Dunnville Drinking Water System
2018 Annual Water Quality Report

January 1, 2018 – December 31, 2018

TABLE OF CONTENTS

Quality Management System Policy

The purpose of The Corporation of Haldimand County's Quality Management System policies are to:

- Ensure our drinking water systems comply with all current legislation and regulatory requirements for the safe supply of drinking water;
- Ensure financial support is provided to maintain infrastructure integrity to allow safe and consistent delivery of drinking water to our water customers;
- Commit to review and update our Operational Plans as regulated by the Drinking Water Quality Management Standard in order to continually improve our Quality Management System and to communicate the results 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, Drinking Water Works Permits and Municipal Drinking Water Licenses for the County's waterworks systems, 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 conducting 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 in 2018 including an update to the drinking water system's risk assessment. A review will be completed in 2019, with a focus on continual improvement and an update to staff roles and responsibilities directly impacting the drinking water system.

Haldimand County conducted internal audits with staff from Operations, Compliance and Management. An audit report was generated that identified minor non-conformances and opportunities for improvement. Staff have corrected the non-conformances and have been diligent in implementing all opportunities for improvement.

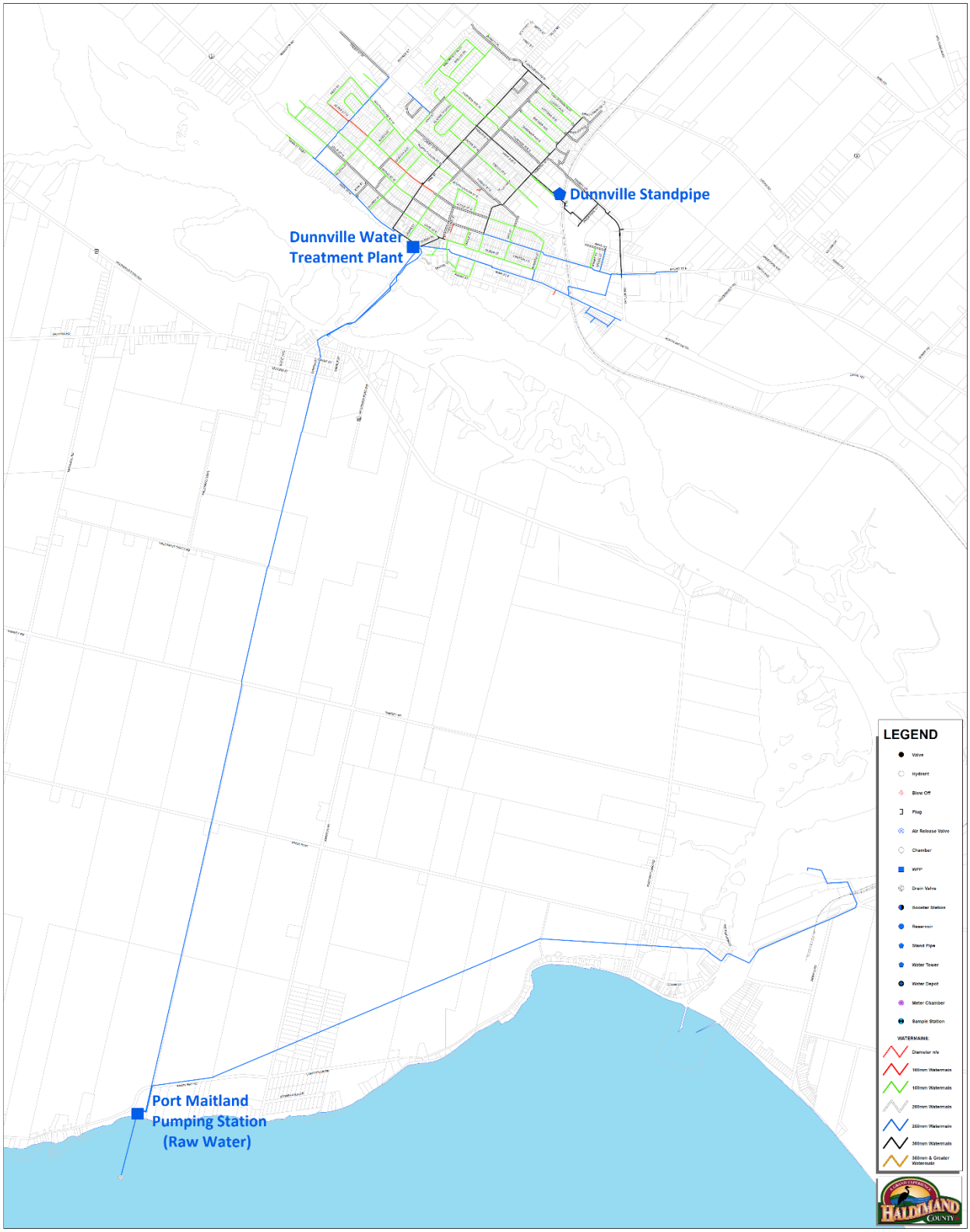
Haldimand County must receive accreditation annually to operate the water distribution systems. Through a qualified third party auditor, the County must demonstrate that its QMS meets the requirements of the DWQMS. SAI Global conducted an external audit on December 19 and 20, 2018. The County has reviewed the audit report, addressed the non-conformances and will be implementing the opportunities for improvement.

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 November 1, 2018.

All requirements were achieved in 2018 and SAI Global have recommended that Haldimand County is issued continued accreditation to operate the drinking water systems in 2019.

As part of the Operating Agreement with the County and regulated requirement, the contracted Operator of the County Water Treatment Plants (WTPs) must receive Drinking Water Quality Management Standard (DWQMS) accreditation as an operating authority. On June 27, 2018, Veolia Water provided a manager review of the external audit and follow-up activities. No non-conformances were identified and three opportunities for improvement. The presentation identified activities to address the opportunities for improvement. All requirements were achieved in 2018 and SAI Global have recommended that Veolia Water is issued continued accreditation to operate the drinking water systems in 2019.

DUNNVILLE DRINKING WATER SYSTEM



Dunnville Drinking Water System Overview

The Dunnville Drinking Water System's primary raw water source is Lake Erie. Raw water is drawn into the Port Maitland Low Lift Pumping Station where it can be pre-chlorinated with sodium hypochlorite for zebra mussel control. Raw water is then pumped through approximately ten kilometres of raw water transmission watermain to the Dunnville Water Treatment Plant. Raw water is also supplied to industrial users in Port Maitland.

There is also a raw water intake located in the Grand River. This raw water source has not been used since the early 2000's, however it is available for use in an emergency situation.

The Dunnville Water Treatment Plant is a conventional water treatment plant with a rated capacity of 14,500 m^3/day. A coagulant (Aluminum Sulphate was used in 2018) is injected into raw water and undergoes flash mixing. Water then flows through a series of flocculation and sedimentation tanks to five dual media filters containing sand and granular activated carbon. Following filtration, the water is disinfected with sodium hypochlorite and stored in two reservoirs. High lift pumps deliver potable water to the Dunnville Water Distribution System.

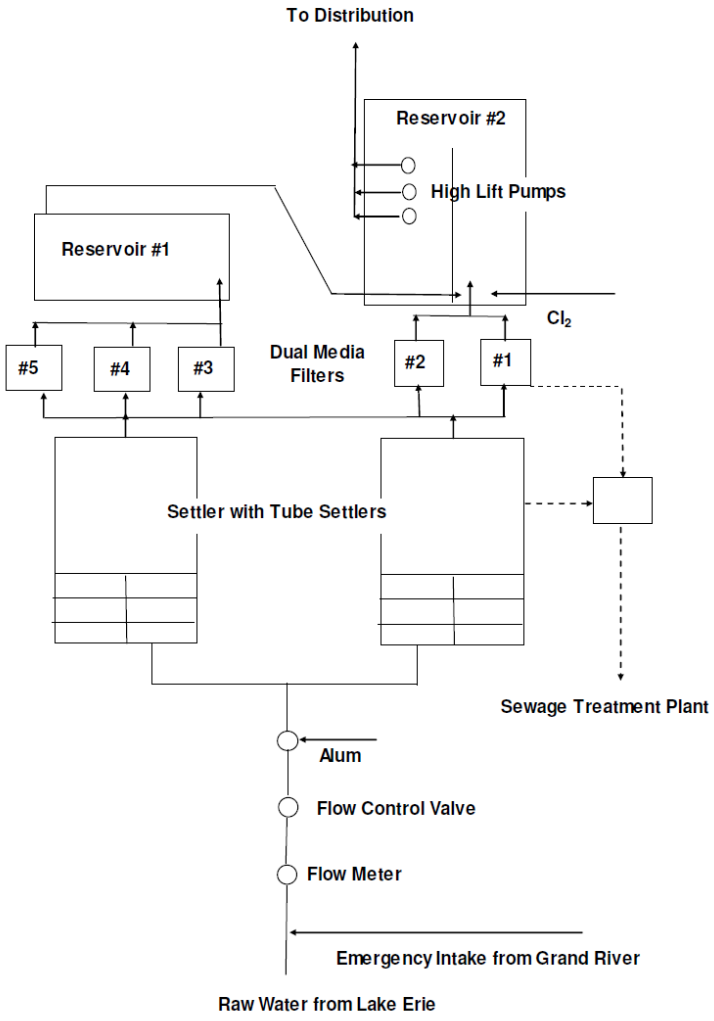


***Figure 1*: Dunnville Water Treatment Plant Schematic**

The water distribution system utilizes a standpipe for storage and to maintain water pressure. A bulk water depot provides potable water to rural residents and bulk water haulers.

The distribution system infrastructure services approximately 5,759 people (2016 Census).

Veolia Water is contracted to operate and maintain the raw water transmission mains, low lift pumping station, water treatment plant, and the standpipe. Haldimand County operates and maintains the distribution system and the bulk water depot.

Expenditure Information

Haldimand County and Veolia Water are diligent in prioritizing projects on an annual basis to eliminate unnecessary expenditures. Using the best available information at the time of this report, expenses incurred in the Dunnville Drinking Water System for 2018 are identified in Table 1. All drinking water expenditure information is not included in this report.

Table 1: Dunnville Drinking Water System 2018 Expenditures

Dunnville Drinking Water System:
Leak Detection
Dunnville Water Treatment Plant (WTP) Static/Power Mixer
Dunnville Water Treatment Plant (WTP) Backwash Valves Replacement
Port Maitland Transmission Main Valve Chamber Repair
Pre-Treatment Options – Taste & Odour Control
Filters 1 and 2 – Air Scour and Underdrains
Dunnville Standpipe Rehab & Mixing System
Port Maitland Low Lift Capital Repairs
Total Cost: $1,157,272

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**
  - ***Chlorine Residual Maintenance***
- **Monitoring**
  - ***Sampling Programs***
- **Emergency Preparedness**
  - ***Emergency Plans***

Haldimand County has adopted the multi-barrier approach in ensuring safe, reliable drinking water. *Figure* 2 shows how administration, design, maintenance, and operation work together to establish and maintain multi-barrier protection (US EPA, 1998).

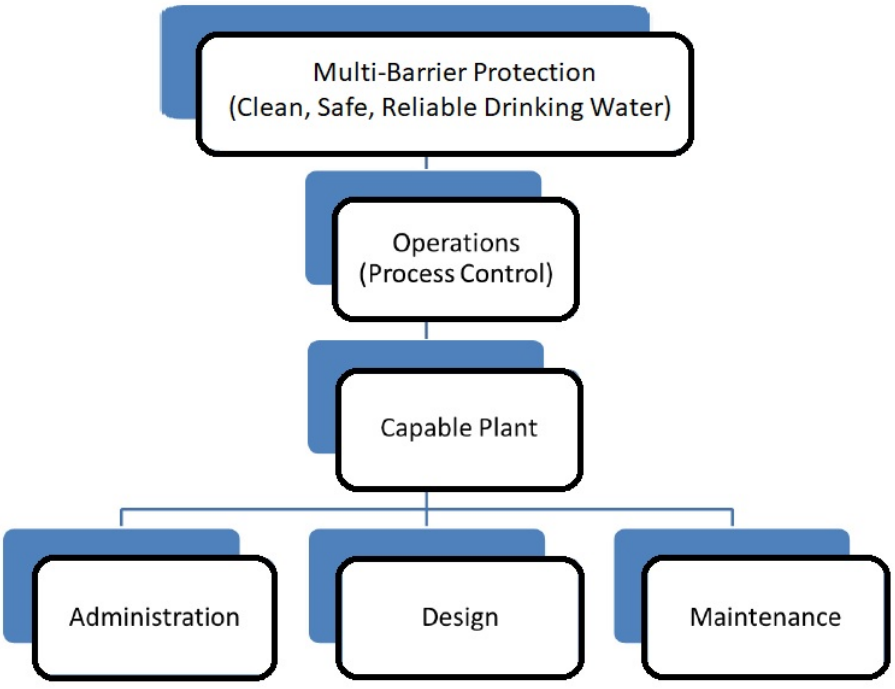


Figure 2: **Responsibilities for Clean, Safe and Reliable Drinking Water**

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.

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 and testing is a way to detect and control pathogenic bacteria in treated drinking water supplies. Heterotrophic Plate Count (HPC) 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 Dunnville Drinking Water System during 2018.

Table 2: 2018 Dunnville Drinking Water System Microbiological Sampling

	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)
Raw – Lake Erie	52	0 - 80	6 – 28,000	0	N/A	N/A	N/A
Raw at WTP	52	0 - 70	0 – 19,700	0	N/A	N/A	N/A
Raw – Grand River	52	4 - 700	20 – 650,000	0	N/A	N/A	N/A
Treated	156	0	0	156	0-8	156	0-1
Distribution System	236	0	0	236	0-260	236	0 - >200

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

Operational Sampling

Operational sampling and monitoring is 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 consistently achieved for filtered water turbidity and efforts continue to consistently achieve recommended settled and filter targets. Disinfection regulatory requirements and operational targets were consistently achieved in 2018.

Table 3: 2018 Dunnville Drinking Water System Operational Sampling

	Number of Grab Samples	Range of Results	Regulatory Requirement	Recommended Target
Raw Turbidity	8760	1.98 - 264	N/A	N/A
Settled Turbidity	8760	0.06 – 5.64	N/A	2.00 NTU
Filter Turbidity	8760	0.025 - 0.193	≤ 0.30 in 95% of all monthly readings	0.10 NTU
Treated Turbidity	8760	0.03 - 0.70	N/A	≤ 5.00 NTU
Free Chlorine High Lift	8760	0.93 – 1.56	≥ 0.05 mg/L	≥ 0.20 mg/L
Free Chlorine Distribution System	236	0.38 - 1.74	≥ 0.05 mg/L	≥ 0.20 mg/L

*****Note: 8760 is used for continuous monitoring (24 samples per day * 365 days/year)

As result of public inquiries, a quarterly treated water hardness sampling program was initiated in 2018.

The term hardness was originally applied to waters that were hard to wash in, referring to the soap wasting properties of hard water. Hardness prevents soap from lathering by causing the development of an insoluble curdy precipitate in the water; hardness typically causes the buildup of hardness scale (such as seen in cooking pans). Dissolved calcium and magnesium salts are primarily responsible for most scaling in pipes and water heaters and can cause numerous problems in laundry, kitchen, and bath. Hardness is usually expressed in grains per gallon (or ppm) as calcium carbonate equivalent.

The degree of hardness standard as established by the American Society of Agricultural Engineers (S-339) and the Water Quality Association (WQA) is shown in the following table:

Table 4: Standard Degree of Hardness

Degree of Hardness	Grains per Gallon (gpg)	Ppm (mg/L)
Soft	< 1.0	< 17.0
Slightly Hard	1.0 – 3.5	17 - 60
Moderately Hard	3.5 – 7.0	60 - 120
Hard	7.0 – 10.5	120 - 180
Very Hard	> 10.5	> 180

The sample results in Table 5 indicate that the average value for Dunnville is moderately hard water as taken from the Degree of Hardness Table above.

Table 5: 2018 Dunnville Drinking Water System Hardness Sampling

Parameter	Sample Date	Dunnville
Total Hardness (mg/L as $CaCO_3$)	March 1, 2018	116
	June 19, 2018	116
	September 18, 2018	108
	November 6, 2018	132
	2018 Average ----->	**118**

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 2018 sampling has been provided in Table 6.

Table 6: 2018 Dunnville Drinking Water System Lead Sampling

Location Type	Number of Samples	Range of Results (min) – (max)	Number of Exceedances
Plumbing - Lead	N/A	N/A	N/A
Distribution - Lead	N/A	N/A	N/A
Distribution - pH	6	6.76 - 7.50	N/A
Distribution - Alkalinity	6	82 – 97 mg/L	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 (DBP), 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 7.

Haldimand County sample for haloacetic acids (HAA) and trihalomethanes (THM) at the water treatment plant and in the distribution system where there is an elevated potential for the formation of these byproducts. Although a treatment sample is not required by regulation, the sample is used to monitor byproduct formation within the drinking water system.

Table 7: 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 an 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 8 provides a summary of 2018 disinfection byproduct sampling.

Table 8: 2018 Dunnville Drinking Water System DBP Sampling

Parameter	Sample Date	Sample Results (ug/L)	Annual Average (ug/L)	Regulatory MAC (ug/L)	Exceedance
Haloacetic Acids Dunnville WTP	February 6, 2018 April 30, 2018 August 13, 2018 November 5, 2018	7.5 6.6 7.6 8.7	7.0	80	No
Haloacetic Acids Dunnville Distribution	February 13, 2018 May 8, 2018 August 7, 2018 November 5, 2018	12.5 < 5.3 < 5.3 15.8	9.7	80	No
Trihalomethanes Dunnville WTP	February 6, 2018 April 30, 2018 August 13, 2018 November 5, 2018	11.4 13.6 20.2 17.7	15.7	100	No
Trihalomethanes Dunnville Distribution	February 13, 2018 May 8, 2018 August 7, 2018 November 5, 2018	17 16 41 26	25	100	No

Additional sample results for organic and inorganic parameters can be found in the appendices.

WATER USE

Raw Water

The Dunnville Drinking Water System's raw water source is Lake Erie. A Permit to Take Water (PTTW) specifies the maximum volume of raw water that can be taken from the water source and conveys MECP site-specific regulatory requirements. When comparing the 2018 maximum raw water flow and the permit limits (*Figure* 3), 74.1% of Haldimand County's raw water allotment was available for use. The Grand River water supply was not used in 2018.

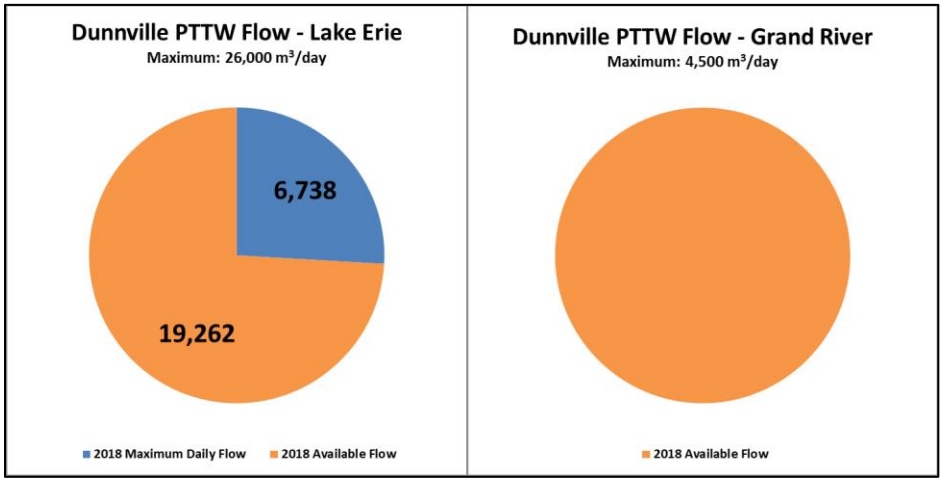


***Figure 3*: Dunnville Permit to Take Water (PTTW) Flow Comparisons**

Potable Water

As required by Schedule 22 of Ontario Regulation 170/03, Table 9, Table 10 and *Figure* 3 are intended to provide a summary of potable water supplied by the Dunnville Drinking Water System in 2018.

Table 9: 2018 Dunnville Monthly Potable Water Flow Data

System	Month	Monthly Total m^3	Daily Average m^3	Maximum Day m^3	Maximum Daily Flow Rate L/s
Dunnville Drinking Water System	January	77,167	2,468	4,587	105.6
	February	64,875	2,317	3,444	105.0
	March	74,474	2,403	3,600	105.2
	April	67,921	2,264	3,173	143.1
	May	91,373	2,941	4,703	223.7
	June	104,265	3,482	5,208	218.9
	July	115,507	3,786	4,688	198.9
	August	99,506	3,210	4,162	153.1
	September	89,238	2,975	5,337	207.5
	October	81,113	2,617	4,464	167.0
	November	69,369	2,322	2,925	104.3
	December	77,441	2,475	3,420	104.5

Figure 4 compares the monthly flows over the last five years at the Dunnville Water Treatment Plant. When comparing the average monthly flows for 2017 and 2018, there was a 5.26% increase in potable water supplied to the distribution system.

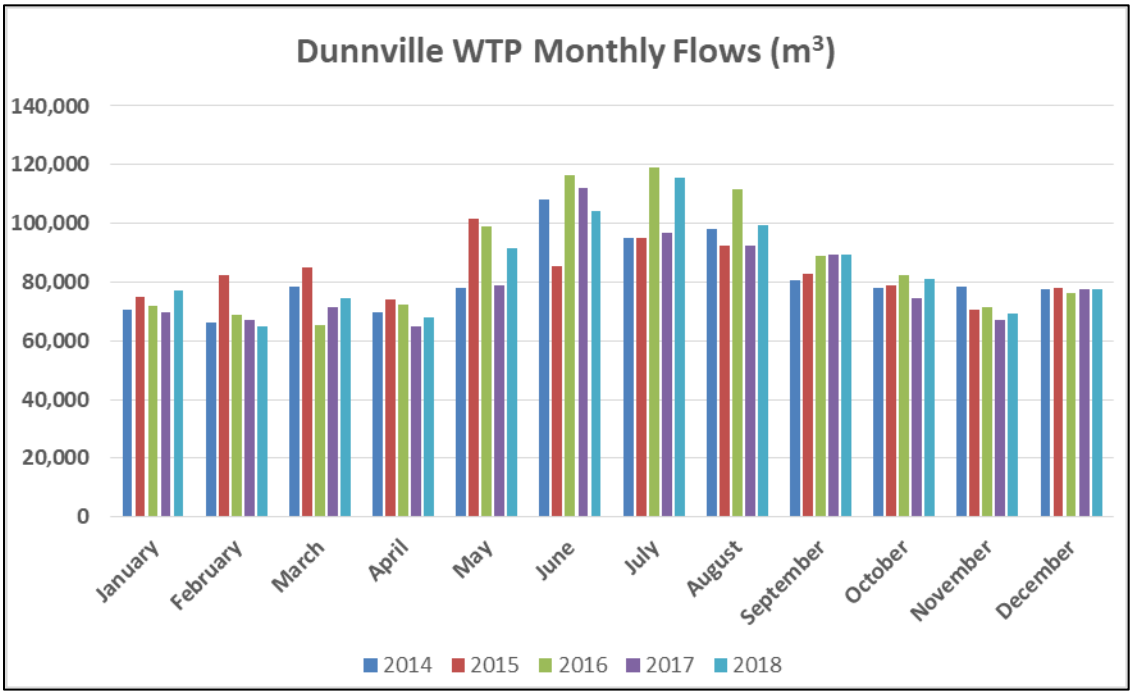


***Figure 4*: Dunnville Water Treatment Plant Five Year Monthly Potable Flow Comparison**

According to the Dunnville Water Treatment Plant's Engineer's Report, the facility has a rated capacity of 14,500 cubic metres per day. When compared against the maximum daily flow for 2018, the Dunnville Water Treatment Plant is operating at approximately 36% of design capacity, however this calculation does not take into account any operational and infrastructure limitations.

Table 10: Comparison of Rated Capacity and 2018 Maximum Flow Rate

System and Municipal Drinking Water License	Rated Capacity	Maximum Daily Flow (m^3 / day)	Percentage of Capacity
Dunnville 066-101	14,500 m^3/day	5,208 m^3/day	35.9 %

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 requires reporting adverse water quality incidents to the Ministry of Health (MOH) and the Ministry of the Environment, Conservation and Parks (MECP). In all instances, corrective action is initiated to resolve the issue. A summary of the events and corrective actions is provided in Table 9.

Table 11: 2018 Dunnville Drinking Water System Reported Adverse Events

Incident Date	Parameter	Result	Corrective Action	Date Resolved
July 25, 2018	Total Coliforms	Dunnville Sample Station #15 8 cfu/100 mL	Resampled – upstream, downstream and at the original adverse location.	July 27, 2018

Corrective actions are based on each incident and is determined through discussion with the MOH. For each adverse identified in Table 9, resamples were taken at the source of the adverse and upstream and downstream locations. All samples were negative for the presence of total coliform bacteria.

Annual Drinking Water Inspection

The MECP annually confirms compliance with drinking water legislation by conducting inspections on 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 and Veolia 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.

The findings for the 2017 and 2018 annual drinking water system inspections are included in this report., as the 2017 final inspection report was not available prior to report completion. Below are the key findings for both inspections:

Dunnville Drinking Water System – Waterworks # 220003555

There were two instances of non-compliance identified during the 2017 inspection period. As a result of the non-compliances, the County received a **97.14%** inspection rating from the MECP.

The following issues were identified during the drinking water inspection:

1. All continuous analysers were not calibrated, maintained and operated, in accordance with the manufacturer's instructions or the regulation.

   Follow-Up: A special study was conducted to confirm the accuracy of the online chlorine analyzer in relation to handheld chlorine analyzers. Due to the age of the analyzer, a replacement chlorine analyzer was obtained and a second study was conducted to ensure representative chlorine residuals were obtained. Veolia reviewed and revised their standard operating procedure for chlorine analyzer calibrations. The MECP was provided a comprehensive report outlining actions taken by Veolia and the County and non-compliance was closed.

2. At the time of the physical inspection the owner/operating authority did not have ready access to the operations and maintenance manuals or the required documents within the manuals as required by the Municipal Drinking Water Licence.

   Follow-Up: All documents were consolidated into a single Operations and Maintenance Manual that is readily accessible for review. The MECP were provided a copy of the manual and the non-compliance was closed.

During each inspection, the Ministry may provide recommendations and best practices specific to each drinking water system. It is recommended that owner's and operators develop an awareness of the identified items and consider measures to address them. The following item was identified during the 2017 drinking water inspection:

1. During the physical inspection, the outdoor access covers to the treated reservoirs did not contain gaskets along base of the covers. With no gaskets along the base of the covers there is a potential for the entry of surface water or foreign material to enter the reservoirs.

   Recommendation: It is recommended that the owner/operating authority installs gaskets along the base of the access covers. It is also recommended that the owner/operating authority periodically checks the integrity of the gaskets and replaces the gaskets if the integrity has been compromised.

   County Follow-Up: Veolia investigated various options and obtained quotes for having the hatches sealed or replaced.

There were no instances of non-compliance during the 2018 inspection period and the County received a **100%** inspection rating from the MECP.

During each inspection, the Ministry may provide recommendations and best practices specific to each drinking water system. It is recommended that owner's and operators develop an awareness of the identified items and consider measures to address them. The following items were identified during the 2018 drinking water inspection:

1. At the time of the physical inspection, the raw water screens at the Port Maitland pump station were very corroded and breaking apart. This allows for material larger than the screen mesh size to pass through and enter the works.

   Recommendation: It is recommended that the owner/operating authority replaces or repairs the raw water screens at Port Maitland pump station.

   County Follow-Up: The raw water manual screens were refurbished to repair any holes.

2. As also noted in the 2018-2019 Dunnville Drinking Water System inspection report, at the time of the physical inspection, the outdoor access covers to the treated reservoirs did not contain gaskets along the base of the covers. With no gaskets along the base of the cover there is a potential for the entry of the surface water or foreign material to enter the reservoirs.

   Recommendation: It is recommended that the owner/operating authority installs gaskets along the base of the access covers. It is also recommended that the owner/operating authority periodically checks the integrity of the gaskets and replaces the gaskets if the integrity has been compromised.

   County Follow-Up: After further investigation, it was determined that the hatch design isn't intended for a gasket and installing one could compromise the seal. To allow safe access to the reservoir hatches, it was proposed to the MECP that an operating procedure will be created that ensures no debris enters the reservoir when a hatch is opened.

   Haldimand County continues to work closely with regulatory bodies to ensure a continued supply of safe, reliable drinking water to its users. All recommendations have been addressed and communicated to the MECP.

REPORT AVAILABILITY

This report can be viewed online at:

https://www.haldimandcounty.ca/drinking-water/

Reports can also be obtained upon request at any Haldimand County Satellite Office:

Cayuga Administration Building
45 Munsee Street North
PO Box 400
Cayuga, ON N0A 1E0

Phone: 905-318-5932
Fax: 905-772-3542

Caledonia Satellite Office
282 Argyle Street South
Caledonia, ON N3W 1K7

Phone: 905-318-5932
Fax: 905-765-1436

Dunnville Satellite Office
117 Forest Street East
Unit 1
Dunnville ON N1A 1B9

Phone: 905-318-5932
Fax: 905-774-4294

Hagersville Satellite Office
1 Main Street South
Hagersville, ON N0A 1Ho

Phone: 905-318-5932
Fax: 905-768-7328

For more information on report content, please contact the Haldimand County Environmental Operations Division at:

Email: wwwops@haldimandcounty.on.ca

Telephone: 905-318-5932

Appendix A

Inorganic and Organic Sample Results

Inorganic Parameters:

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Antimony	March 5 2018	ND	ug/L	No
Arsenic	March 5 2018	ND	ug/L	No
Barium	March 5 2018	20	ug/L	No
Boron	March 5 2018	ND	ug/L	No
Cadmium	March 5 2018	ND	ug/L	No
Chromium	March 5 2018	ND	ug/L	No
Fluoride	March 5 2018	ND	mg/L	No
Mercury	March 5 2018	ND	mg/L	No
Nitrite	February 5 2018 Apr 30 2018 Aug 7 2018 November 5 2018	ND	mg/L	No
Nitrate	February 5 2018 Apr 30 2018 Aug 7 2018 November 5 2018	0.835 0.834 0.161 0.214	mg/L	No
Selenium	March 5 2018	ND	ug/L	No
Sodium	March 5 2018	15.8	mg/L	No
Uranium	March 5 2018	ND	ug/L	No

ND = Not Detectable

Organic Parameters:

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Alachlor	March 5 2018	ND	ug/L	No
Atrazine + Metabolites	March 5 2018	ND	ug/L	No
Azinphos-methyl	March 5 2018	ND	ug/L	No
Benzene	March 5 2018	ND	ug/L	No
Benzo(a)pyrene	March 5 2018 April 2, 2018[1]	ND ND	ug/L	No
Bromoxynil	March 5 2018	ND	ug/L	No
Carbaryl	March 5 2018	ND	ug/L	No
Carbofuran	March 5 2018	ND	ug/L	No
Carbon Tetrachloride	March 5 2018	ND	ug/L	No
Chlorpyrifos	March 5 2018	ND	ug/L	No
Diazinon	March 5 2018	ND	ug/L	No
Dicamba	March 5 2018	ND	ug/L	No
1,2-Dichlorobenzene	March 5 2018	ND	ug/L	No
1,4- Dichlorobenzene	March 5 2018	ND	ug/L	No
1,2- Dichloroethane	March 5 2018	ND	ug/L	No
1,1- Dichloroethylene	March 5 2018	ND	ug/L	No
Dichloromethane (Methylene Chloride)	March 5 2018	ND	ug/L	No
2,4- Dichlorophenol	March 5 2018	ND	ug/L	No
2,4- Dichlorophenoxy acetic acid (2,4-D)	March 5 2018	ND	ug/L	No
Diclofop-methyl	March 5 2018	ND	ug/L	No
Dimethoate	March 5 2018	ND	ug/L	No
Diquat	March 5 2018	ND	ug/L	No
Diuron	March 5 2018	ND	ug/L	No
Glyphosate	March 5 2018	ND	ug/L	No
Malathion	March 5 2018	ND	ug/L	No
MCPA	March 5 2018	ND	ug/L	No
Metolachlor	March 5 2018	ND	ug/L	No
Metribuzin	March 5 2018	ND	ug/L	No
Monochlorobenzene (Chlorobenzene)	March 5 2018	ND	ug/L	No
Paraquat	March 5 2018	ND	ug/L	No
Pentachlorophenol	March 5 2018	ND	ug/L	No
Phorate	March 5 2018	ND	ug/L	No
Picloram	March 5 2018	ND	ug/L	No
Prometryne	March 5 2018	ND	ug/L	No
Simazine	March 5 2018	ND	ug/L	No
Terbufos	March 5 2018	ND	ug/L	No
Tetrachloroethylene	March 5 2018	ND	ug/L	No
2,3,4,6- Tetrachlorophenol	March 5 2018	ND	ug/L	No
Total PCBs	March 5 2018	ND	ug/L	No
Triallate	March 5 2018	ND	ug/L	No
Trichloroethylene	March 5 2018	ND	ug/L	No
2,4,6- Trichlorophenol	March 5 2018	ND	ug/L	No
Trifluralin	March 5 2018	ND	ug/L	No
Vinyl Chloride	March 5 2018	ND	Ug/L	No

ND = Not Detectable

[1] Final quarterly Benzo(a)pyrene adverse resample required through Regulation 170 Schedule 24.

Microcystin Sample Results

Parameter	Sample Date	Raw Water Results		Treated Water Results	Unit of Measure	Exceedance
		Lake Erie	Grand River			
Microcystin	May 7 2018	ND		ND	ug/L	No
	May 14 2018	ND		ND		
	May 22 2018			ND		
	May 28 2018	ND		ND		
	June 4 2018	ND		ND		
	June 11 2018	ND		ND		
	June 18 2018	ND	ND	ND		
	June 25 2018	ND	ND	ND		
	July 2 2018	ND		ND		
	July 9 2018	ND	ND	ND		
	July 16 2018	ND	ND	ND		
	July 23 2018	ND	ND	ND		
	July 30 2018	ND	ND	ND		
	August 6 2018	ND	ND	ND		
	August 13 2018	ND	ND	ND		
	August 20 2018	ND	ND	ND		
	August 27 2018	ND		ND		
	Sept. 3 2018	ND	ND	ND		
	Sept. 10 2018	ND	ND	ND		
	Sept. 17 2018	ND	ND	ND		
	Sept. 24 2018	ND	ND	ND		
	October 1 2018	ND	ND	ND		
	October 8 2018	ND	ND	ND		
	October 15 2018	ND	ND	ND		
	October 22 2018	ND	ND	ND		
	October 29 2018	ND	ND	ND		

ND = Not Detectable