



**Caledonia and Cayuga Distribution System
2025 Annual Water Quality Report
January 1, 2025 – December 31, 2025**

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Quality Management System Policy

The Corporation of Haldimand County owns, maintains and operates various drinking water systems. Haldimand County is committed to:

- Ensuring our drinking water systems comply with all current legislation and regulatory requirements for the safe supply of drinking water;
- Ensuring financial support is provided to maintain infrastructure integrity to allow safe and consistent delivery of drinking water to our water customers;
- Reviewing, maintaining and continually improving our Quality Management System and to communicate the Plan with our water customers.



Haldimand County Quality Management System Summary

Haldimand County's Quality Management System (QMS) is legislated under the Drinking Water Quality Management Standard (DWQMS) through the Safe Drinking Water Act. To maintain operating authority accreditation, the Ministry of the Environment, Conservation and Parks (MECP) mandate tasks that must be completed annually. These activities include:

- Conducting an internal audit of the Quality Management System.
- Conducting a Management Review meeting.
- Participating in an external audit conducted by a third-party Accreditation Body.
- Updating the Quality Management System Operational Plan.
- Updating Council of the status of the County's Quality Management System.

The QMS Operational Plan was reviewed and updated in 2025, with a focus on Document and Records Control (Element 5), conforming to DWQMS standards and Continual Improvement (Element 21) while incorporating organizational changes within the County.

Internal audits were completed with support from Environmental Operations staff. The Internal Audit has shown the County's Quality Management System is conforming to the Drinking Water Quality Management Standards 2.0. Opportunities for Improvement were identified to improve the County's maturing system. These include expanding system roles and responsibilities and identifying groups that may have some peripheral responsibility in the drinking water system. The audit has shown that more awareness and communication of the QMS may be necessary. Increasing awareness and understanding of QMS roles and responsibilities in Haldimand County will help achieve our goals of providing safe, reliable drinking water and meeting future needs of system users.

Haldimand County must receive accreditation annually to operate the water distribution systems. Through a qualified third-party auditor, the County must demonstrate that its QMS (Quality Management System) meets the requirements of the DWQMS (Drinking Water Quality Management Standard).

Intertek performed the annual systems audit on September 2, 2025 which resulted in one opportunity for improvement and zero non-conformances. Any non-conformance or opportunity for improvement is considered for implementation corrective action is initiated as required.

Staff are required to conduct an annual Management Review meeting to evaluate the effectiveness of the QMS. Deficiencies and opportunities for improvement are identified and action items are developed to ensure follow-up. The County held their Management Review meeting on December 5, 2025.

Caledonia and Cayuga Distribution System Overview

Chloraminated water is received from the City of Hamilton’s Woodward Water Treatment Plant at the Caledonia Reservoir. Sodium hypochlorite is added to the water to achieve breakpoint chlorination and create a free chlorine residual that meets regulatory requirements. The chlorinated water is sent through the transmission mains to the Caledonia Distribution System. A standpipe provides secondary water storage and maintains water pressure within the distribution system.

Potable water is also sent via transmission mains to Cayuga. At the Cayuga Reservoir, sodium hypochlorite can be added to increase the disinfectant residual. The chlorinated water is then pumped to the Cayuga distribution system. A standpipe provides secondary storage and maintains water pressure within the distribution system.

The distribution system infrastructure services approximately 12,179 people in Caledonia and 1,720 people in Cayuga for a total of 13,899 (2021 Census). This number is suspected to increase steadily with the on-going development in the Caledonia distribution system.

Haldimand County operates and maintains all aspects of the drinking water system, including reservoirs, hydrants, valves, sample stations and watermains.

Expenditure Information

Haldimand County staff are diligent in prioritizing projects on an annual basis to eliminate unnecessary expenditure. Using the best available information at the time of this report, key expenditures occurring in the Caledonia and Cayuga Distribution System are identified in Table 1. All drinking water expenditure information is not included in this report.

Table 1: Caledonia and Cayuga Distribution System 2025 Expenditures

Key Expenditures	Cost
Caledonia Reservoir Pipe Repair	\$ 160,000
Caledonia Reservoir and Booster Station Pump No. 1 Replacements	\$140,000
Caledonia Reservoir Expansion – Engineering Design	\$175,000
Total Cost	\$475,000

Multi-Barrier Approach

Through the Walkerton Inquiry, Justice O'Connor recommended that drinking water is best protected by taking an approach that uses multiple barriers to prevent contamination from affecting our drinking water. The multi-barrier approach addresses potential threats by ensuring barriers are in place to either eliminate or minimize their impact. This holistic approach recognizes that each barrier may not be able to completely remove a contaminant, but by working together the barriers provide a high-level of protection. Typical barriers include:

Source Protection

- *Source Protection Plans*
- **Treatment**
 - *Treatment and Disinfection Goals*
- **Distribution System**
 - *Residual Maintenance*
- **Monitoring**
 - *Sampling Programs*
- **Emergency Preparedness**
 - *Emergency Plans*



Haldimand County has adopted the multi-barrier approach in ensuring safe, reliable drinking water. Figure 1 shows how administration, design, maintenance, and operation work together to establish and maintain multi-barrier protection (US EPA, 1998).

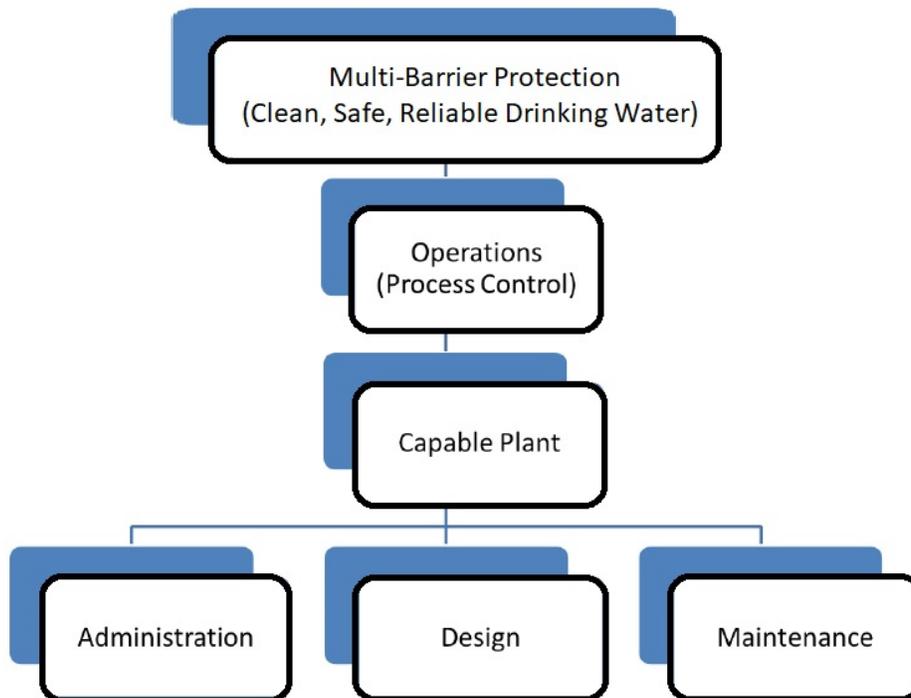


Figure 1: Responsibilities for Clean, Safe and Reliable Drinking Water

A description of the responsibilities in each area is summarized as follows:

- **Administration:** The administrators or managers of a water treatment system are responsible for providing the resources (budget and staff) and policies (hours of staffing, reporting requirements, training and certification requirements, etc.). Funding may also need to be justified and obtained if the design of a system is inadequate or major upgrades are required. Managers establish and maintain emergency response plans and communication procedures to ensure prompt response to unsafe drinking water.
- **Design:** The designer's responsibility is to provide the physical infrastructure (pipes, valves, tanks, meters, etc.) capable of reliably producing and distributing the quality and quantity of water required. The design must provide adequate flexibility and controllability to enable the operator to make appropriate adjustments.
- **Maintenance:** The system must be maintained in good working order with the key equipment functional at all times. Should a key piece of equipment break down then it should be repaired in a timely manner.
- **Operations:** Once a capable system is in place, then it is the operator's responsibility to deliver safe drinking water through monitoring, testing and process control (for example by changing the setting on the dosing pumps). Operators are also responsible for maintaining records (log books, data forms, etc.), which aid in troubleshooting and design of upgrades. A further, and commonly unrecognized responsibility of the operator is to communicate the needs of the facility to administrators for possible action.

Water Sampling

To comply with drinking water legislation, drinking water systems are required to monitor their water quality. Haldimand County has committed to providing safe, reliable drinking water and is diligent in ensuring that sampling and monitoring programs effectively characterize water quality. All samples are taken by certified operators and tests performed by accredited, licensed laboratories.

The Caledonia and Cayuga drinking water system receive their water from the Hamilton drinking water system. Hamilton provides Haldimand County with regular bacteriological samples and there is a strong relationship between the two municipalities to ensure clean, safe drinking water is supplied to all users.

Microbiological Sampling

Microbial quality is one of the primary indicators for the safety of a drinking water supply. Of all contaminants in drinking water, human and/or animal feces present the greatest danger to public health. Pathogenic or disease-causing micro-organisms (including certain protozoa, bacteria or viruses) may be found in untreated water supplies. Bacteriological monitoring or testing is a way to detect and control pathogenic bacteria in treated drinking water supplies. Heterotrophic Plate Count (HPC) and background bacteria samples are monitored to identify potential changes in water quality and are not used as an indicator of adverse human health effects. Table 2 provides a summary of microbiological sampling completed in the Caledonia and Cayuga Distribution System during 2025.

Table 2: 2025 Caledonia and Cayuga Distribution System Microbiological Sampling

Community	Number of Samples	Range of E. coli Results (cfu/100ml)	Range of Total Coliform Results (cfu/100ml)	Number of HPC Samples	Range of HPC Results (cfu/ml)	Number of Background Samples	Range of Background Results (cfu/ml)
Caledonia Distribution	208	0	0	52	0 – 17	202	0 – 252
Cayuga Distribution	156	0	0-2	52	0 - 10	152	0 – 150

*Note: At a minimum, 25% of all drinking water samples must be analyzed for HPC.

Operational Sampling

Operational sampling and monitoring are important in maintaining the integrity of each barrier in the multi-barrier approach. Schedule 7 and 8 of Ontario Regulation 170/03 specify requirements for operational checks that municipalities must follow. Table 3 provides a summary of operational samples taken for the drinking water system. Regulatory requirements were achieved for all samples taken. Although not included in this report, Caledonia and Cayuga Reservoirs have continuous monitoring chlorine residual analyzers, which monitor all water pumped to the distribution systems.

Table 3: 2025 Caledonia and Cayuga Distribution System Operational Sampling

Community	Number of Grab Samples	Range of Results	Regulatory Requirement	Minimum Recommended Target
Free Chlorine Caledonia	400	0.51 – 1.67 mg/L	≥ 0.05 mg/L	≥ 0.20 mg/L
Free Chlorine Cayuga	349	0.23 – 1.26 mg/L	≥ 0.05 mg/L	≥ 0.20 mg/L

Lead Sampling

The community lead testing program is a requirement of O.Reg. 170/03 under the Safe Drinking Water Act, 2002. Haldimand County is exempt from sampling private residences due to having less than 10% of plumbing sample locations exceed the standard for two consecutive periods of reduced sampling. Annual pH and alkalinity samples are taken, as well as distribution system lead samples, every three years. There are no regulatory limits for alkalinity and pH, however Haldimand County sample results are within the operational guidelines provided by the MECP. A summary of 2025 sampling has been provided in Table 4.

Table 4: 2025 Caledonia and Cayuga Distribution System Lead Sampling

Community	Sample Type	Number of Samples	Range of Results	Number of Exceedances
Caledonia	Distribution - Alkalinity	4	85 - 95 mg/L	0
Caledonia	Distribution - pH	4	6.89 - 7.11	N/A
Cayuga	Distribution - Alkalinity	4	81 - 90 mg/L	0

Community	Sample Type	Number of Samples	Range of Results	Number of Exceedances
Cayuga	Distribution - pH	4	6.95 - 7.07	N/A

Organic Sampling

To protect drinking water from pathogens, a disinfectant (usually chlorine) is added to the drinking water. Disinfectants can react with naturally-occurring materials in the water to form disinfection byproducts, which may pose health risks.



A challenge for water systems is balancing pathogen control and disinfection byproduct formation. It is important to provide protection from pathogens while minimizing health risks from disinfection byproducts. More information on each byproduct is summarized in Table 5.

Haldimand County sample for haloacetic acids (HAA) and trihalomethanes (THM) in the distribution system where there is an elevated potential for the formation of these byproducts.

Table 5: Disinfection Byproduct Information

Disinfection Byproduct	How it is formed?	Health Effects
Trihalomethanes	Trihalomethanes occur when naturally-occurring organic and inorganic materials in the water react with the disinfectants, chlorine and chloramine.	Some people who drink water containing total trihalomethanes in excess of the MCL over many years could experience liver, kidney, or central nervous system problems and increased risk of cancer.
Haloacetic Acids	Haloacetic acids occur when naturally-occurring organic and inorganic materials in the water react with the disinfectants, chlorine and chloramine.	Some people who drink water containing haloacetic acids in excess of the MCL over many years may have an increased risk of getting cancer.

Regulatory reporting is based on a running annual average of quarterly sample results. The calculated THM and HAA averages were below the maximum allowable concentrations (MAC) permitted by the MECP. Table 6 provides a summary of 2025 organic sample results.

Table 6: 2025 Caledonia and Cayuga Distribution System DBP Sampling

Parameter	Sample Date	Sample Results (ug/L)	Annual Average (ug/L)	Regulatory MAC (ug/L)	Exceedance
Haloacetic Acids – Caledonia Distribution	Feb 18, 2025	5.3	12.2	80	No
Haloacetic Acids – Caledonia Distribution	May 20, 2025	12.5	12.2	80	No
Haloacetic Acids – Caledonia Distribution	Aug 22, 2025	19.1	12.2	80	No
Haloacetic Acids – Caledonia Distribution	Nov 25, 2025	11.9	12.2	80	No
Haloacetic Acids - Cayuga Distribution	Feb 18, 2025	13.9	16.8	80	No
Haloacetic Acids - Cayuga Distribution	May 20, 2025	19.8	16.8	80	No
Haloacetic Acids - Cayuga Distribution	Aug 22, 2025	17.7	16.8	80	No
Haloacetic Acids - Cayuga Distribution	Nov 25, 2025	15.9	16.8	80	No
Trihalomethanes - Caledonia Distribution	Feb 18, 2025	23	38.25	100	No
Trihalomethanes - Caledonia Distribution	May 20, 2025	28	38.25	100	No
Trihalomethanes - Caledonia Distribution	Aug 22, 2025	76	38.25	100	No
Trihalomethanes - Caledonia Distribution	Nov 25, 2025	26	38.25	100	No
Trihalomethanes - Cayuga Distribution	Feb 18, 2025	31	49.5	100	No
Trihalomethanes - Cayuga Distribution	May 20, 2025	31	49.5	100	No
Trihalomethanes - Cayuga Distribution	Aug 22, 2025	79	49.5	100	No
Trihalomethanes - Cayuga Distribution	Nov 25, 2025	40	49.5	100	No

Water Use

Raw Water

Haldimand County does not have a Permit to Take Water for the Caledonia and Cayuga Distribution System. All water supplied to the Caledonia and Cayuga Distribution System originates from Lake Ontario and is treated by the City of Hamilton at their Woodward Water Treatment Plant.

Potable Water

As required by Schedule 22 of Ontario Regulation 170/03, Table 7, Table 8, Figure 2 and Figure 3 are intended to provide a summary of potable water supplied to the Caledonia and Cayuga Distribution System in 2025.

Table 7: 2025 Caledonia Reservoir Monthly Potable Water Flow Data

Month	Monthly Total m ³	Daily Average m ³	Maximum Daily m ³
January	128,754	4,153	4,739
February	113,316	4,047	4,602
March	126,028	4,065	4,819
April	128,288	4,276	5,124
May	142,345	4,592	5,557
June	149,853	4,995	5,938
July	76,323*	5,088	6,126
August	63,542*	4,888	5,278
September	146,170	4,872	5,975
October	139,779	4,509	5,232
November	130,864	4,362	4,717
December	137,816	4,446	4,885

* From the dates of July 16, 2025 to August 18, 2025 the flow meter for the Caledonia Reservoir was non-operational. The months of July and August show the flow during the operational window of these months.

The Caledonia Reservoir flows include all water pumped to York and Cayuga. Figure 2 compares the monthly flows over the last five years at the Caledonia Reservoir. When comparing the average monthly flows for 2024 and 2025, there was an approximate 6.4% **increase** in potable water distributed from the Caledonia Reservoir.

Figure 2: Caledonia Reservoir Five Year Monthly Flow Comparison

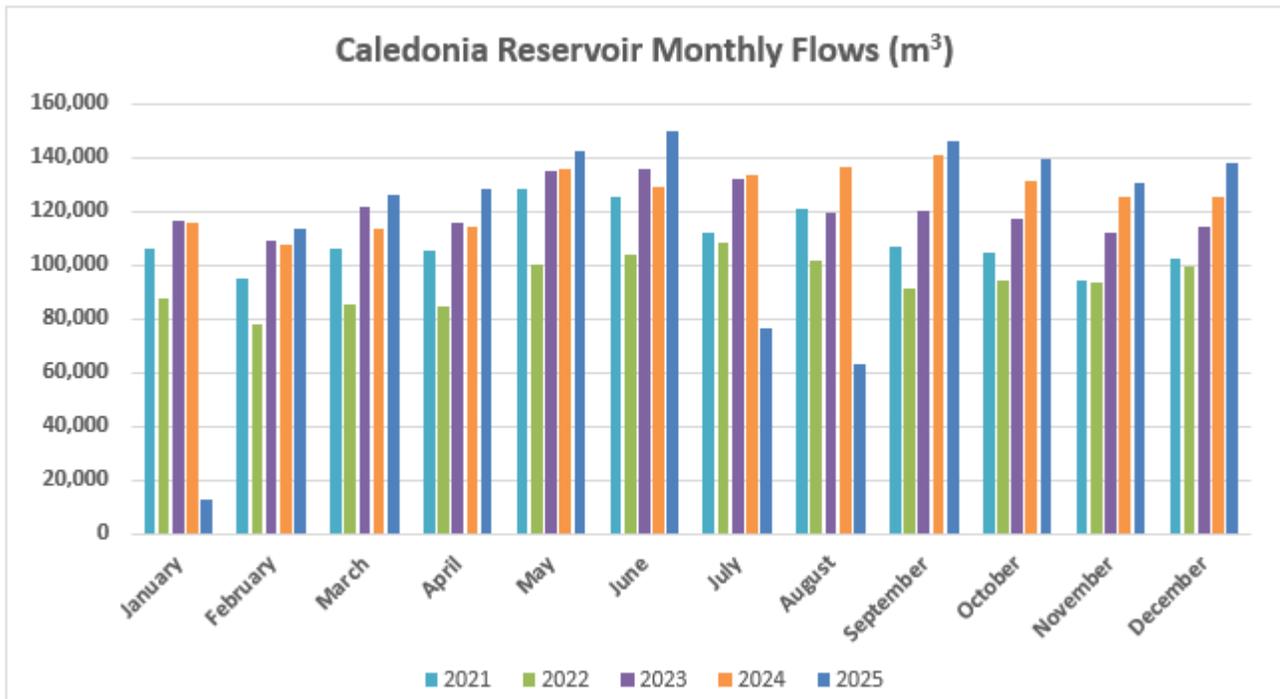
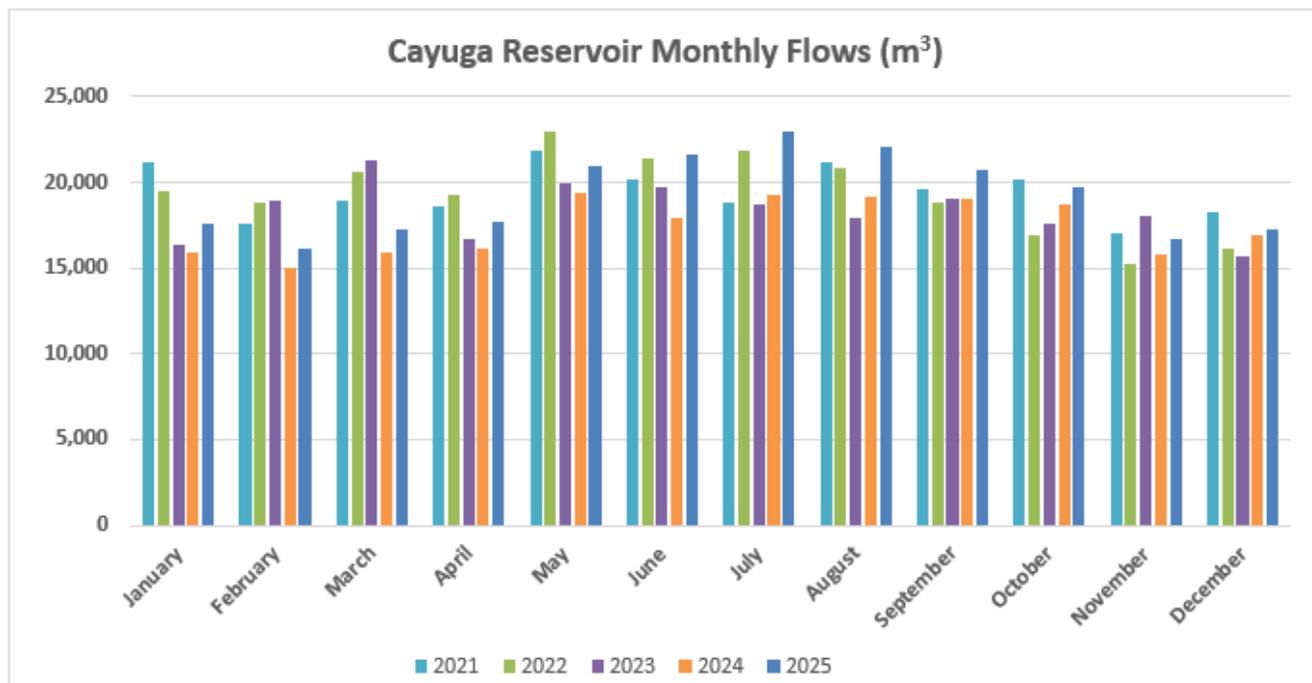


Table 8: 2025 Cayuga Reservoir Monthly Water Quantities and Flow Rates

Month	Monthly Total m ³	Daily Average m ³ /d	Maximum Daily Flow m ³ /d
January	17,608	568	678
February	16,101	575	819
March	17,221	555	750
April	17,677	589	806
May	21,006	677	1113
June	21,612	720	888
July	22,983	741	921
August	22,083	712	899
September	20,755	691	765
October	19,748	637	720
November	16,720	557	683
December	17,296	558	641

Figure 3 compares the monthly flows over the last five years at the Cayuga Reservoir. When comparing the average monthly flows for 2024 and 2025, there was a 10% **increase** in potable water serviced by the Cayuga Reservoir.

Figure 3: Cayuga Reservoir Five Year Monthly Flow Comparison



Each facility is assigned a rated capacity in their Engineer’s Report. When the maximum daily flow for 2025 and the rated capacity are compared, the Caledonia and Cayuga are operating at approximately for Caledonia and for Cayuga, however this calculation does not take into account any operational and infrastructure limitations.

Table 9: Summary Comparison of Rated Capacities and 2025 Maximum Flows

Municipal Drinking Water License	Distribution System	Rated Capacity	Maximum Daily Flow (m ³ / day)	Percentage of Capacity
66-103	Caledonia	13,000 m ³ /day	6,414	41.5%
066-103	Cayuga	2,333 m ³ /day	808	34.6%

To ensure the water treatment facility is capable of meeting current and projected demands, Haldimand County staff annually review plant capability and performance and update development allocation accordingly.

Regulatory Compliance

Adverse Water Quality Incidents

Regulatory compliance includes reporting any adverse water quality incidents to the Ministry of Health (MOH) and the MECP. In all instances, corrective action is initiated to resolve the issue. There were three non-confirmed adverse water quality reports in 2025.

Table 10: Summary of Adverse Water Quality Incidents in 2025

Incident	Date of Incident	Adverse Type	Corrective Action	Status
1	May 15, 2025	Low pressure alarm through loss of communication at Caledonia Reservoir.	Pumps were placed in local and the reservoir was placed in bypass mode while maintaining chlorine residuals. Chlorine residuals were monitored in the distribution system while in bypass mode.	Resolved
2	July 9, 2025	A Total Coliform Count of 2 cfu/100mL at SS#6 (Cayuga Standpipe)	Flushed sample stations and resamples were collected.	Resolved
3	August 13, 2025	The microbiological test was non determinative with a result of NDOGT (no data: overgrown with target)	Flushing of sample stations and resamples were collected.	Resolved

Annual Drinking Water Inspection

The MECP annually confirms compliance with drinking water legislation by conducting inspections on municipal drinking water systems. All aspects of the drinking water system are reviewed, including treatment equipment, disinfection, training records, and operational data required under the Safe Drinking Water Act, Ontario Regulations 170/03, 169/03 and 128/04. These inspections provide Haldimand County an opportunity to review best management practices and work towards continually improving the operation and management of the drinking water systems. Any issues of regulatory non-compliance are identified and corrective actions issued.

An inspection of the Caledonia and Cayuga Distribution System for the 2024 reporting period was completed on January 9, 2025. The findings from the 2024 annual drinking water system inspections are included in this report. Below is a summary of the key inspection findings:

There were three non-compliances identified during the inspection period resulting in an inspection rating of 85.49%. In all instances, corrective action was completed to satisfy MECP requirements.

Table 11: Summary of Non-Compliance Incidents in 2025

Incident	Finding Type	Finding	Status
# 1	Non-compliance	One quarterly sampling requirement of Trihalomethane was missed in the 2025 reporting period.	Corrective Actions Complete
# 2	Non-compliance	One quarterly sampling requirement of Haloacetic Acid was missed in the 2025 reporting period.	Corrective Actions Complete

Incident	Finding Type	Finding	Status
# 3	Non-compliance	One sample was missed during a watermain commissioning. Bacteriological samples was above regulatory requirement.	Corrective Actions Complete

The 2025 Caledonia and Cayuga Drinking Water Inspection has not taken place prior to the creation of this report. Information for 2025 inspection will be included in the 2026 Annual Report.

Report Availability

Reports can be viewed [online](#) or obtained at the Haldimand County Administration Building located at 53 Thorburn Street South, Cayuga, Ontario.

For more information on report content, please contact the Haldimand County Environmental Operations Division at 905-318-5932 or wwwops@haldimandcounty.on.ca