
HALDIMAND COUNTY

Report ENV-02-2023 Annual Wastewater Report

For Consideration by Council in Committee on May 23, 2023



OBJECTIVE:

To provide a summary of wastewater treatment facilities' performance and key achievements in 2022 and planned activities for 2023.

RECOMMENDATIONS:

1. THAT Report ENV-02-2023 Annual Wastewater Report be received.

Prepared by: Lisa Young, Water and Wastewater Technologist

Reviewed by: Brandon Hedges, Manager, Environmental Operations

Respectfully submitted: Philip Mete, P. Eng., General Manager of Public Works Operations

Approved: Cathy Case, Acting Chief Administrative Officer

EXECUTIVE SUMMARY:

Haldimand County owns eight wastewater treatment facilities including four mechanical plants and four lagoon systems. The 2022 facility performance parameters, along with the results, have been summarized and provided within ENV-02-2023 Annual Wastewater Report. Since 2008, the County has successfully incorporated the Composite Correction Program approach concerning the operation, maintenance, and capital program upgrades related to its wastewater facilities. This report contains key information regarding Haldimand County's approach to wastewater optimization and facility performance, as well as some key activities and achievements that occurred during the year, with plans and goals developed for 2023.

BACKGROUND:

For the past fourteen years, Haldimand County's wastewater treatment operations staff have been participating in an optimization program. The foundation of the program is based on the Composite Correction Program, established by the US EPA in the 1970s. The focus of the program is to obtain a "good", economical effluent that meets or exceeds compliance limits. An "economical" effluent is achieved through the efficient and effective use of power, chemicals, staff time and available plant infrastructure. Since the goal is environmental protection, "good" is placed ahead of "economical" as the focus.

For Haldimand County, administration, design and maintenance practices are the foundation necessary to establish a plant that is capable of achieving the desired performance. By applying process control activities on a day-to-day basis, the plant operators take a capable plant to the desired level of performance. The requirements of the treatment process determined by process control and testing help establish priorities for the facility.

Haldimand County's wastewater treatment infrastructure consists of four facultative lagoon systems, four mechanical plants and twenty pump stations. These facilities are currently operated by Veolia Water Canada, under contract to Haldimand County. The current contract expires in June 2024. Staff are currently considering the County's options related to future contracts.

Haldimand County Wastewater Treatment Plants (WWTP)

Mechanical Plant	Type of Plant	Design Flow	Average Flow 2022
Caledonia	Stacked conventional activated sludge plant with tertiary filtration, aerobic digestion, chlorine disinfection, and de-chlorination.	7,200 m ³ /d	2,860 m ³ /d
Cayuga	Oxidation ditch, aerobic sludge digestion and storage, and U.V. disinfection.	1,200 m ³ /d	912 m ³ /d
Dunnville	Extended aeration plant with on-site aerobic sludge treatment and storage. Effluent is chlorinated and de-chlorinated. The plant is also equipped with hauled sewage pre-treatment and storage facilities for holding and septic tanks, portable toilet wastes, and landfill leachate.	7,728 m ³ /d	4,308 m ³ /d
Hagersville	Extended aeration plant with on-site aerobic sludge treatment and storage. The plant is also equipped with tertiary filtration (2 units) and ultraviolet disinfection (2 units). The facility also includes a leachate receiving station.	4,200 m ³ /d	1,796 m ³ /d

Haldimand County Lagoon Systems

Lagoon System	Description	Design Flow (m ³ /d)	Average Flow 2022 (m ³ /d)	Discharge Period	Effluent Discharge
Jarvis	4-cell lagoon system	853	891	Spring: 21 - 30 days starting March 15. Fall: 21 - 30 days starting November 1.	Sandusk Creek
Townsend	4-cell lagoon system (3 cells for wastewater treatment, 1 cell for biosolids storage).	2,095	237	Spring: 50% free of ice cover for 14 – 45 days. Fall: starting on October 15, continuing for at least 14 days and ending on November 30.	Nanticoke Creek
Oswego	2-cell lagoon system	85	62	Specific daily flow rate for March, April, May, November and December.	Oswego Creek
LEIP (Lake Erie Industrial Park)	3-cell lagoon system	657	682	Spring and Fall: discharge when conditions allow.	Centre Creek

Observations for the 2022 performance data include the following:

- The Jarvis Lagoons received approximately 683,585m³ of influent and discharged approximately 750,048m³; there were several days with influent above the design flow of 853m³/day.
- Several large rain events in the first quarter of 2022 contributed to elevated total suspended solids readings.
- The Lake Erie Industrial Park Lagoons received higher than average precipitation, resulting in an increased influent flow that reached above-average design flow for the year. The exceedance was reported in the 2022 Wastewater Reports that are sent to the Director of the Ministry of Environment, Conservation and Parks (MECP) as required.

ANALYSIS:

Municipalities are required to meet effluent quality compliance and objective limits as defined in the Environmental Compliance Approval which is issued by the Ministry of Environment, Conservation and Parks (MECP) as per the following tables. Haldimand County has also committed to meeting the voluntary targets established through the Grand River Conservation Authority (GRCA) Wastewater Optimization Program (WWOP).

The MECP compliance objectives set out for each facility are criteria that the plant is designed to meet. These are performance values that operations strive to achieve regularly. There are no penalties for exceeding these objectives.

The GRCA Targets are established to improve overall receiving water quality. The plants that discharge to the Grand River are operated to achieve more stringent performance targets on a day-to-day basis. There are no penalties for exceeding these targets. Haldimand County has been recognized most recently in 2022 by the GRCA for achieving the performance targets at the Caledonia and Cayuga wastewater treatment plants for all months in 2021. All three wastewater plants (Dunnville, Caledonia and Cayuga) participating in the GRCA WWOP received “silver” recognition from the GRCA for their performance in 2021. Hagersville wastewater plant does not participate in the GRCA WWOP because the effluent does not discharge to the Grand River watershed.

The MECP compliance limits should never be exceeded. These are set by the Ministry based on maximum levels of nutrients or other parameters being sent to the receiving water. Each plant is evaluated based on its specific receiving water. There are no defined penalties for exceeding these limits, however, they are reportable. The MECP expectation is that a plan be put in place to address the reason for the non-compliance, as well a due date will be established to complete the actions.

Compliance Limits and Objectives for Performance Parameters

Facility	Performance Parameter	MECP Compliance Limits mg/L	MECP Compliance Objectives mg/L	GRCA Voluntary Targets mg/L
Caledonia	Phosphorous	0.3	0.15	0.15
	Ammonia May 1 – November 30 December 1 – April 30	1.0 2.0	0.75 1.5	November – April 2.0 May – October 1.0
	CBOD5	25.0	15.0	Not required
	Total Suspended Solids	25.0	15.0	Not required
	Residual Chlorine	0.02	ND	Not required
	pH	6.0-9.5	6.5-8.5	Not required
Cayuga	Phosphorous	0.75	0.50	0.30
	Ammonia October 1 – May 31 June 1 – September 30	4 2	N/A N/A	November – April 2.0 May – October 1.0
	CBOD5	18.0	10.0	Not required
	Total Suspended Solids	18.0	15.0	Not required
	E. coli*	200	100	Not required
	Residual Chlorine	0.02	ND	Not required
	pH	6.0-9.5	6.5-9.0	Not required

Facility	Performance Parameter	MECP Compliance Limits mg/L	MECP Compliance Objectives mg/L	GRCA Voluntary Targets mg/L
Dunnville	Phosphorous	1.0	0.5	0.30
	Ammonia December 1 – April 30 May 1 – November 30	N/A N/A	10 5	November – April 2.0 May – October 1.0
	CBOD5	15.0	25.0	Not required
	Total Suspended Solids	15.0	25.0	Not required
	Residual Chlorine	ND	0.02	Not required
	pH	6.5-8.5	6.0-9.0	Not required
	E. coli*	150	100	Not required
Hagersville	Phosphorous June 1 – November 30 December 1 – April 30	0.15 0.20	0.10 0.14	N/A
	Ammonia May 1 – October 31 November 1 – April 30	2.20 3.60	0.73 2.20	N/A N/A
	CBOD5	3.6	7.3	Not required
	Total Suspended Solids	3.6	7.3	
	pH	6.5-8.5	6.0-9.5	
	E. coli*	100	200	

* E. coli reported as the # of organisms per 100 mL calculated as a geometric mean

2022 had four wastewater facilities not meet the MECP effluent requirements. Operational issues, such as equipment breakdowns and staffing turnovers by the contractor led to several occasions of non-compliance. Each instance of non-compliance was reported to the MECP and to Haldimand County by the Operating Authority immediately. Monthly operational meetings with Veolia addressed the cause of each incident and what was done to rectify the situation. There is no fine for any exceedance of the wastewater ECA Effluent limits although reporting is mandatory.

Large rain events in 2022 had an impact on the treatment plants which resulted in several out-of-compliance occurrences and bypasses. Excessive incoming flows can exceed the plants rated capacity and bypassing will occur. Any bypass event is reported to the MECP.

Haldimand County Wastewater Treatment Plant Performance Parameters

Facility	MECP Compliance Limits	MECP Compliance Objectives	GRCA Voluntary Targets
Caledonia	Total phosphorous exceeded for one month Ammonia exceeded for two months E. coli exceeded for one month	Total phosphorous exceeded for four months Ammonia exceeded for two months pH exceeded for one month	Total phosphorous exceeded for four months Ammonia exceeded for two months
	The cause was determined to be high strength influent that put stress on the treatment plant. The high loading to the plant had stressed the process resulting in elevated effluent parameters. This condition was first detected during the second week of May and the Municipality's wastewater collections department performed some investigations of the collection system to pinpoint the location so that it could be stopped.		
Cayuga	No exceedances	No exceedances	No exceedances
Dunnville	cBOD ₅ exceeded for one month	cBOD ₅ exceeded for one month Total suspended solids exceeded for two months pH exceeded for one month	Ammonia exceeded for five months
	The cause was due to a mechanical failure of a blower. The Operating Authority was operating on a single remaining blower during early February until it could be repaired. During this time, there were some periods where the dissolved oxygen level in the aeration step dropped to lower-than-normal levels resulting in some stress to the biological process. Once the blower was repaired, the dissolved oxygen rose and the levels fell below compliance limits.		
Hagersville	Total suspended solids exceeded for one month Total phosphorous exceeded for one month	cBOD ₅ exceeded for two months Total suspended solids exceeded for one month Total ammonia exceeded for one month Total phosphorous exceeded for one month	N/A
	The exceedance was a result of one of five monthly effluent samples being collected over a 24-hour period where the facility received excessive incoming flows due to a storm and we have to initiate a filter bypass (which was reported to Spills Action Centre (MECP) and the Haldimand-Norfolk Health Unit). This occurred on March 23 rd , 2022. The plant performance quickly returned to normal once the flows subsided and the filter bypassing ceased.		

Equipment failures (chemical dosing pumps in Hagersville, blower issues in Dunnville) resulted in processes being out of compliance (through test results) as stated above. Repairs and replacements were prioritized and completed to resolve these issues immediately and ensure the plant was performing within compliance by the next month of testing.

In 2022 there were ten reported bypass/overflow days in Haldimand County. Bypasses were recorded at the following plants:

Wastewater Facility	Date of Bypass/Overflow	Duration
Caledonia WWTP	February 17, 2022	9.25 hours
Cayuga WWTP	February 18 to February 23, 2022	67.5 hours
Hagersville WWTP	March 23, 2022	20 hours
Jarvis Sewage Pumping Station	February 17, 2022	3.5 hours
	March 23, 2022	3.25 hours
	August 5, 2022	1.35 hours

Ministry of the Environment, Conservation and Parks (MECP) Inspections

Wastewater treatment plant inspections are performed by the MECP approximately every four years. These inspections occur to ensure that the County's wastewater plants are operating as per their assigned Environmental Compliance Approvals (ECAs). The performance data that has been collected in the previous four years (between inspections) is reviewed against the effluent compliance objectives and limits. The Townsend Lagoons were the only facility inspected by the MECP in 2020 and there have been no inspections during the past two years. Any performance issues that are identified are communicated or reported to the MECP as they occur. The performance of the treatment facilities is jointly reviewed and discussed every month with operations staff. If there are performance or operational issues, actions are jointly identified to address the problem(s) as they arise.

Key Achievements in 2022

- Completed digester tank special study at the Dunnville WWTP to determine if insulating the digester will increase temperature and improve performance in cold weather months. The study was suspended until 2023. More sampling data (by increased frequencies) will be required to determine a more accurate result for recommendations.
- Completed a special study to evaluate if the Caledonia WWTP could achieve an effluent Total Phosphorus target (TP objective of 0.11 mg/L consistently in cold water conditions). This evaluation is being done as the County is looking to build a new WWTP which will impact the effluent loading limits within the ECA of the current and new wastewater treatment facilities.
- Completed a special study to increase the air supply to the digesters at the Caledonia WWTP to further understand air distribution with the goal of increasing dissolved oxygen in the digesters. Digester performance has improved in 2022 by making the operational change to consistently send sludge to each train.
- Construction began in 2022 for the Nairne Street Forcemain Replacement. The construction is scheduled to be completed in May 2023. The project will install a new 300 mm forcemain within an existing water lot under the Grand River in Caledonia.

Planned Key Activities for 2023

Below is a list of planned activities, projects and process improvements for 2023.

- Commissioning of the Jarvis to Townsend Lagoon sewage forcemain.

- Lake Erie Industrial Park Lagoon berm restoration and splitter box valve replacement.
- At the Hagersville WWTP, blower replacements and aeration control upgrades.
- At the Dunnville WWTP, rebuilding of clarifiers 1&2, and aeration diffuser system replacements.
- At the Cayuga WWTP, the mechanical aerator replacement.
- At the Caledonia WWTP, there are scheduled replacements of the filter building roof, Filter #2 media and aeration control improvements.
- In 2023, Caithness Street in Caledonia will undergo sanitary collection pipe replacement; Hagersville will have the sanitary collection pipes replaced on Tuscarora Street (including King to Oneida and Victoria Street).

The eight reports required by the MECP for each wastewater treatment facility have been completed and sent to the MECP Director on March 31st, 2022. These reports are available for review upon request through wwops@haldimandcounty.on.ca.

FINANCIAL/LEGAL IMPLICATIONS:

The focus of the collaboration between Environmental Operations, Engineering and the Operating Authority is to obtain a “good”, economical effluent that meets or exceeds compliance limits. An “economical” effluent is achieved through the efficient and effective use of power, chemicals, staff time, and available plant infrastructure.

STAKEHOLDER IMPACTS:

A collaborative effort between the Divisions of Water and Wastewater Operations, Engineering and Capital Works and our contracted operating authority (Veolia) is required to successfully deliver program activities. The wastewater contract will expire in 2024. Continued collaboration between Haldimand County and the applicable contractor will be a priority to continue optimized wastewater processing and treatment.

REPORT IMPACTS:

Agreement: No

By-law: No

Budget Amendment: No

Policy: No

REFERENCES:

None.

ATTACHMENTS:

None.