4.3	
Number of Influent TP Samples	10	8	8	9	9	8	10	8	9	9	8	8		104
Influent - Monthly Average TKN (mg/L)	21.16	26.46	29.56	26.51	29.63	36.48	45.12	40.21	44.66	48.76	39.09	30.63	34.86	
Number of Influent TKN Samples	10	8	8	9	9	8	10	8	9	9	8	8		104
Total Plant Flows (ML)	274.589	136.050	143.274	228.165	142.131	137.317	141.326	126.460	96.272	92.992	102.383	154.651	1775.610	
Daily Average (MLD)	8.858	4.691	4.622	7.606	4.585	4.577	4.559	4.079	3.209	3.000	3.413	4.989	4.851	
Maximum Flow (ML)	24.610	7.527	6.385	22.817	6.234	8.645	6.716	5.972	4.960	5.554	6.409	10.009	**MAX**	24.610
Minimum Flow (ML)	4.226	3.526	3.774	4.272	3.425	3.496	3.604	3.201	2.732	2.547	2.540	2.677	**MIN**	2.540
Final Effluent - Monthly Average TSS (mg/L)	8.9	7.1	7.6	11.6	15.1	9.3	22.3	10.9	10.8	8.7	9.4	13.1	11.2	
Final Effluent - Average Daily TSS Loading (kg/d)	79	33	35	88	69	43	102	44	35	26	32	65	54	
Number of Final Effluent TSS Samples	10	8	8	9	9	8	10	8	9	9	8	8		104
Final Effluent - Monthly Average CBOD5 (mg/L)	5.1	4.0	4.0	5.7	8.3	5.4	9.8	4.3	5.0	4.0	4.0	6.4	5.5	
Final Effluent - Average Daily CBOD Loading (kg/d)	45	19	18	43	38	25	45	18	16	12	14	32	27	
Number of Final Effluent CBOD5 Samples	10	8	8	9	9	8	10	8	9	9	8	8		104
Final Effluent - Monthly Average TP (mg/L)	0.14	0.31	0.59	0.49	0.60	0.33	0.85	0.56	0.40	0.39	0.37	0.55	0.47	
Final Effluent - Average Daily TP Loading (kg/d)	1.24	1.45	2.73	3.73	2.75	1.51	3.88	2.28	1.28	1.17	1.26	2.74	2.26	
Number of Final Effluent TP Samples	10	8	8	9	9	8	10	8	9	9	8	8		104
Final Effluent - Monthly Average TKN (mg/L)	10.36	15.11	16.04	14.37	17.52	17.83	14.23	6.45	3.92	3.60	5.31	16.98	11.81	
Number of Final Effluent TKN Samples	10	8	8	9	9	8	10	8	9	9	8	8		104
Final Effluent - Monthly Average NH3 (mg/L)	7.16	12.88	13.70	11.98	13.90	13.71	9.07	3.70	1.12	0.27	2.73	10.54	8.40	
Number of Final Effluent NH3 Samples	10	8	8	9	9	8	10	8	9	9	8	8		104
Final Effluent - Monthly Average NO3 (mg/L)	1.49	0.21	0.25	0.90	1.87	3.59	3.66	6.43	8.03	13.86	9.60	1.79	4.31	
Number of Final Effluent NO3 Samples	10	8	8	9	9	8	10	8	9	9	8	8		104
Final Effluent - Monthly Average NO2 (mg/L)	0.17	0.10	0.11	0.14	0.10	0.26	0.44	0.41	0.41	0.41	0.48	0.40	0.29	
Number of Final Effluent NO2 Samples	10	8	8	9	9	8	10	8	9	9	8	8		104
Final Effluent - Monthly Geomean E.Coli (MPN/100mL)				12	9	2	9	7	4	33			8	
Number of Final Effluent E.Coli Samples				10	9	8	9	9	8	10				63
Final Effluent - Monthly Average TRC (mg/L)				0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00	
Number of Final Effluent TRC Samples				30	31	30	30	29	29	31				210

Measured Parameter	January	February	March	April	May	June	July	August	September	October	November	December	Total / Average	Samples Collected
Final Effluent - Monthly Average Temperature (°C)	11.25	11.44	12.08	12.91	16.12	18.04	20.86	20.26	20.42	17.02	16.13	12.59	15.76	
Number of Final Effluent Temperature Samples	10	8	8	9	9	8	10	8	9	9	8	8		104
Final Effluent - Monthly Average pH	7.53	7.54	7.54	7.47	7.48	7.46	7.30	7.18	7.13	7.14	7.15	7.28	7.35	
Number of Final Effluent pH Samples	10	8	8	9	9	8	10	8	9	9	8	8		104

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

On June 10, 2024, a drop in the liquid level in the primary digester caused a loss of the digester gas seal resulting in a spill of digester gas to the environment. This spill is covered in detail Section CB-T-8 Spills below. To re-establish the gas seal in the digester, solids were pumped from the process to the digester to increase the liquid level. This increased pumping resulted in a deficiency of activated sludge in the secondary treatment process. To replenish the bacterial population, the Crystal Beach WWTP was seeded with activated sludge from the Anger Avenue WWTP.

CB-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 Crystal Beach WWTP:

- North final clarifier – complete chain, flight and sprocket replacement, cross collector replacement
- Clarifier drive gearbox repair/replacement.
- Gravity belt thickener repair
- Clarifier scum pump replacement
- Digester recirculation pump replacement
- Grit snail gearbox replacement.
- Heat exchanger repair/replacement (In progress)

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

There are no planned capital upgrades for the Crystal Beach WWTP for the near future.

Summary and Update of Notice of Modifications Completed

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

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

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

Proposed Works – Status Update

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

CB-T-5 Summary Calibration Activities

Flow Meter Calibration – Influent, Effluent and Overflow

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

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

Meter Name	Date Calibrated	Comments
Crystal Beach Influent Meter	2024-07-11	Passed
Crystal Beach Final Effluent Meter	2024-12-11	Passed

Calibration certificates are available upon request.

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 contractor performs calibration or verification on all effluent monitoring equipment. A summary of calibration/verification activities are available in Table CB-T-6 below.

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

Equipment Description	Date Calibrated	Comments
DR 1900 Spectrophotometer	2024-09-18	Passed
Chlorine Portable Pocket Colorimeter	2024-09-18	Passed
Thermo Star A111 pH	2024-09-18	Passed
HQ40D with DO probe	2024-09-18	Passed
COD Reactor (Hach DRB 200)	2024-09-18	Passed
Balance – MS204	2024-09-10	Passed

Calibration certificates are available upon request.

CB-T-6 Solids Handling

Processed Organics Received

173 m^3 of seed sludge was brought to Crystal Beach WWTP from the Anger Avenue WWTP in June 2024 to reseed the secondary process with bacteria. Crystal Beach does not typically receive processed organics.

Volume 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 Crystal Beach 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.

43 m^3 of waste activated sludge was trucked to the Welland WWTP for further treatment while the gravity belt thickener was out of service for repairs.

Table CB-T-7 provides a summary of 2023 and 2024 sludge volumes removed from site.

Table CB-T-7: Summary of Sludge Removed from Site

Month	2024 Volume Sludge Hauled (ML)	Prior Year Volume Sludge Hauled (ML)
January	0.694	0.650
February	0.650	0.694
March	0.780	0.780
April	0.694	0.780
May	0.780	0.867
June	0.564	0.824
July	0.694	0.780
August	0.694	0.824
September	0.867	0.737
October	1.214	0.780
November	1.084	0.694
December	1.388	0.780
TOTAL	**10.103**	**9.192**

There was a 10% increase in sludge removed from site in 2024 versus reporting year 2023. Crystal Beach WWTP is equipped with one (1) primary digester that provides anaerobic digestion and storage of solids.

More sludge haulage is anticipated in 2025 from the Crystal Beach WWTP due to changes in scum handling practices. Repairs to the final clarifier scum system and changes to the handling practices for scum have been made. All scum is now being directed to the digester, increasing the volume of material being hauled off site.

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 Crystal Beach WWTP is included in Table CB-T-8.

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

Analyte	Units	NMA Limits	January	February	March	April	May	June	July	August	September	October	November	December
Total Solids	%	-	1.80	1.75	1.60	2.05	2.45	2.50	2.80	3.60	4.10	4.10	1.00	2.40
Ammonia as N	mg/kg	-	1,070	1,260	1,055	1,230	1,520	1,425	1,745	1,565	800	470	400	380
Nitrate+Nitrite	mg/kg	-	1.00	0.99	1.00	1.00	1.00	0.99	0.99	0.99	1.00	0.93	1.00	1.00
Phosphorus	mg/kg	-	25,800	26,250	24,650	21,600	29,550	27,400	35,150	29,600	21,600	16,900	50,600	25,100
Arsenic	mg/kg	170	3.29	4.94	3.25	3.00	3.45	2.85	4.00	3.75	1.50	0.90	2.60	2.00
Cadmium	mg/kg	34	0.50	0.50	0.50	0.35	0.65	0.50	0.60	0.50	0.50	0.50	0.60	0.50
Chromium	mg/kg	2,800	80.60	79.40	64.75	51.90	56.75	50.00	61.25	57.70	67.45	31.60	178.00	77.00
Cobalt	mg/kg	340	3.10	2.90	2.15	2.30	3.25	2.75	2.25	1.65	2.65	2.40	7.00	1.90
Copper	mg/kg	1,700	377	365	283	307	328	331	344	360	281	182	301	373
Lead	mg/kg	1,100	28	27	128	215	226	166	174	171	58	31	61	29
Mercury	mg/kg	11	0.27	0.30	0.33	0.12	0.13	0.19	0.13	0.12	0.15	0.45	3.09	0.09
Molybdenum	mg/kg	94	6.00	7.00	5.00	7.25	3.50	3.50	6.00	5.50	4.50	3.00	23.00	5.00
Nickel	mg/kg	420	20.40	19.65	15.45	17.00	20.55	15.65	27.30	17.50	21.70	15.70	104.00	25.50
Potassium	mg/kg	-	8,370	10,320	10,650	10,095	8,555	7,310	6,750	6,575	4,070	1,770	10,700	4,180
Selenium	mg/kg	34	1.96	1.34	1.74	2.45	3.00	2.55	2.80	2.90	1.20	0.40	0.90	2.00
Zinc	mg/kg	4,200	590	676	520	576	646	590	666	699	413	275	693	544

CB-T-7 Complaints

No complaints were received at the Crystal Beach WWTP in 2024.

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

Bypasses and Overflows

There is no bypass or overflow on the Crystal Beach WWTP site. An overflow is located upstream of the plant raw sewage pumping station in the collection system. As the overflow location is not on the plant property, it has been included in the collection system approval for the Crystal Beach WWTP system catchment. All overflows are reported in section CB-C-7 Collections System Overflows and Spills below.

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 plant 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 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. Spills are communicated to the System Owner (Council) through a public report. Below in Table CB-T-9 summarizes spills that occurred at the Crystal Beach WWTP in 2024 and includes a link to the public report with details of the spill.

Table CB-T-9: Summary of spills occurring at the Crystal Beach WWTP during the reporting year

Spill Date	MECP Incident Number	Short Description of Spill	Link to Public Spill Report
2024-06-10	1-7JMOAI	Spill of digester biogas – loss of digester seal	CWCD 2024-126 (https://www.niagararegion.ca/council/Council%20Documents/2024/council-correspondence-july-19-2024.pdf)
2024-06-24	1-84RTJH	Spill of digester biogas – loss of digester seal	CWCD 2024-126 (https://www.niagararegion.ca/council/Council%20Documents/2024/council-correspondence-july-19-2024.pdf)

Abnormal Discharges

An abnormal discharge is a discharge to the environment that is abnormal in quality or quantity. There were no abnormal discharges from the Crystal Beach WWTP during this reporting year.

CB-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 CB-T-1 and Table CB-T-4, the annual averages for CBOD, TSS and TP were all under secondary treatment equivalence objectives in 2024.

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 Crystal Beach 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 Town of Fort Erie 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. Three (3) projects were approved for cost sharing in the Town of Fort Erie with Niagara Region contributing $328,500 to support inflow and infiltration reduction.

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 Crystal Beach wastewater collection system is considered nominally separated. This procedure does not apply.

CB-C-1 Overview of the Crystal Beach WWTP Collection System

The Crystal Beach WWTP collection system is a class II system that collects wastewater from domestic, commercial and some industrial sources from the Town of Fort Erie. The collection system consists of the following:

- Local sanitary sewers
- 5.7 kilometres of regional gravity mains
- 3.9 kilometres of regional force mains
- 3 pumping stations:
    - Shirley Road Sewage Pumping Station
    - Nigh Road Sewage Pumping Station
    - Erie Road Sewage Pumping Station
- There are two Sanitary Sewage Outfalls (SSO) within the collection system - one at a sewage pumping station and one SSO upstream of the Crystal Beach WWTP.

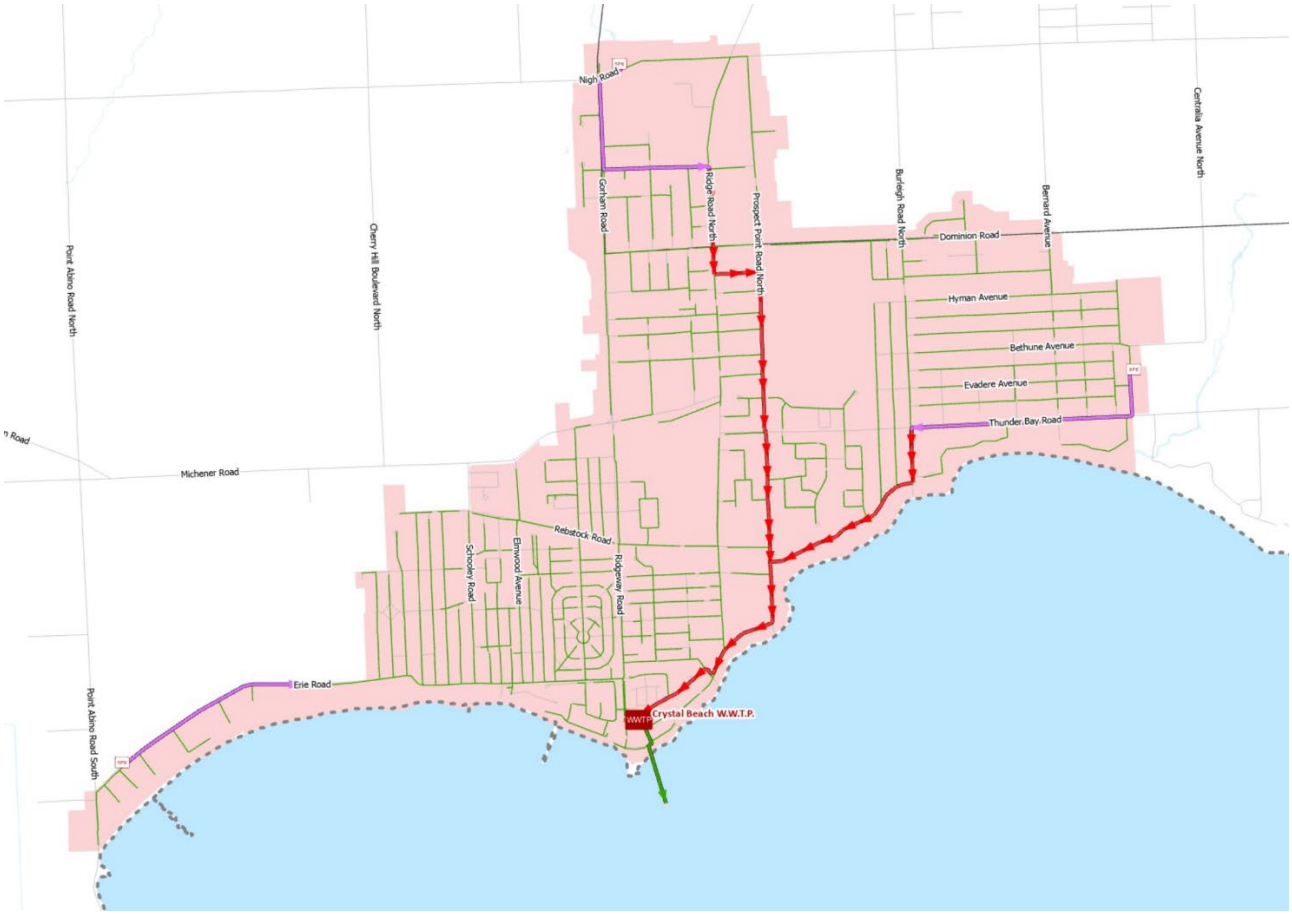

Figure CB-C-1: Map of Crystal Beach WWTP Collection System

The collection system is operated under a two-tier system, where the Town of Fort Erie 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:

- Crystal Beach Wastewater Collection System, 007-W609, issue number 1

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

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

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 Crystal Beach WWTP 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. SCADA is monitored by staff at the Crystal Beach WWTP Monday to Friday 7 a.m. to 3 p.m. and is monitored remotely by operations staff at the Seaway (Port Colborne) WWTP outside of these times.

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 two (2) visual inspections of sanitary sewer overflow locations.

Sanitary Sewer Closed-Circuit Television Inspection Program

Niagara Region owns and maintains 145 kilometers of trunk sanitary gravity sewers, 161 kilometers of sanitary forcemains, and 2,093 sanitary access chambers across 11 municipalities. Approximately 85% of its conventional trunk sanitary gravity system is inspected using closed-circuit television (CCTV) once every three years. The remaining 15% is large 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 CB-C-1 details the total length of sewers inspected over the past four years.

Table CB-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.

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

Pump Stations and Forcemains

No operating issues were encountered at pumping stations or forcemains within the Crystal Beach collection system.

Gravity Trunk Sewers

No operating issues were encountered at gravity trunk sewers within the Crystal Beach collection system.

CB-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

[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.

emergency equipment repair or replacement. Where a substantial amount of upgrade is required, this work is carried out under the capital works program.

There were no emergency repairs carried out on major equipment in the Crystal Beach Collection System in 2024.

This 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 Crystal Beach Collection System:

- Shirley Road Sewage Pumping Station upgrades
- Nigh Road Sewage Pumping Station upgrades
- Erie Road Sewage Pumping Station 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.

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

Table CB-C-2: Annual Summary of Collection System Flow Meter Calibrations

Equipment Description	Date Calibrated	Comments
Maintenance Hole 7 Overflow Meter	2024-12-11	Passed

Calibration certificates are available upon request.

CB-C-6 Summary of Complaints

Two (2) odour complaint was received in 2024 regarding the operation of the Crystal Beach collection system. When a complaint is received, Operations staff attend the site to verify the complaint. Corrective actions are taken as needed upon verification of any issue. All complaints and corrective actions taken are recorded and available.

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

Collection System Overflows

Although the Crystal Beach 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 CB-T-4 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. Overflow records are 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).

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 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. Spills are investigated and written reports are submitted to the MECP and Environment and Climate Change Canada as required by legislation. Below in Table CB-C-3 summarizes spills that occurred in the Crystal Beach collection system in 2024.

Table CB-C-3: Summary of Spills Occurring in the Crystal Beach Collection System

Spill Date	MECP Incident Number	Short Description of Spill	Link to Public Spill Report
No spills from the collection system in 2024			

Table CB-C-4: Collection System Overflow Event Details. Where NS is indicated, no sample result is available

Overflow Location	Overflow Date	Overflow Volume (ML)	Overflow Duration (hhh:mm)	BOD Loading (kg)	TSS Loading (kg)	TP Loading (kg)	TKN Loading (kg)	E.Coli (MPN/100 mL)	Was the Overflow Disinfected (Yes/No)	Were Any Adverse Impacts Observed (Yes/No)	Corrective Actions Taken
Maintenance Hole 7 (Plant Overflow)	2024-01-26	1.538	11:06	61.5	135.3	0.7	3.2	NS	No	No	Awaited end of Event

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

Projects Undertaken to Reduce Bypasses or Overflows

The Crystal Beach 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 Town of Fort Erie 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. Three (3) projects were approved for cost sharing in the Town of Fort Erie with Niagara Region contributing $328,500 to support overflow reduction.

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 CB-C- 2 - Image of Sanitary Sewer Overflow Public Signage