



Crystal Beach (Fort Erie) Wastewater  
Treatment Plant  
Annual Performance Report –  
Treatment and Collection  
Reporting Year: 2023

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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<sup>3</sup>/d and is designed to treat flows up to 27,300 m<sup>3</sup>/d. Flows more than 27,300 m<sup>3</sup>/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 2023 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 2023 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)	1,979.240
Annual Average Daily Flow (MLD)	5.423
% Annual Average Daily Flow Utilization	60%
% Increase/Decrease over prior year	2%

Reviewing the treated flows in 2023, it was observed that, on average, the plant is utilizing 60% 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 2023, there were 22 instances where the flow to the plant was greater than the design Average Daily Flow, amounting to approximately 6% 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.

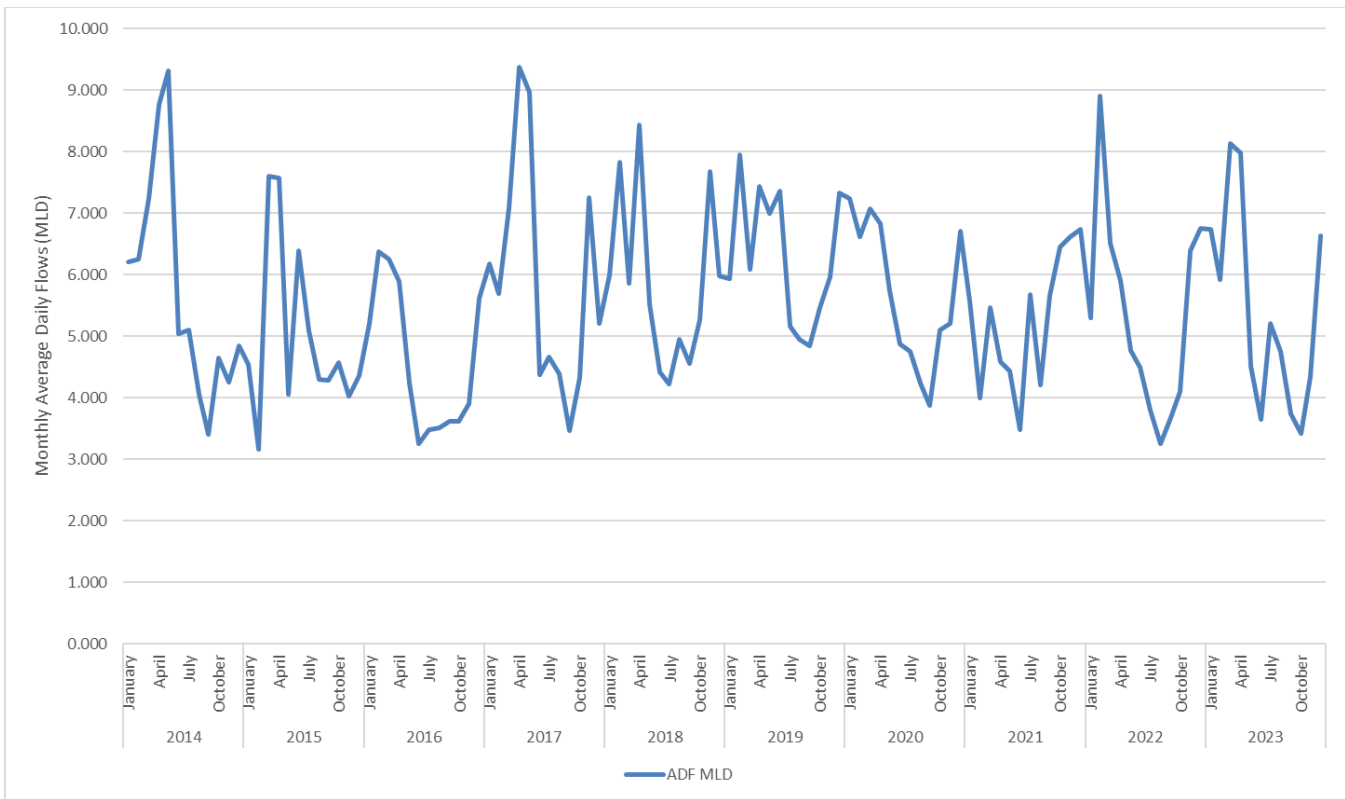


Figure CB-T-1: Graph displaying the Monthly Average Daily Flow Rate in MLD

## Review of Influent Sampling and Monitoring Activities

In 2023, 105 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 2021-2023.



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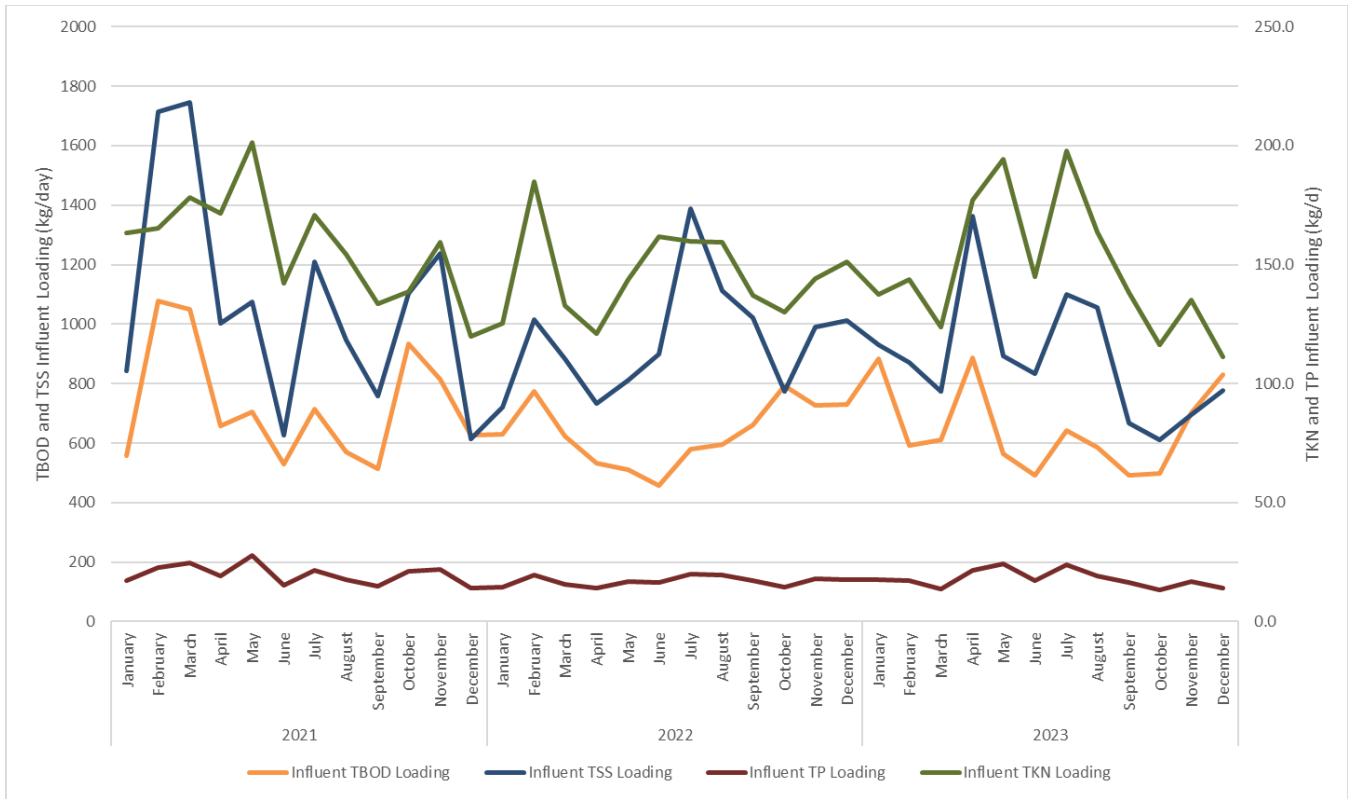


Figure CB-T-2: Figure of monthly plant loadings to the Crystal Beach WWTP for Total Biochemical Oxygen Demand (TBOD), Total Suspended Solids (TSS), Total Kjeldahl Nitrogen (TKN) and Total Phosphorus (TP), in kg/d, for the period 2021 to 2023.

Reviewing the calculated loadings for TBOD, TSS, TKN and TP for the past 3 years shows no observable trend indicating a change to the sewage strength being received at the site.

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

In 2023, there were 105 samples of final effluent collected and tested. Individual as well as monthly average results are reviewed and compared to the objective and compliance limits stated in the facility ECA. Table CB-T-2 below summarizes the number of monthly objective and compliance limit exceedances at the Crystal Beach WWTP in the reporting year.

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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	4	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) <sup>1</sup>	0.50 mg/L	-	0	-	-	-
<i>E-Coli</i> (geomean) <sup>1</sup>	200 MPN/100 mL	200 MPN/100 mL	0	0	-	-

There were no final effluent compliance limit exceedances in 2023.

There were four (4) monthly objective exceedances of TSS in 2023 that occurred in January, April, November and December. Exceedances in January and April were related to wet weather/high flow events. November and December exceedances were caused by a plant upset. This is covered in more detail in section CB-T-3 Operating Issues 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 – 30%
- TP – 1%
- E.Coli – 5%

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.

<sup>1</sup> TRC/E.Coli monitoring only required April 01 to October 31 inclusive  
Section: Crystal Beach – Treatment (CB-T)

## 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
- 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 2023, six (6) 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 2024 sampling schedule is available upon request.

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

Sampling Date Deviation	Sample Type(s)	Reason
2023-01-03 2023-02-14 2023-03-28 2023-06-06	Digested Sludge	Sample is collected during sludge haul – no sludge haul occurred on sampling day
2023-01-04	Final Effluent field pH and temperature	Not recorded, operator error
2023-03-23	Influent/ Final Effluent	Courier disruption – no sample pickup

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)	138	147	95	171	198	228	211	222	179	178	160	117	170	
Number of Influent TSS Samples	9	8	9	8	11	8	9	9	8	10	8	8		105
Influent - Monthly Average TBOD5 (mg/L)	131	100	75	111	125	135	123	123	132	145	162	125	124	
Number of Influent TBOD5 Samples	9	8	9	8	11	8	9	9	8	10	8	8		105
Influent - Monthly Average TP (mg/L)	2.6	2.9	1.7	2.7	5.4	4.7	4.6	4.0	4.4	3.9	3.9	2.1	3.6	
Number of Influent TP Samples	9	8	9	8	11	8	9	9	8	10	8	8		105
Influent - Monthly Average TKN (mg/L)	20.38	24.25	15.21	22.20	43.05	39.70	37.97	34.41	37.01	33.92	31.15	16.76	29.67	
Number of Influent TKN Samples	9	8	9	8	11	8	9	9	8	10	8	8		105
Total Plant Flows (ML)	209.133	165.943	252.348	239.297	139.882	109.482	161.525	147.390	112.093	106.235	130.173	205.739	1,979.240	
Daily Average (MLD)	6.746	5.927	8.140	7.977	4.512	3.649	5.210	4.755	3.736	3.427	4.339	6.637	5.423	
Maximum Flow (ML)	12.804	11.558	21.176	29.705	8.018	5.373	8.039	10.474	9.215	5.162	9.875	14.132	MAX	29.705
Minimum Flow (ML)	5.182	4.083	5.409	3.329	3.321	3.118	3.890	3.802	2.754	2.751	3.054	4.253	MIN	2.751
Final Effluent - Monthly Average TSS (mg/L)	23.4	8.5	12.7	17.5	11.7	9.9	8.6	5.7	3.8	8.3	15.6	16.8	11.9	
Final Effluent - Average Daily TSS Loading (kg/d)	158	50	103	140	53	36	45	27	14	28	68	111	64	
Number of Final Effluent TSS Samples	9	8	9	8	11	8	9	9	8	10	8	8		105
Final Effluent - Monthly Average CBOD5 (mg/L)	11.2	4.8	7.9	11.4	6.8	4.6	4.2	4.0	4.6	4.4	5.5	6.9	6.4	
Final Effluent - Average Daily CBOD Loading (kg/d)	76	28	64	91	31	17	22	19	17	15	24	46	34	
Number of Final Effluent CBOD5 Samples	9	8	9	8	11	8	9	9	8	10	8	8		105
Final Effluent - Monthly Average TP (mg/L)	0.40	0.31	0.35	0.46	0.40	0.31	0.21	0.17	0.18	0.30	0.39	0.34	0.32	
Final Effluent - Average Daily TP Loading (kg/d)	2.70	1.84	2.85	3.67	1.80	1.13	1.09	0.81	0.67	1.03	1.69	2.26	1.73	
Number of Final Effluent TP Samples	9	8	9	8	11	8	9	9	8	10	8	8		105
Final Effluent - Monthly Average TKN (mg/L)	10.58	14.51	9.77	11.74	17.83	22.36	16.93	17.76	17.68	5.11	6.69	6.29	13.10	
Number of Final Effluent TKN Samples	9	8	9	8	11	8	9	9	8	10	8	8		105
Final Effluent - Monthly Average NH3 (mg/L)	6.60	11.61	7.20	8.36	15.46	17.33	14.50	17.54	16.01	2.84	3.77	3.75	10.41	
Number of Final Effluent NH3 Samples	9	8	9	8	11	8	9	9	8	10	8	8		105
Final Effluent - Monthly Average NO3 (mg/L)	1.24	0.88	1.02	0.64	0.87	1.78	1.34	1.72	2.06	10.23	6.48	2.90	2.60	
Number of Final Effluent NO3 Samples	9	8	9	8	11	8	9	9	8	10	8	8		105
Final Effluent - Monthly Average NO2 (mg/L)	0.37	0.40	0.20	0.14	0.25	0.20	0.17	0.18	0.79	0.54	0.35	0.15	0.31	
Number of Final Effluent NO2 Samples	9	8	9	8	11	8	9	9	8	10	8	8		105
Final Effluent - Monthly Geomean E.Coli (MPN/100mL)				23	4	4	2	2	5	7			5	
Number of Final Effluent E.Coli Samples				8	10	9	8	10	8	9				62
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				29	29	27	29	31	29	30				204
Final Effluent - Monthly Average Temperature (°C)	11.31	10.55	11.27	12.96	14.82	18.64	20.09	20.47	22.73	18.26	14.14	13.20	15.70	

Measured Parameter	January	February	March	April	May	June	July	August	September	October	November	December	Total / Average	Samples Collected
Number of Final Effluent Temperature Samples	8	8	9	8	11	8	9	9	8	10	8	8		104
Final Effluent - Monthly Average pH	7.48	7.61	7.57	7.55	7.55	7.55	7.46	7.61	7.46	7.46	7.45	7.46	7.52	
Number of Final Effluent pH Samples	8	8	9	8	11	8	9	9	8	10	8	8		104

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

In 2023, several intense wet weather events occurred causing high flows to the Crystal Beach WWTP. During these events, the plant struggled with maintaining solids inventory in the secondary treatment process or experienced what is commonly known as solids washout.

In January, a rainfall volume of almost 20 mm was recorded on January 10, 2023. On top of this rain, snow melt occurred from snow remaining from Winter Storm Elliott that occurred in December 2022. Solids washout occurred during this event. Loss of solids and microbiology from the secondary treatment process reduces the efficiency of treatment and the quality of the final effluent. To boost the microbiological population, seed sludge from the Welland WWTP was trucked to site.

April 2023 saw multiple heavy rainfall events, with a total monthly rainfall of 103 mm. There were five separate wet weather events during the month with rainfall totals greater than 10 mm. Two events were greater than 25 mm. With long periods of sustained high flows, settling in the final clarifiers was impacted and some solids carried over into the final effluent. Intense wet weather events are happening more frequently due to climate change and impact the wastewater treatment process.

Objective exceedances in November and December were related to a process upset that occurred at the plant where foaming and solids settling issues were observed. Operations and process optimization staff worked together to identify the cause of the upset. Through microscopic investigation, the microorganisms observed indicated that the sludge age in the secondary treatment process consisted of mainly older sludge leading to the settling and foaming issues. The age of the sludge was corrected through changes to the return and wasting of sludge in the secondary treatment process.

## **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:

- South final clarifier – complete chain, flight and sprocket replacement, cross collector replacement
- Improvements to generator and motor control centre (MCC) room including isolation of MCCs, piping retrofit and generator intake baffle
- Return activated sludge pump replacement and rebuild

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 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 were no Proposed Works to be reported on for the 2023 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	2023-04-18	Passed
Crystal Beach Final Effluent Meter	2023-04-18	Passed
Crystal Beach Final Effluent Meter	2023-11-10	Passed
Crystal Beach Plant Overflow Meter	2023-06-06	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	2023-08-09	Passed
Chlorine Portable Pocket Colorimeter	2023-08-09	Passed
Thermo Star A111 pH	2023-08-09	Passed
HQ40D with DO probe	2023-08-09	Passed
COD Reactor (Hach DRB 200)	2023-08-09	Passed
Balance – MS204	2023-09-12	Passed

Calibration certificates are available upon request.

## CB-T-6 Solids Handling

### Processed Organics Received

0.22 ML of seed sludge was brought in from Welland WWTP in January 2023 to help re-build the microbiological population after a washout event. No other processed organics were received at the Crystal Beach WWTP during the reporting period. 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. Table CB-T-7 provides a summary of 2022 and 2023 sludge volumes removed from site.



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

Month	2023 Volume Sludge Hauled (ML)	Prior Year Volume Sludge Hauled (ML)
January	0.650	0.564
February	0.694	0.780
March	0.780	0.780
April	0.780	0.650
May	0.867	0.780
June	0.824	0.911
July	0.780	0.824
August	0.824	0.867
September	0.737	0.780
October	0.780	0.650
November	0.694	0.867
December	0.780	0.780
<b>TOTAL</b>	<b>9.192</b>	<b>9.236</b>

The volume of sludge removed from site was approximately the same between 2022 and 2023. Crystal Beach WWTP is equipped with one (1) primary digester that provides anaerobic digestion and storage of solids.

No changes are anticipated for sludge handling in 2024 at the Crystal Beach 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 2023 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	%	-	2.90	1.70	4.15	2.95	2.40	3.30	2.30	2.70	1.95	3.20	1.60	1.65
Ammonia as N	mg/Kg	-	910	650	795	660	615	830	840	890	785	265	1180	995.00
Nitrate+Nitrite	mg/Kg	-	1.00	0.99	1.00	1.00	0.99	0.99	0.98	0.99	1.00	1.00	0.98	1.00
Phosphorus	mg/Kg	-	10,691	19,700	23,500	20,600	24,100	26,600	23,150	23,833	22,900	19,250	28,000	25,350
Arsenic	mg/Kg	170	5.19	3.19	4.60	4.30	2.75	1.90	2.65	2.70	3.43	2.08	1.59	4.26
Cadmium	mg/Kg	34	0.25	0.50	0.45	0.50	0.50	0.50	0.50	0.50	0.65	0.50	0.55	0.50
Chromium	mg/Kg	2,800	50.49	51.60	60.85	61.10	55.30	56.30	57.10	52.80	48.75	42.65	67.80	71.90
Cobalt	mg/Kg	340	0.47	2.30	2.10	3.35	1.75	2.00	2.60	2.37	2.30	1.60	1.35	2.85
Copper	mg/Kg	1,700	209	288	328	308	310	350	291	258	243	264	388	371.50
Lead	mg/Kg	1,100	12	22	25	27	18	20.00	14	14	8.50	11	17	23.00
Mercury	mg/Kg	11	0.21	0.17	0.22	0.19	0.25	0.27	0.24	0.17	0.19	0.12	0.38	0.22
Molybdenum	mg/Kg	94	4.05	6.00	2.50	3.00	3.50	5.00	4.50	4.67	4.00	5.00	7.00	7.00
Nickel	mg/Kg	420	11.06	33.00	25.10	22.65	18.65	21.40	7.50	16.80	11.15	6.05	39.05	11.50
Potassium	mg/Kg	-	2,449	9,080	4,950	6,695	5,395	3,900	6,260	7,230	9,885	4,605	9,355	9,730
Selenium	mg/Kg	34	1.67	0.30	1.19	2.10	1.80	1.80	1.40	1.29	1.65	1.33	1.87	1.79
Zinc	mg/Kg	4,200	244	459	500	473	486	490	519	492	470	395	592	558

## **CB-T-7 Complaints**

No complaints were received at the Crystal Beach WWTP in 2023.

## **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. Below in Table CB-T-9 summarizes spills that occurred at the Crystal Beach WWTP in 2023.

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

Spill Date	MECP Incident Number	Description of Spill
2023-05-25	1-3HHW5M	<p><b>Abnormal Discharge/Spill – Suspected Cooking Oil Spill to System</b></p> <p>The operator discovered an oily residue on the surface of the secondary clarifiers and effluent stream during morning plant rounds. An Environmental Enforcement Officer (EEO) responded to the site to collect samples of what was suspected to be used cooking oil. The EEO attempted to track down the source through an investigation of the collection system but was unable to determine the source.</p> <p>Clean up was initiated using spill-absorbent mats and skimming to remove the residue. The issue was reported to the Spills Action Centre (SAC), as some of the substance had made its way through the contact tanks and into the effluent discharge (to Lake Erie). No adverse impacts were reported to Niagara Region regarding the spill.</p>

## Abnormal Discharges

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

Suspected used cooking oil was discovered in the plant final effluent on May 25, 2023.

## 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.

## **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 2023, Niagara Region had an approved budget totaling \$4.0M 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 \$228,800 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.

## **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 is two Sanitary Sewage Outfalls (SSO) at one sewage pumping station and one SSO at the Crystal Beach WWTP within the collection system.

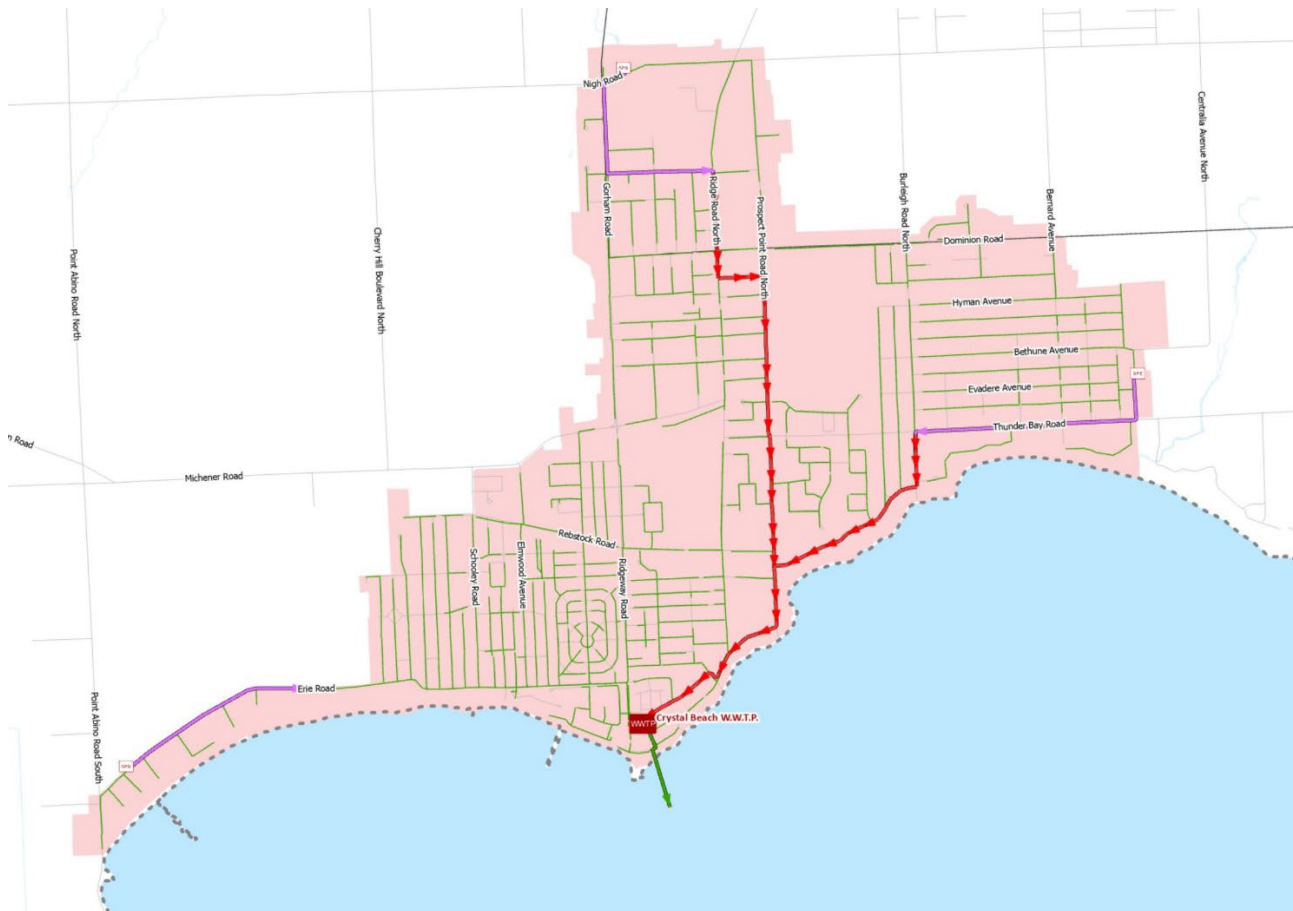


Figure CB-C-1: Map of Crystal Beach WWTP Collection System

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.

### **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)	2020	2021 <sup>2</sup>	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.

## 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

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<sup>2</sup> 2021 marked the end of one inspection contract and the start of a new contract. Delays in the procurement process due to competing priorities resulted in a gap in inspection contracts. As a result, the length of sewers inspected in 2021 was less than in prior years.



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 Crystal Beach Collection System:

- Shirley Road SPS pump replacement

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 Crystal Beach Collection System:

- Shirley Road Sewage Pumping Station upgrades are anticipated to begin in 2024. Upgrades to include pumps and generator replacement, and instrumentation and control 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 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.

## 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 2023.

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

Equipment Description	Date Calibrated	Comments
No equipment calibrations required.		

## CB-C-6 Summary of Complaints

One (1) odour complaint was received in 2023 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.

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](http://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 2023.

Niagara Region – Crystal Beach (Fort Erie) Wastewater System  
2023 Annual Performance and Summary Report - Collection

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

Spill Date	MECP Incident Number	Description of Spill
No spills from the collection system in 2023		

Table CB-C-4: 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 <sup>3</sup> (MPN/100 mL)	Was the Overflow Disinfected (Yes/No)	Were Any Adverse Impacts Observed (Yes/No)	Corrective Actions Taken
No collection system overflow events in 2023.											

<sup>3</sup> E.Coli sampling and analysis is required April 01 to October 31 annually.

## **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 2023, Niagara Region had an approved budget totaling \$4.0M 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 \$228,800 to support overflow reduction.

### **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.