Nanticoke Drinking Water System
2019 Annual Water Quality Report

January 1, 2019 – December 31, 2019

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NANTICOKE DRINKING WATER SYSTEM

Nanticoke Drinking Water System Overview

Lake Erie raw water flows from the Ontario Power Generation forebay into the Nanticoke Industrial Pumping Station forebay. Raw water can be pre-chlorinated for zebra mussel control and then drawn into two raw water wet wells. Seven vertical turbine pumps are capable of supplying Imperial Oil and US Steel plants with raw water. Two submersible pumps supply the municipal treatment works with raw water.

A coagulant (poly-aluminum chloride was used in 2019) is injected into the raw water supply. Powdered activated carbon can be injected into the raw water if there are taste and odour issues, however it was not added in 2019. Water flows into a high-rate clarification process (Actiflo), which uses microsand and polymer to improve floc formation and significantly reduce settling times. Settled water then flows to three filter units containing sand and anthracite. Filtered water is chlorinated with sodium hypochlorite for primary disinfection prior to flowing to two reservoirs. The reservoirs supply a high lift pumping station, where chlorine is injected for secondary disinfection, before being pumped into the distribution system.

A settling lagoon collects waste water from various water treatment plant processes and continuously discharges to Lake Erie.

Figure 1 is a simplified schematic of the Nanticoke Water Treatment Plant. A larger version of the diagram is included in the appendices.

The distribution system is comprised of three residential communities (Townsend, Jarvis and Hagersville) and the Lake Erie Industrial Park. Townsend utilizes a water tower for storage and to maintain pressure in the distribution system. A booster station is utilized to maintain pressure and flow to Hagersville. As required, this facility has the capability to add sodium hypochlorite to the potable water to maintain chlorine residuals. Hagersville utilizes a standpipe for storage and to maintain pressure in the distribution system. Bulk water depots are located in Hagersville and Jarvis. In addition, the Nanticoke Drinking Water System provides potable water to the Mississaugas of the New Credit First Nation.

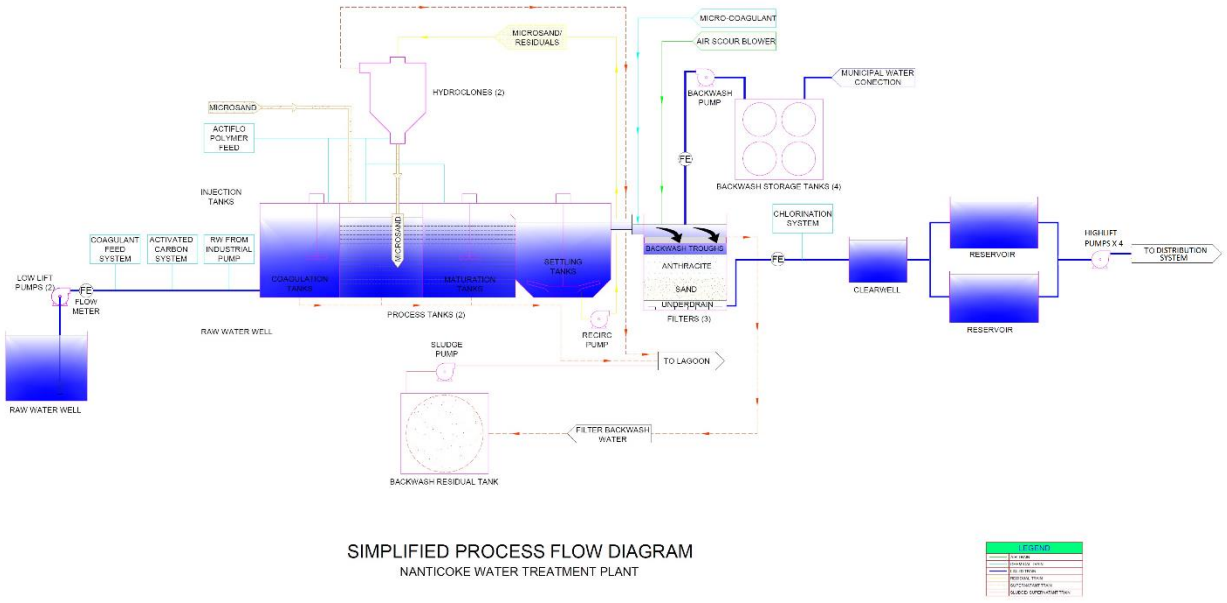

***Figure 1*: Nanticoke Water Treatment Plant Schematic**

The distribution system infrastructure services approximately 4,900 people (2016 Census).

Veolia Water Canada is contracted to operate and maintain the Nanticoke Water Treatment Plant, Townsend Re-chlorination Building, Townsend Elevated Tank, Hagersville Booster Station, Hagersville Standpipe and the transmission watermains. Haldimand County operates and maintains the distribution system, including the bulk water depots.

Expenditure Information

Haldimand County and Veolia 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, expenses incurred in the Nanticoke Drinking Water System for 2019 are identified in Table 1. Not all drinking water expenditure information is included in this report.

Table 1: Nanticoke Drinking Water System 2019 Expenditures

Nanticoke Drinking Water System:	
Nanticoke WTP Lagoon Clean Out	
Transmission Main Valve Chamber Repair Program	
Nanticoke Entry Gate Replacement	
Low Lift Analyzer Replacements	
High Lift Pump Motors and VFDs	
IPS Travelling Screen Refurbishment	
Forebay Headwall Structural Repairs	
Total Cost:	**$690,810**

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 2 shows how administration, design, maintenance, and operations work together to establish and maintain multi-barrier protection (US EPA, 1998).

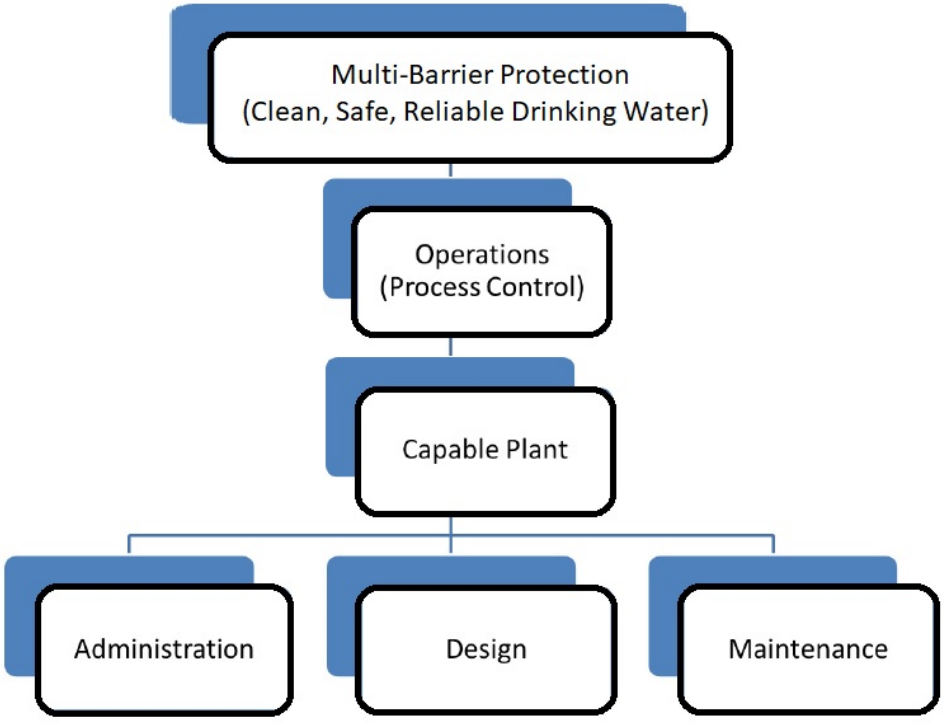

***Figure 2*: Responsibilities for Clean, Safe and Reliable Drinking Water**

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 microorganisms (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) 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 Nanticoke Drinking Water System during 2019.

Table 2: 2019 Nanticoke 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	159	0 – 20	0– 7,600	N/A	N/A	N/A	N/A
Treated	159	0	0	159	0 – 500	N/A	N/A
Industrial Park Distribution System	53	0	0	53	0	53	0 - 1
Townsend Distribution System	106	0	0 - 2	106	0 - 7	53	0 - >200
Jarvis Distribution System	53	0	0	53	0 – 3	53	0 - 22
Hagersville Booster Station	74	0	0	74	0 - 5	N/A	N/A
Hagersville Distribution System	106	0	0 - 3	53	0 – 9	53	0 - 65

*****Note: A minimum of 25% of 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. Schedules 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 filtered water turbidity and efforts continue to consistently achieve settled and filter targets. Disinfection regulatory requirements and operational targets were consistently achieved in 2019.

Table 3: 2019 Nanticoke Drinking Water System Operational Sampling

	Number of Grab Samples	Range of Results	Regulatory Requirement	Recommended Target
Raw Turbidity	8760	0.59 – 56.1	N/A	N/A
Settled Turbidity	8760	0.08 – 4.98	N/A	1.00 NTU
Filtered Turbidity	8760	0.02 - 0.20	≤ 0.30 in 95% of all monthly readings	0.10 NTU
Treated Turbidity	8760	0.01 – 4.6	N/A	≤ 5.00
Free Chlorine High Lift	8760	0.72 – 2.12	≥ 0.05 mg/L	≥ 0.20 mg/L
Free Chlorine Industrial Park	105	0.72 – 1.58 mg/L	≥ 0.05 mg/L	≥ 0.20 mg/L
Free Chlorine Townsend	158	0.53 - 1.33 mg/L	≥ 0.05 mg/L	≥ 0.20 mg/L
Free Chlorine Jarvis	105	0.38 – 1.33 mg/L	≥ 0.05 mg/L	≥ 0.20 mg/L
Free Chlorine Hagersville Booster Station	74	0.80 – 1.28 mg/L	≥ 0.05 mg/L	≥ 0.20 mg/L
Free Chlorine Hagersville	158	0.32 – 1.29 mg/L	≥ 0.05 mg/L	≥ 0.20 mg/L

*****Note: 8760 is used for continuous monitoring.

Water treatment plant filters are backwashed to maintain or improve performance of the filters. The backwash water is discharged to a lagoon, which continuously discharges to Lake Erie. Municipal Drinking Water License number 066-102 specifies sampling requirements, summarized in Table 4, to monitor the discharge and ensure minimal impact to the natural environment.

Table 4: 2019 Nanticoke Water Treatment Plant Lagoon Sampling

Date of Legal Instrument Issued	Parameter	# of Samples	Annual Average (mg/L)	Regulatory Requirement
License 066-102 July 15, 2016	Backwash Lagoon Total Suspended Solids	52	2.4	Annual Average Concentration 25 mg/L

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

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 5: 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 6 indicate that the average values for the Nanticoke system is considered a moderately hard to hard water as taken from the Degree of Hardness Table above.

Table 6: 2019 Nanticoke Drinking Water System Hardness Sampling

Parameter	Sample Date	Industrial Park	Townsend	Jarvis	Hagersville
Total Hardness (mg/L as $CaCO_3$)	March 5, 2019	160	144	174	166
	May 24, 2019	123	133	124	140
	September 3, 2019	116	124	136	132
	November 19, 2019	156	161	124	124
	2019 Average ------>	**139**	**141**	**140**	**141**

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 2019 sampling has been provided in Table 7.

Table 7: 2019 Nanticoke Drinking Water System Lead Sampling

	Sample Type	Number of Samples	Range of Results	Number of Exceedances
Industrial Park	Plumbing - Lead	Exempt By Regulation		
	Distribution - Lead	Not Required By Regulation in 2019		
	Distribution - Alkalinity	2	92 - 98 mg/L	N/A
	Distribution - pH	2	7.99 – 8.05	N/A
Townsend	Plumbing - Lead	Exempt By Regulation		
	Distribution - Lead	Not Required By Regulation in 2019		
	Distribution - Alkalinity	2	98 mg/L	N/A
	Distribution - pH	2	8.11 – 8.21	N/A
Jarvis	Plumbing - Lead	Exempt By Regulation		
	Distribution - Lead	Not Required By Regulation in 2019		
	Distribution - Alkalinity	2	95 - 99 mg/L	N/A
	Distribution - pH	2	7.99 – 8.22	N/A
Hagersville	Plumbing - Lead	Exempt By Regulation		
	Distribution - Lead	Not Required By Regulation in 2019		
	Distribution - Alkalinity	2	92 – 98 mg/L	N/A
	Distribution - pH	2	8.06 – 8.21	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 6.

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 and individual distribution system samples are not required by regulation, these samples are used to monitor byproduct formation within the drinking water system.

Table 8: 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 using the worst case scenario. The calculated THM and HAA averages were below the maximum allowable concentrations (MAC) permitted by the MECP. Table 9 provides a summary of 2019 disinfection byproduct sampling.

Table 9: 2019 Nanticoke Drinking Water System DBP Sampling

Parameter	Sample Location	Sample Date	Sample Results (ug/L)	Annual Average (ug/L)	Regulatory MAC (ug/L)	Exceedance
Haloacetic Acids	Nanticoke WTP	February 4, 2019 May 6, 2019 August 6, 2019 November 4, 2019	8.3 18.9 27.9 19.0	18.5	80	**No**
	Industrial Park Distribution	February 13, 2019 May 10, 2019 August 6, 2019 November 12, 2019	6.5 19.5 24.7 9.8	15.1	80	**No**
	Townsend Distribution	February 13, 2019 May 10, 2019 August 6, 2019 November 12, 2019	12.4 23.4 33.4 18.4	21.9	80	**No**
	Jarvis Distribution	February 13, 2019 May 10, 2019 August 6, 2019 November 12, 2019	14.7 24.1 31.8 18.2	22.2	80	**No**
	Hagersville Distribution	February 13, 2019 May 10, 2019 August 6, 2019 November 12, 2019	14.5 28.6 31.4 22.5	24.3	80	**No**

Table 9: 2019 Nanticoke Drinking Water System DBP Sampling (continued)

Parameter	Sample Location	Sample Date	Sample Results (ug/L)	Annual Average (ug/L)	Regulatory MAC (ug/L)	Exceedance
Trihalomethanes	Nanticoke WTP	February 4, 2019 May 6, 2019 August 6, 2019 November 4, 2019	18.5 36.2 47.2 25.2	31.8	100	**No**
	Industrial Park Distribution	February 13, 2019 May 10, 2019 August 6, 2019 November 12, 2019	26 37 60 33	39.0	100	**No**
	Townsend Distribution	February 13, 2019 May 10, 2019 August 6, 2019 November 12, 2019	28 51 69 46	48.5	100	**No**
	Jarvis Distribution	February 13, 2019 May 10, 2019 August 6, 2019 November 12, 2019	31 47 67 48	48.3	100	**No**
	Hagersville Distribution	February 13, 2019 May 10, 2019 August 6, 2019 November 12, 2019	32 51 68 61	**53.0[1]**	100	**No**

[1] Result exceeded half the standard prescribed in Schedule 2 on the Ontario Drinking Water Quality Standards.

Additional sample results for organic and inorganic parameters are located in the appendices.

WATER USE

Raw Water

The Nanticoke 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. Haldimand County has a large volume of available raw water capacity, however an interim limit of 437 MLD is in place until a number of Ministry imposed conditions have been satisfied. When comparing the 2019 maximum raw water flow and the interim permit limits (Figure 2), the County's maximum daily flow for 2019 represented 80.5% of its PTTW raw water allotment.

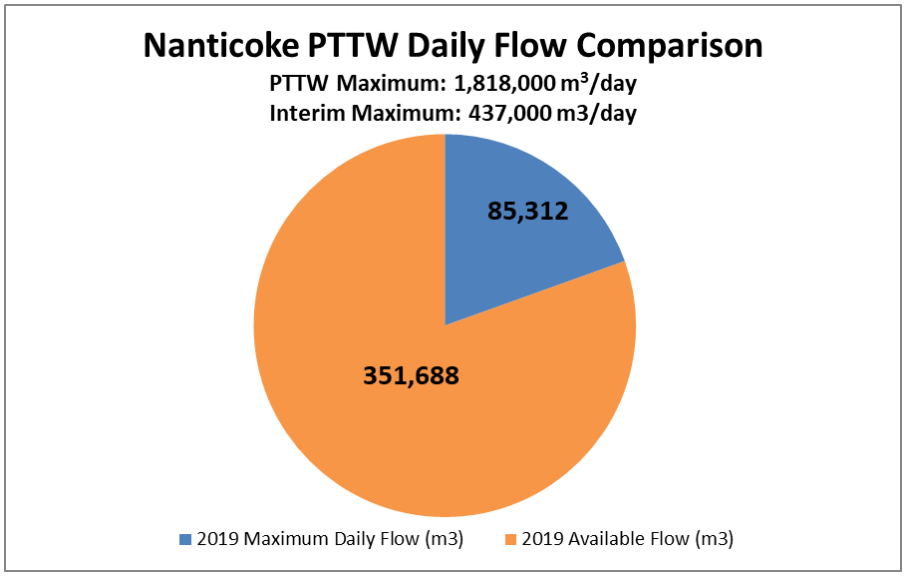

***Figure 2*: Nanticoke Permit To Take Water Flow Comparison**

Potable Water

As required by Schedule 22 of Ontario Regulation 170/03, Table 10, Table 11 and Figure 3 are intended to provide a summary of potable water supplied by the Nanticoke Drinking Water System in 2019.

Table 10: 2019 Nanticoke Monthly Potable Water Flow Data

System	Month	Monthly Total m^3	Daily Average m^3/d	Maximum Daily Flow m^3/d	Maximum Daily Peak Flow L/s
Nanticoke Drinking Water System	January	236,090	7,616	8,941	248.9
	February	236,156	8,434	9,640	247.6
	March	217,678	7,022	9,248	246.9
	April	193,924	6,464	7,715	257.4
	May	215,618	6,955	8,339	265.1
	June	228,556	7,619	8,856	271.8
	July	236,644	7,634	9,211	278.5
	August	233,822	7,543	9,764	307.6
	September	213,048	7,102	8,582	294.3
	October	195,347	6,302	7,522	304.8
	November	183,157	6,105	6,929	283.6
	December	186,707	6,023	7,599	268.8

Figure 3 compares the monthly flows over the last five years at the Nanticoke Water Treatment Plant. When comparing the average monthly flows for 2018 and 2019, there was a 11.5% increase in metered potable water treated at the Nanticoke Water Treatment Plant. The 2019 increase is the result of improved tracking of all water treated at the treatment plant. Previous reported volumes do not include water that is used at the treatment facility for operational purposes.

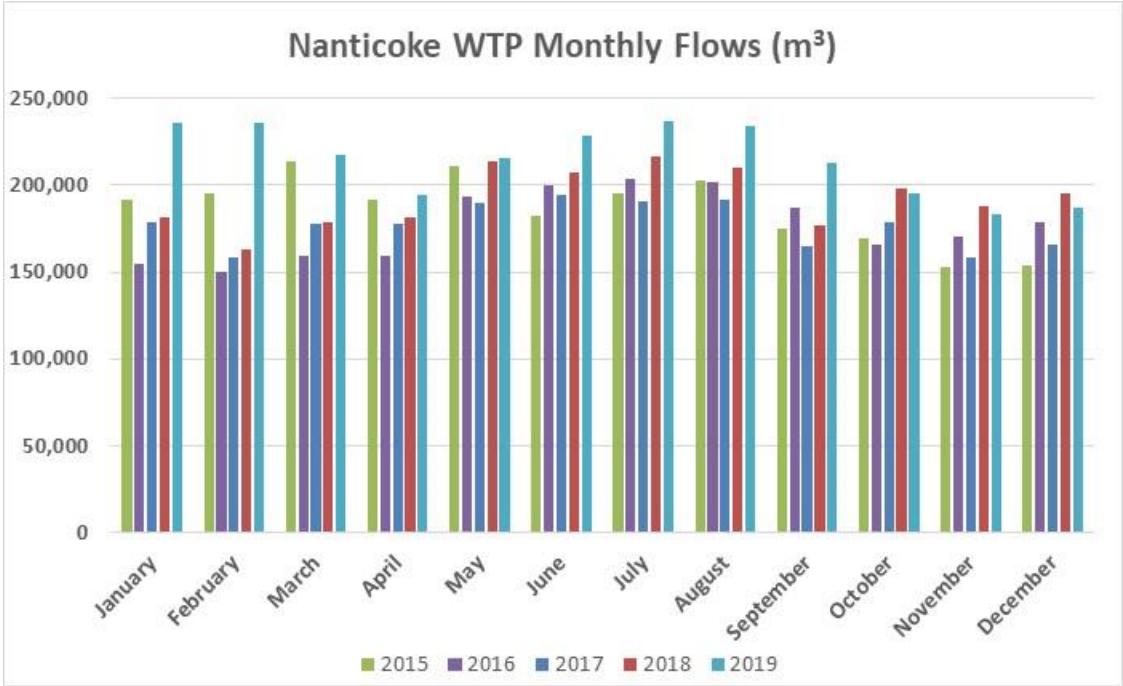

***Figure 3*: Nanticoke WTP Five Year Monthly Potable Flow Comparison**

The Nanticoke Water Treatment Plant has a rated capacity of 13,636 cubic metres per day. When compared against the maximum daily flow for 2019, the Nanticoke Water Treatment Plant operated at approximately 72% of design capacity, however this calculation does not take into account any operational and infrastructure limitations.

Table 11: Comparison of Rated Capacity and 2019 Maximum Flow Rate

System and Municipal Drinking Water Licence	Rated Capacity (m^3/day)	Maximum Daily Flow (m^3)	Percentage of Capacity
Nanticoke 066-102	13,636	9,764	71.6 %

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 requires reporting adverse water quality incidents to the Ministry of Health (MOH) and the MECP. In all instances, corrective action is initiated to resolve the issue. A summary of the incidents and corrective actions is provided in Table 12.

Table 12: 2019 Nanticoke Drinking Water System Reported Adverse Events

Incident Date	Parameter	Result	Corrective Action	Date Resolved
April 9, 2019	Total Coliforms	Hagersville Standpipe 3 cfu/100 mL	Resampled – upstream, downstream and at the original adverse location on April 9, 2019 and April 11, 2019.	April 15, 2019
July 9, 2019	Total Coliforms & E. Coli	Nanticoke West Reservoir NDOGN*	Isolated West Reservoir. Resampled – upstream, downstream and at the original adverse location on July 9, 2019 and July 10, 2019.	July 12, 2019
July 10, 2019	Total Coliforms	Townsend SS#3 2 cfu/100 mL	Resampled – upstream, downstream and at the original adverse location on July 10, 2019 and July 11, 2019.	July 14, 2019

* NDOGN = No data; total coliform plate overgrown w/ nontarget

Corrective actions are based on each incident and is determined through discussion with the MOH. For each adverse identified in Table 12, resamples were taken at the adverse location, an upstream sample site and a downstream sample site. 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 Water 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 Nanticoke Drinking Water System inspection occurred on July 9, 2019. Below is a summary of key inspection findings:

Nanticoke Drinking Water System – Waterworks # 210001558

There was one non-compliance identified during the 2019 inspection period. As a result of the non-compliance, the County received a **97.23%** inspection rating from the MECP.

The following issue was identified during the drinking water inspection:

1. The owner had not ensured that all equipment was installed in accordance with Schedule A and Schedule C of the drinking Water Works Permit. At the time of the physical inspection, the sodium hypochlorite chemical feed pumps were not connected to the injection lines/points at the Hagersville Booster Pumping Station.

   County Follow-Up: The injection lines were connected prior to the final inspection report being issued and the MECP required no additional actions from the County.

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 2019 drinking water inspection:

1. The owner indicated during the physical inspection that internal checks are not conducted on the Hach Pocket Colorimeters using secondary standards.

   Recommendation: It is recommended that the owner conducts internal calibration checks on the Hach Pocket Colorimeters every three months using secondary standards. This is recommended from Hach's document ID: TE6258.

   County Follow-Up: Veolia and the County have implemented colorimeter checks that adhere to manufacturer recommendations.

2. During the physical inspection, the owner/operating authority did not have an SOP outlining their sampling procedures for harmful algae blooms.

   Recommendation: It is recommended that the owner/operating authority develops an SOP outlining information such as; sampling techniques, frequency and location(s) for harmful algae blooms.

   County Follow-Up: The County currently requires Veolia to monitor for microcystin as per recommendations provided in an MECP annual notification. A monitoring program is in development and will address the recommendations provided by the MECP.

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

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Appendix A

Inorganic and Organic Sample Results

Inorganic Parameters:

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Antimony	February 25, 2019	ND	ug/L	No
Arsenic	February 25, 2019	ND	ug/L	No
Barium	February 25, 2019	24	ug/L	No
Boron	February 25, 2019	ND	ug/L	No
Cadmium	February 25, 2019	ND	ug/L	No
Chromium	February 25, 2019	ND	ug/L	No
Fluoride	February 25, 2019	0.11	mg/L	No
Mercury	February 25, 2019	ND	mg/L	No
Nitrite	February 4 2019 May 6, 2019 August 6, 2019 November 4, 2019	ND	mg/L	No
Nitrate	February 4 2019 May 6, 2019 August 6, 2019 November 4, 2019	0.295 0.366 0.192 0.344	mg/L	No
Selenium	February 25, 2019	ND	ug/L	No
Sodium	February 25, 2019	13.3	mg/L	No
Uranium	February 25, 2019	ND	ug/L	No

ND = Not Detectable

Organic Parameters:

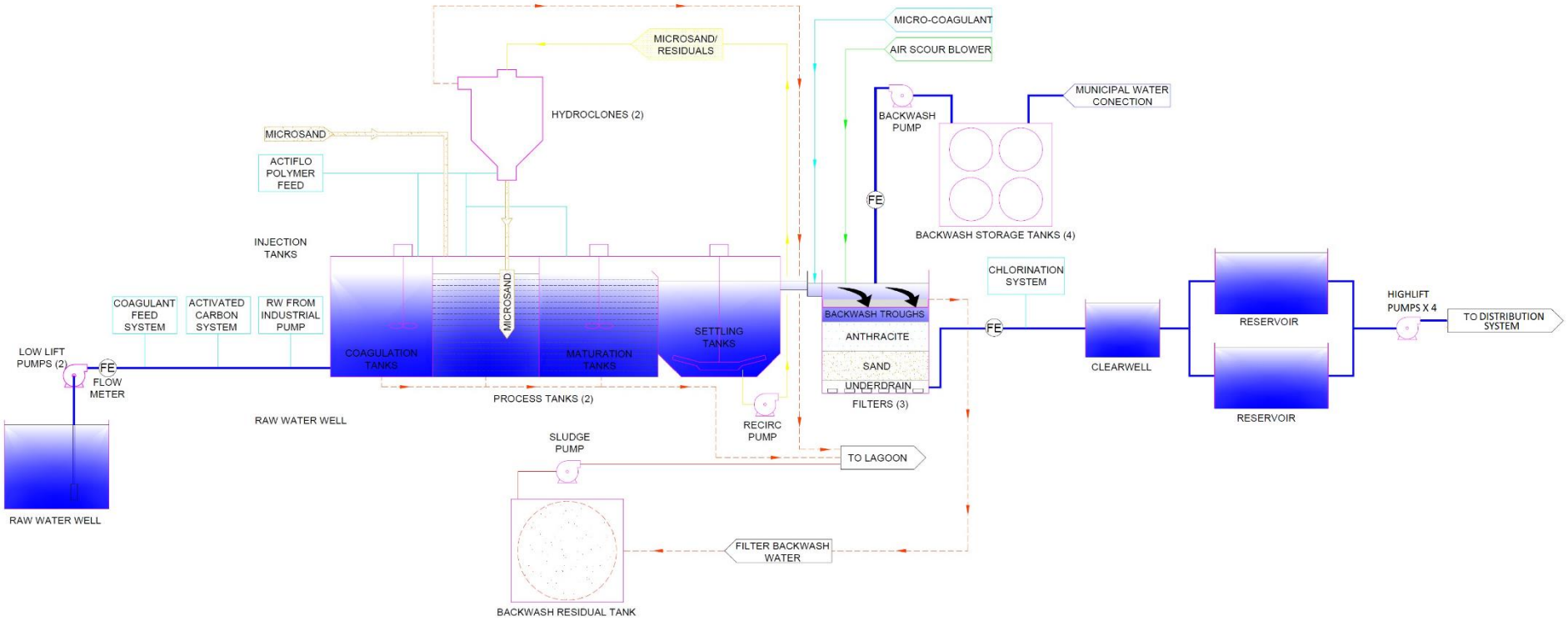
Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Alachlor	February 25, 2019	ND	ug/L	No
Atrazine + Metabolites	February 25, 2019	ND	ug/L	No
Azinphos-methyl	February 25, 2019	ND	ug/L	No
Benzene	February 25, 2019	ND	ug/L	No
Benzo(a)pyrene	February 25, 2019	ND	ug/L	No
Bromoxynil	February 25, 2019	ND	ug/L	No
Carbaryl	February 25, 2019	ND	ug/L	No
Carbofuran	February 25, 2019	ND	ug/L	No
Carbon Tetrachloride	February 25, 2019	ND	ug/L	No
Chlorpyrifos	February 25, 2019	ND	ug/L	No
Diazinon	February 25, 2019	ND	ug/L	No
Dicamba	February 25, 2019	ND	ug/L	No
1,2-Dichlorobenzene	February 25, 2019	ND	ug/L	No
1,4- Dichlorobenzene	February 25, 2019	ND	ug/L	No
1,2- Dichloroethane	February 25, 2019	ND	ug/L	No
1,1- Dichloroethylene	February 25, 2019	ND	ug/L	No
Dichloromethane	February 25, 2019	ND	ug/L	No
2,4- Dichlorophenol	February 25, 2019	ND	ug/L	No
2,4- Dichlorophenoxy acetic acid (2,4-D)	February 25, 2019	ND	ug/L	No
Diclofop-methyl	February 25, 2019	ND	ug/L	No
Dimethoate	February 25, 2019	ND	ug/L	No
Diquat	February 25, 2019	ND	ug/L	No
Diuron	February 25, 2019	ND	ug/L	No
Ethylbenzene	February 25, 2019	ND	ug/L	No
Glyphosate	February 25, 2019	ND	ug/L	No
Malathion	February 25, 2019	ND	ug/L	No
MCPA	February 25, 2019	ND	ug/L	No
Metolachlor	February 25, 2019	ND	ug/L	No
Metribuzin	February 25, 2019	ND	ug/L	No
Monochlorobenzene	February 25, 2019	ND	ug/L	No
Paraquat	February 25, 2019	ND	ug/L	No
Pentachlorophenol	February 25, 2019	ND	ug/L	No
Phorate	February 25, 2019	ND	ug/L	No
Picloram	February 25, 2019	ND	ug/L	No
Prometryne	February 25, 2019	ND	ug/L	No
Simazine	February 25, 2019	ND	ug/L	No
Terbufos	February 25, 2019	ND	ug/L	No
Tetrachloroethylene	February 25, 2019	ND	ug/L	No
2,3,4,6- Tetrachlorophenol	February 25, 2019	ND	ug/L	No
Toluene	February 25, 2019	ND	ug/L	No
Total PCBs	February 25, 2019	ND	ug/L	No
Triallate	February 25, 2019	ND	ug/L	No
Trichloroethylene	February 25, 2019	ND	ug/L	No
2,4,6- Trichlorophenol	February 25, 2019	ND	ug/L	No
Trifluralin	February 25, 2019	ND	ug/L	No
Vinyl Chloride	February 25, 2019	ND	Ug/L	No
Xylenes (Total)	February 25, 2019	ND	Ug/L	No

ND = Not Detectable

Microcystin Sample Results

Parameter	Sample Date	Raw Water Results	Treated Water Results	Unit of Measure	Exceedance
Microcystin	May 6 2019	ND	ND	mg/L	No
	May 13 2019	ND	ND		
	May 21 2019	ND	ND		
	May 28 2019	ND	ND		
	June 4 2019	ND	ND		
	June 10 2019	ND	ND		
	June 18 2019	ND	ND		
	June 25 2019	ND	ND		
	July 2 2019	ND	ND		
	July 9 2019	ND	ND		
	July 16 2019	ND	ND		
	July 23 2019	ND	ND		
	July 30 2019	ND	ND		
	August 6 2019	ND	ND		
	August 13 2019	ND	ND		
	August 20 2019	ND	ND		
	August 27 2019	ND	ND		
	Sept. 3 2019	ND	ND		
	Sept. 10 2019	ND	ND		
	Sept. 17 2019	ND	ND		
	Sept. 24 2019	ND	ND		
	October 1 2019	ND	ND		
	October 8 2019	0.12	ND		
	October 15 2019	ND	ND		
	October 22 2019	ND	ND		
	October 28 2019	ND	ND		

ND = Not Detectable



SIMPLIFIED PROCESS FLOW DIAGRAM

NANTICOKE WATER TREATMENT PLANT