



Pelham Water Distribution System
ANNUAL SUMMARY REPORT

January 1, 2016 to December 31, 2016

SUMMARY REPORT PELHAM WATER DISTRIBUTION SYSTEM

Preamble

This report was prepared by the Director of Public Works and Manager of Public Works for the Owner of the Pelham Water Distribution System, the Corporation of the Town of Pelham, to be presented to Council.

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APPENDIX A – Certificate of Accreditation

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APPENDIX C – MOECC Annual Report

2 GLOSSARY

DWQMS	Drinking Water Quality Management Standard
MOECC	Ontario Ministry of the Environment and Climate Change
OIC	Operator-in-Charge, as per Ontario Regulation 128/04
OIT	Operator-in-Training, as per Ontario Regulation 128/04
ORO	Overall Responsible Operator, as per Ontario Regulation 128/04
PRV	Pressure Reducing/Regulating Valve
QMS	Quality Management System
WTP	Water Treatment Plant

3 PURPOSE

Two annual water reports are required by the Ministry of the Environment and Climate Change (MOECC) to be prepared – the 'MOECC Annual Report' (O. Reg. 170/03 section 11), in Appendix C, and the municipal 'Summary Report' (O. Reg. 170/03 schedule 22), this overall report.

As legislated, Council is responsible as Owner of the water system for ensuring these reports are prepared and available to the public (before February 28, 2017 for the MOECC Annual Report and before March 31, 2017 for the Summary Report).

To enhance the communication and understanding of both of these reports, this Annual Drinking Water Summary Report contains additional non-legislated information on the drinking water system operations and water quality.

4 SYSTEM OVERVIEW

The provision of drinking water for residents in the Niagara Region is a responsibility shared between two tiers of municipal government. The Niagara Region is responsible for treatment and supply of the water to the Town of Pelham via transmission mains. The Town of Pelham is responsible for distributing water to local consumers via its own network of distribution pipes.

The Pelham Distribution System is a Class 2 water distribution subsystem. The system consists of approximately 77.8 km of watermains varying in size from 50mm to 400mm diameter providing water to approximately 12,000 residents within the general urban area.

The service area has an approximate area of 14 square km and includes the Villages of Fonthill, Ridgeville and Fenwick. The system receives treated drinking water from the Welland Water Treatment Plant located on Cross Street in the City of Welland. The treatment plant is owned and operated by the Regional Municipality of Niagara. The plant receives its raw water from the Welland Recreational Canal. Treated water is transmitted to the Town by way of a 750mm diameter watermain to the Shoalts Drive Reservoir. The reservoir, which includes chlorination, is also Regionally-owned and operated. Water enters the Pelham Distribution System at the reservoir outlet.

The Town of Pelham owns and operates a water filling station with side-fill and a backflow prevention device to serve consumers outside of the urban boundary who do not have direct access to the distribution system. Water haulers must obtain approval from the Niagara Region before being permitted to use the station.

The Town of Pelham owns a small pressure booster pump station which is located on the Niagara Region's Elevated Tank Property. This pump is used to improve water pressure in the Chestnut Ridge development area. The normal operating pressure in the area is low due to its geographic location in relation to the elevated tank that supplies distribution supply and pressure by way of gravity.

The Town of Pelham Distribution System consists of 4 pressure zones separated by Pressure Reducing Valves (PRV). In Pelham, because of our unique topography, maintaining safe operating pressure within the system is a delicate balance. Increasing pressure in one area can cause damage to municipal infrastructure and private plumbing

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downstream. Work is ongoing in Fenwick to add an additional pressure zone by installing a PRV in a strategic location. The additional pressure zone will allow operators to improve local water pressures to residents while maintaining safe operating pressures downstream.

5 LEGISLATIVE COMPLIANCE

5.1 Water Haulers

Drinking water haulage vehicles often supply water to homes in areas not serviced by the distribution system. The Town of Pelham owns and operates one bulk water loading station where water haulers may purchase bulk water from the Town.

All water haulers wishing to access the water loading station must provide a current Niagara Region Public Health Department inspection report that exhibits no non-compliance issues. All haulage vehicles are also required to be inspected once each year by the Niagara Region Public Health Department.

5.2 Water Quality Testing

Ontario Regulation 170/03 prescribes water quality testing requirements for municipal drinking water systems.

The requirements prescribed by the MOECC include: test parameters, number of test samples, frequency of testing, location of testing, reporting of test results, and reporting and corrective action of adverse test results, amongst other items. Operational guidelines are parameters used to monitor the general quality of water and the performance of the system.

The Town carried out testing in 2016 as prescribed by legislation.

The Town was granted relief under Schedule 15.1 of Ontario Regulation 170/03. The Town is no longer required to take samples from residential or non-residential plumbing for the community lead testing program; however, reduced sampling must still take place in four locations within the distribution system on a three year cycle. As such, the Town has continued with its lead testing program in the distribution system under the relief regime as required, with no concerns.

In addition to the prescribed sampling, the Town tested for water quality in response to complaints from consumers. Complaints generally refer to colour, odour, pressure, particulate, supply and/or taste.

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The Town responded to **17** water quality/supply complaints in 2016. All were resolved promptly, 12 related to low pressure concerns, and 5 to colour/odour.

Taste and odour episodes are often related to a natural phenomenon caused by seasonal biological changes in the source water. These changes may produce odour-causing chemical compounds that can be detected by humans at very low levels. Most municipalities in Ontario which obtain their water supply from surface water sources experience this problem periodically in the summer or early fall. Also, private plumbing fixtures including small water filtration systems and drain traps can also contribute to concerns regarding taste and odour of municipally supplied water. Once identified, most of these can be resolved quickly and easily through regular maintenance completed by the property owner.

Water Treatment Plants are equipped with various filtration systems designed to reduce the effects of taste and odour, but may not eliminate it entirely.

Table 1 shows the testing requirements and number of deficient samples in 2016.

Table 1 – 2016 Testing Summary

Parameter	# Samples Required	Actual # Samples Taken	Legislated Requirement	Guideline	Actual # Samples Exceeding Limit
Escherichia Coli (bacteriological)	22 per month	~ 46 per month	Not detected - 0 CFU/100mL	--	0
Total Coliform (bacteriological)	22 per month	~ 46 per month	Not detected - 0 CFU/100mL	--	0
HPC (heterotrophic plate count - bacteriological)	6 per month (25% of 26)	~ 46 per month	--	< 500 CFU/100mL (AWWA C651-05)	None
Trihalomethanes	1 per quarter	3 per quarter	100 ug/L (annual running average)	--	None

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Parameter	# Samples Required	Actual # Samples Taken	Legislated Requirement	Guideline	Actual # Samples Exceeding Limit
Free chlorine	7 per week	14 per week	≥ 0.05 mg/L, ≤ 4.0 mg/L	--	None
pH	4 per semi-annual test period	4 per semi-annual test period	--	6.5 – 8.5 O.G.	None
Alkalinity	4 per semi-annual test period	4 per semi-annual test period	--	30 – 500 mg/L O.G.	None
Lead	4 per applicable semi-annual test period, 8 per applicable year of test cycle	4 per applicable semi-annual test period, 8 per applicable year of test cycle	0.01 mg/L	--	None
Pressure	None	5 per month including 1 sample in each pressure zone	--	≥ 28 psi	None

O.G. – operational guideline

5.3 Adverse Water Quality Incidents

An “adverse water quality incident” refers to a water quality test result exceeding the legislated requirements shown in Table 1.

A total of **Zero** incidents of adverse water quality conditions were detected in the system in 2016.

Improvements to the sampling procedure are believed to be the reason for the reduction of adverse water quality incidents in 2016.

5.4 MOECC Drinking Water System Inspection Report

In September 2016, the Town’s distribution system underwent an unannounced focused annual inspection by a MOECC Drinking Water Inspector. The inspection covered the period October 2, 2015 to September 13, 2016.

No issues of non-compliance with regulatory requirements were identified by the inspector.

The following **recommendations** were issued by the inspector:

1 - The Town is encouraged to update the O&M manual while ensuring that it better meets Condition 16.2.6 of Schedule B of the Licence.

2 - The Town is encouraged to provide education and outreach to the owners of all existing industrial/commercial/industrial facilities and agricultural processes served by the drinking water systems to educate the owners on the need for backflow prevention devices installation and testing. The Town is also encouraged to create a backflow prevention program for existing facilities as resources become available.

3 - As the Town is required monitor for THM, the Town is encouraged to update its Standard Operating Procedure for Adverse Water Quality Incident reporting to include THM exceedances.

The system received a 100% Inspection Risk Rating.

5.5 Regulatory Updates

Some regulatory changes occurred in 2016, which have a moderate effect on water operations.

5.5.1 Drinking Water Quality Management Standard

The MOECC drafted an updated Drinking Water Quality Management Standard in 2015, and the Director of Public Works participated in a focus group with the MOECC providing comment on this draft. The finalized new standard has still not yet been released. The revisions are administrative in nature and intended to clarify existing requirements and to ensure that consideration is given to the potential impacts of climate change when the risks to a drinking water system are being assessed by the system owner or operating authority. The changes are not anticipated to have a significant effect on the management system in place with the Town.

5.5.2 Sampling and Reporting Requirements

Trihalomethanes (THMs) O.Reg. 170/03

New sampling, testing and reporting requirements for trihalomethanes (THMs) were put into place in 2016. The changes included how the Running Annual Average (RRA) is calculated. The responsibility for RRA calculation and reporting to the ministry was passed from the testing laboratory to the Municipality. Adverse results for THMs must be reported to the ministry within seven days of the end of every calendar quarter.

Haloacetic Acid (HAA) O.Reg. 170/03

In 2017 Town staff will begin to sample for the concentration of (HAA) in our drinking water on a quarterly basis. Results will be added to the 2017 Annual Summary Report. Haloacetic acids (HAAs) are a type of disinfection by-product that is formed when chlorine reacts with natural organic matter in the water.

5.6 Competency, Licensing and Training

Operator training is required by law to maintain water licenses and ensure competency. In 2016, training records were reviewed for all licensed operators in an ongoing effort to

ensure that staff remain competent, and participate in training opportunities that are engaging and relevant to Town operations.

Operators and key water staff participated in a number of diverse course offerings aimed at broadening their knowledge. This included training in water metering installation, hydrant flow testing, watermain repair and disinfection, leak detection, QMS awareness, and many other topics.

The Town of Pelham owns and operates a Class 2 Water Distribution System and a Class 2 Wastewater Collection System. Town of Pelham Water Distribution and Wastewater Collection System Operators are working towards obtaining or maintaining Class 2 Licenses in both water and wastewater disciplines. All water/wastewater staff are endeavoring to upgrade to Class 2 licenses by 2018.

The Town water group currently has a complement of a Manager of Public Works, Supervisor of Water and Wastewater, and three Water Operators. Of these staff, there are three operators with a Class 2 Drink Water License, two with a Class 1 license. The Operators have established a plan to each achieve a Class 2 license over the next few years.

6 FLOWS AND USAGE

6.1 Flow Data

Water consumed by the Town of Pelham is measured by the Niagara Region, and provided monthly to the Town. In 2016, a total of 1,410,410 cubic meters (m³) of water flowed to the Town of Pelham in total. (1 cubic meter of water = 1,000 litres). This quantity has decreased since 2007, and appears to be on a slightly decreasing overall trend, as shown in **Table 2**.

Table 2 – Annual Totals

Year	Supply (m³)
2006	1,559,490
2007	1,752,470
2008	1,488,891
2009	1,499,700
2010	1,497,110
2011	1,469,470
2012	1,491,850
2013	1,420,220
2014	1,374,130
2015	1,364,450
2016	1,410,410

It is anticipated that the decreasing general demand may be generally attributed to decreasing customer demand.

All water demands were met in the system, thus the Town was not required to implement the additional use restrictions under section 4 (p) of the Water Supply By-law No. 3198-2011.

The Town’s Drinking Water License does not limit demand or flows to the Town, so a comparison to license limits is not required. The 2016 average daily consumptions are shown in **Table 3**, along with the maximum daily flows for each month.

Table 3 –2016 Daily Water Usage

Month	Average Daily Quantity (m³)	Peak Flow in One Day (m³)
January	3112	5200
February	3044	4390
March	3000	3960
April	3092	3790
May	4121	7070
June	5670	8550
July	6199	7900
August	5157	6890
September	4014	5850
October	3067	3940
November	2884	3360
December	2865	3690

The 2016 highest demand days and highest monthly consumptions occurred in June and July, which aligns with the typical high demands in the summer months.

The Master Servicing Plan (MSP - September 2011) lists 2016 peak day demand projections (at the combined two zones of the BPS) at 10,970 m³/day, which is higher than the actual 8,550 m³/day peak usage. Thus, the station reached 78% of its projected peak in June. This peak is higher than last year’s peak day at 7,340 m³/day.

6.2 Water Loss (Unaccounted Water)

A 2009 Residential and Civil Construction Alliance of Ontario study said leaky pipes cost the province 25 per cent of its drinking water—enough to fill 131,000 Olympic-sized swimming pools. The direct causes of water loss are not known without detailed investigation, auditing, testing and monitoring, but is typically attributed to such causes as:

- meter inaccuracies (after approximately 5years water meters begin to under-

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- read),
- unknown leaks (although leak detection monitoring is performed, not all mains can be tested in their entirety each year, and leak detection itself is complicated by traffic noise, normal industrial usage and ground conditions), and
 - flushing and main breaks (although estimates of losses are provided from regular maintenance flushing activities, fire department flushing and firefighting use, and from main break events, there is room for significant error in these coarse estimates, which may account for some of the unaccounted loss), and
 - usage through unknown or illegal connections.

Water loss is calculated as a percentage and defined below as:

$$\% \text{ Water Loss} = \text{Unaccounted Consumption} \div \text{Total System Input} \times 100$$

Where:

$$\text{Unaccounted Consumption} = \text{Total System Input} - \text{Accounted Consumption (purchased from Region)}$$

Accounted Consumption =

Volume of **Billed Authorized Consumption**
(metered water consumption, including Town facilities)

+ Volume of Unbilled Authorized Consumption
(metered and estimated operational and construction use, firefighting, main breaks)

Total System Input = Volume of Water Purchased From Niagara Region

Unbilled authorized water usage is water use that is known, usually from Town uses, but not metered. For example, water through hydrants for some fire training exercises, firefighting, watermain maintenance and main breaks is coarsely estimated and incorporated into this 2016 figure. Estimated loss through a main break is particularly difficult since the loss depends on the system pressures, break size and system conditions, and sometimes can go a significant amount of time undetected.

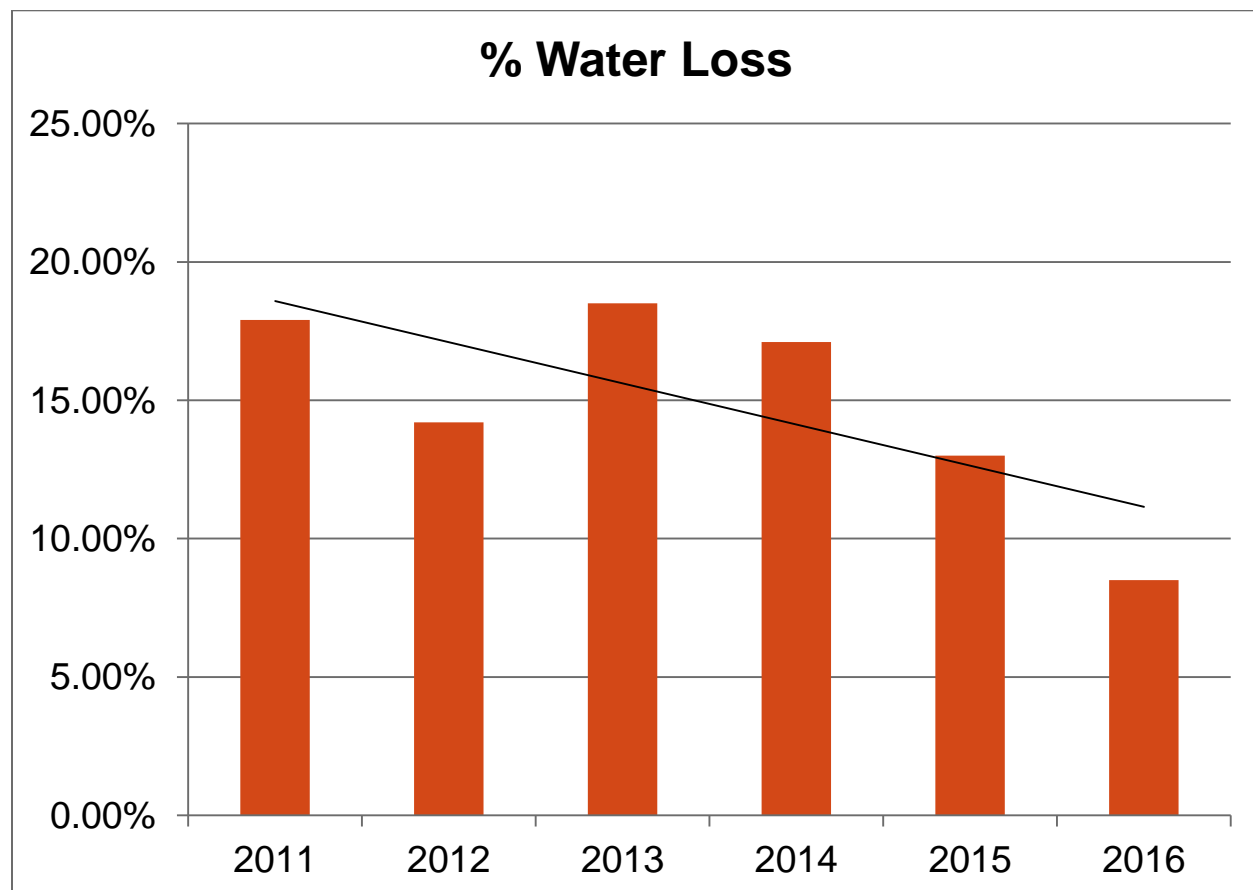
However, with best estimates prepared, water loss for 2016 is estimated at 8.5%, compared to 13.0% in 2015, summarized in **Table 4**. Input data becomes more accurate each year, and in previous years, not all of the same input data was always

available, skewing the numbers slightly. **Figure 1** shows the water loss by year.

Table 4 –Water Loss Approximations by Year

Year	% Water Loss
2011	17.9
2012	14.2
2013	18.5
2014	17.1
2015	13.0
2016	8.5

Figure 1– Water Loss by Year (%)



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The black trend line shows the overall trend of water loss. In general, water loss by percentage has decreased.

As this appears to be the first year below 10%, staff will continue to monitor this trend closely and pro-actively improve the system. Efforts towards this significant reduction in loss include:

- Six leaking water services were identified and replaced – 4 galvanized, 1 Polyethylene plastic, 1 copper. 1 service leak undetected can result in losses as much as 18,000 m³/year.
- Several leaking hydrants identified in the leak detection program were also repaired.
- Two new construction meter boxes purchased in 2016 were used to better capture all new watermain commissioning and construction-related water use, and minimize unauthorized use in construction areas.
- Water meter repairs were completed in a timely manner to reduce water loss, since water meter failures typically fail in favour of the consumer, and water use can go un-metered.
- Response times to repair broken watermains/services/valves/hydrants are continuing to shorten, due to finding efficiencies in operations. We also are experiencing reduced time of water loss due to regular preventative maintenance programs and proactive repairs identified by operating staff.

7 INFRASTRUCTURE

7.1 Capital Projects and Purchases

The Town updated the 20-year capital plan. Although efforts to ensure that it represents the most current water distribution system improvement needs were made, allowances were necessary based on competing capital infrastructure needs.

The following system-specific capital projects were carried out:

Highland watermain replacement was completed in 2016. New watermain was constructed in the East Fonthill development, and commissioned successfully. Private watermain was constructed but not yet commissioned at the East Fonthill Commercial Block, and on Haist Street at Davis Heights.

7.2 Rehabilitation and Repairs

7.2.1 Water Main

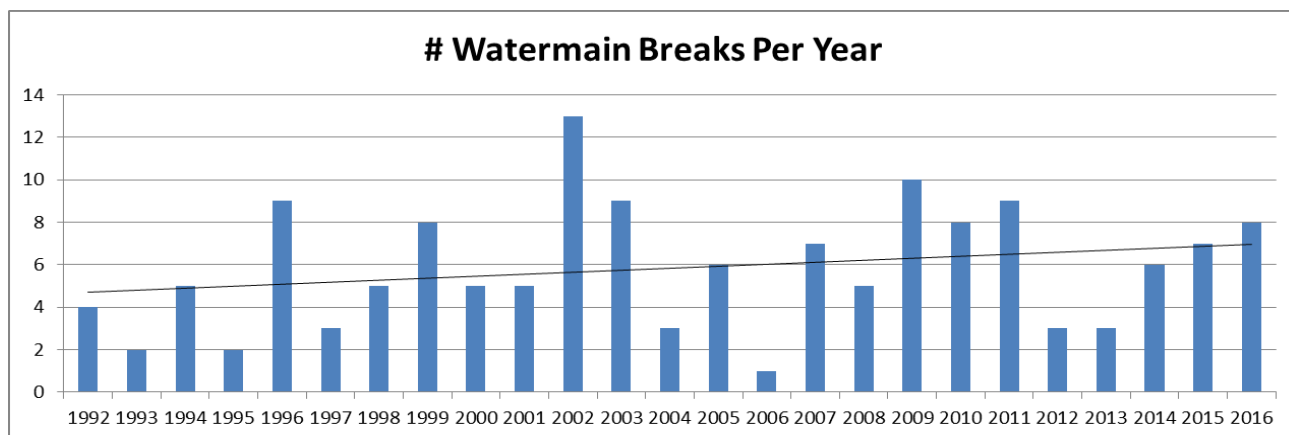
A total of eight main breaks occurred in 2016, summarized in **Table 5**.

Table 5 – Water Main Break Summary

Date	Location	Type of Pipe	Suspected Cause	Replacement in 20-year Capital Plan
1/3/16	CLARE AVENUE	Cast iron	Age/condition	2025
1/19/16	HURRICANE ROAD	Cast iron	Age/condition	2017 (red-circled with funding)
1/19/16	LORIMER STREET	Cast iron	Age/condition	2019
3/6/16	LORIMER STREET	Cast iron	Age/condition	2019
3/8/16	WELLAND ROAD	Cast iron	Age/condition	2018
3/29/16	PARK LANE	Cast iron	Age/condition	>20 years
7/11/16	CLARE AVENUE	Cast iron	Age/condition	2025
12/31/16	HAIST STREET	Cast iron	Age/condition	2017 (red-circled with funding)

Figure 2 shows the overall upward trend for the total number of water main breaks.

Figure 2 – Town of Pelham - Water Main Breaks



The trend line suggests the general number of breaks is increasing. The following should be noted:

Important to note –

1. The likelihood of breaks increases where the water main pipe material is cast iron - Approximately 17% of the distribution system is made up of cast iron pipe, on average approximately 60 years old.
2. The likelihood of breaks increases where the diameter of the cast iron pipe is 150mm - most of the cast in the system is of this size.
3. The likelihood of breaks increases where the normal operating pressure of the watermain is 65psi or greater - the average system pressure is 71.6psi. The lowest recorded pressure in the system is 42psi and the highest is 95psi.
4. There is one active lawsuit related to watermain break property damage. Risk of property damage increases where breaks occur in urban areas without stormwater infrastructure.
5. Breaks are costly to repair, but most importantly, pose public health threats for contamination, especially in areas where pressure poses challenges and backflow risk is increased.
6. As recommended through the infrastructure review process, included in this report, continued planning of all cast iron replacement should continue.

Table 6 shows the overall downward trend for the total remaining amounts of cast iron still in service in the system.

Table 6 – Remaining Cast Iron in Water Distribution System

Year	Approximate kilometers of Cast Iron Remaining	Approximate % Cast Iron Remaining
2010	21	26%
2011	21	26%
2012	20	25%
2013	19	23%
2014	14	17%
2015	14	17%
2016	13.8	17%

7.2.2 *Booster Pumping Stations*

Regular maintenance and repairs are required at our Chestnut Ridge Booster Pump Station. In 2016 these were completed by the Niagara Region through a Maintenance Agreement. The Town continues to work closely with the Region of Niagara to maintain close communication about pressure or supply interruptions related to this pumping station. Although the Town was considering assuming maintenance of this station, with advice from the Region, the Town is considering simply extending the existing operating agreement.

The pump was replaced in 2016 by the Region, billed to the Town, and a spare pump was purchased by the Region for redundancy, should the main pump fail. The Town negotiated a lower monthly fee for the Regional maintenance services, and an updated operating agreement is being drafted by the Region.

7.2.3 *Water Loading Station*

Minor maintenance tasks were also performed at the water loading station including backflow prevention device testing and improvements to site drainage.

8 REGION OF NIAGARA – SUPPLY

8.1 Master Servicing Plan

The Region of Niagara’s Master Servicing Plan continues to be a regularly referenced document. Input is being provided by staff to the consulting group updating the MSP.

8.2 Memorandum of Understanding

As a result of discussions with several local municipalities and the Region, the updated Memorandum of Understanding (MOU) between the Region, as supplier of treated drinking water, and each local municipality, as receiver of the drinking water, was reviewed, updated and implemented. The MOU is a critical document that is relied upon in the Drinking Water Quality Management System, as it defines the scope, quality and service requirements for the drinking water received into the Town system.

9 MONITORING AND IMPROVEMENT INITIATIVES

In 2016, staff continued to place an increased emphasis on proactive measures to ensure the Town's continued ability to efficiently deliver safe drinking water.

Town Of Pelham Water Distribution Operators are engaged in new self-directed research and program implementation initiatives including Water Loss Management, Frozen Water Service Procedures, improving the Hydrant & Valve Maintenance Program and Water Sampling.

9.1 Backflow Prevention

The Ontario Building code requires backflow prevention devices to be installed at each connection to new buildings where a potentially severe health hazard may be caused by backflow. The Town relies on the change in Building Code to ensure that backflow preventers are installed in new buildings.

In addition, in October 2016, the MOECC has again recommended in their annual compliance inspection the following:

" The Town is encouraged to provide education and outreach to the owners of all existing industrial/commercial/industrial facilities and agricultural processes served by the drinking water systems to educate the owners on the need for backflow prevention devices installation and testing. The Town is also encouraged to create a backflow prevention program for existing facilities as resources become available."

The creation of a backflow program requires a comprehensive review of MOECC recommendations and CSA recommendations, and municipal successes and failures of other municipalities. The program should involve the clear definition of program goals and requirements, including decisions about subsidies, drafting of a policy, bylaw or other enforceable document, an implementation and public education program, enforcement program and roll-out schedule. .

9.2 Leak Detection

Flowmetrix Technical Service Inc. provided a small water leak detection survey for the Town Of Pelham in 2016. A total of 15km of watermain of various diameters, including all cast iron, as well as all valves and fire hydrants within the stipulated area were included in the survey. A small number of leaks were identified and repairs have been completed.

The 2017 budget includes funding for continuing the leak detection program. Proactive detection of leaks ensures water loss remains low, and is often data sought in claims investigations.

9.3 Hydraulic Water Model

Detailed discussions to create a distribution system model for the Town's water system were initiated, with budgetary needs integrated into the 2016 capital budget. This project is ongoing.

An up-to-date computer model of the Town's water infrastructure can accurately calculate and show how the system operates under all types of conditions. This is likely the most powerful engineering tool available to water staff. The water model can be used to:

- enhance sampling programs,
- study chlorine residual loss,
- evaluate risk and vulnerability
- plan and improve each system's hydraulic performance,
- assist with pipe, pump, and valve placement and sizing,
- perform fire flow analysis, and
- train staff.

10 MUNICIPAL DRINKING WATER LICENSING PROGRAM

The Municipal Drinking Water Licensing Program is a five-stage initiative by the MOECC under the Safe Drinking Water Act, 2002. The Town of Pelham maintains its Certificate of Accreditation as an Operating Authority for its water distribution system, and the system license and permit are in place. **Table 7** lists the status of the key elements for water licensing.

Table 7 – Municipal Drinking Water Licensing Program Progress

Stage	Status
License	Active and current - Expires July 24, 2019 (originally issued Sept 21 2009)
Permit	Active and current – no expiry (originally issued Sept 17 2009)
Operational Plan	Revision 2016 completed (including supporting procedures and forms)
Accreditation	Maintained full accreditation, following an off-site verification audit by NSF in May 2015 - This accreditation certificate expires May 24, 2018
Financial Plan	Updated in 2014, covering 2014 – 2020 inclusive.

11 QUALITY MANAGEMENT SYSTEM

The Quality Management System (QMS) is fully integrated into Water operations, and maturing and improving with time.

Council should remain aware of its commitments in the QMS Policy, which is the framework upon which to set the QMS. As planned, the Policy was revised and approved in 2016.

The current Operational Plan is available through the network or in printed copies at select locations.

Changes that occurred to the plan in 2016 included;

- Emergency procedure and contact updates
- Updates to the risk assessment
- Updates to the trending databases
- Updates to entire procedure and SOP documents

11.1 Infrastructure Review

Infrastructure review is a required component of the DWQMS, where infrastructure includes piping and related infrastructure, but also buildings, workspace, process equipment, hardware, software, and supporting services such as transport or communication. The purpose of the review was to assess the adequacy of the infrastructure necessary to operate and maintain the water system.

In 2016, the Director of Public Works and Manager of Public Works completed a review of infrastructure needs during the budget and capital planning process, in accordance with the Town's Operational Plan. Recommendations were translated accordingly into the 2017 water operational and capital budgets and 20-year Capital Plan updates, and are communicated in this report below.

Recommendations from Infrastructure Review Nov 2016:

1. Watermain – servicing, replacement, monitoring, operating & capital needs, other
 - Station street based on cast iron condition and risk – ***recommend keeping on the capital budget based on condition***
 - ***2017 Deferring budget for Pelham Street and Station Street***
 - ***Budget request for Haist St. @ Welland Road – Design***
 - ***Prioritized Hurricane road, Haist/Welland and Pelham Street Cast Iron Replacement***

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- **Leak detection for identified operating budget**
- **New Lead requirements to be evaluated to determine Municipal Responsibility**
- 2. Hydrants – monitoring, servicing, operating & capital needs, other – none at this time
 - **Budget ask for hydrant addition – Pelham Street Merrit to Quaker**
 - **Unexpected staffing issues have impacted the hydrant maintenance program – all hydrants may not receive their annual maintenance in 2016**
- 3. Main valves – monitoring, servicing, operating & capital needs, other
 - **Watermain replacement will address remaining valve issues**
 - Station Street watermain – isolation challenges – new station street watermain replacement – design will allow for better isolation to lower risks related to seniors residences. **Design and construction to be budgeted for 2017**
- 4. Other appurtenances – operating & capital budget needs, other
 - Church Street PRV install in progress and loosely **scheduled for install in October 2016**
- 5. Inventory and Tools – operating & capital needs, other
 - **Ph Meter will be purchased in 2016**
 - **Speed Shore Trench Box to be purchased in 2016**
- 6. Software / hardware – capital needs, other
 - Water model upgrade – **need to establish better tool for development and monitoring, using regional model – Ongoing – budget ask for 2017**
 - **2017 Budget ask to maintain the water model**
- 7. Pumping Station – review of operation responsibility, and replacement of pump planned for 2016, council review of operation (Council report) – Done. **Region to install pump October 2016.**
- 8. Staffing –
 - **License upgrade plan is ongoing for operators (to be communicated in COW report and annual report)**
 - **Training budget ongoing requirements**
 - **2017 Budget ask for Backflow prevention program/investigation**
 - **Ongoing concerns with DWQMS maintenance – staffing support – DPW recommend consulting assistance monthly, or contract position funded by water rates, while internal staff get training and experience**
 - **Focus to be procedure updates and emergency training, record keeping and continual improvement, especially related to corrective and preventive actions**

11.2 Management Review

Management review is a required component of the DWQMS. In Nov 2016, the Director of Public Works and Manager of Public Works completed a management review of the QMS in alignment with the budget and capital planning process, in accordance with the Town's Operational Plan. Recommendations were translated accordingly into the 2017 water operational and capital budgets and 20-year Capital Plan updates, and are communicated in this report below.

Recommendations from Infrastructure Review Nov 2016:

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Incidents of regulatory non-compliance:

- Reviewed MOE inspection report (final) 2016, no other regulatory incidents in 2016. Inspection yielded no non-compliances, and two opportunities for improvement.
- **Backflow program recommended by MOE inspector – currently in draft budget request**

Incidents of adverse drinking-water tests:

- None in this period
- Corrective action from adverse response in 2015 still proving to be effective

Deviations from critical control point limits and response actions:

- No reports of deviation from CCL free chlorine in 2016
- Under former assessment CCLs, no deviations were recorded or observed

The efficacy of the risk assessment process

- The RA process was followed in February, and the RA was updated accordingly. Process involved Operators and was effective. RA is being used in 2016 budgeting process.

Internal and third-party audit results:

- Third party audit results: Issues raised at audit are being addressed. Successful pass communicated to Owner through COW report .
- Internal audit results: 2015 Major issues arose from internal audit, leading to re-organization of QMS, staffing and content. Communicated to Owner through COW report – DPW. 2016 internal audit overdue, planned for Nov 18 2016. **Audits will be scheduled with Outlook for August 2017 - DPW.**

Results of emergency response testing:

- Mainbreaks have occurred in 2016. Manager & LH have reviewed response when preparing main break report. Response concerns or needs for procedure changes would have been recorded in the form if required.

Operational performance:

- No significant concerns noted through evaluation of main breaks, water loss, inspection results, water sampling results, **to be described in the Annual Council Report by DPW. Cast iron condition concerns to be re-summarized in that report also, and 20-year capital plan created to show replacement plan for cast iron over 20 years.**
- PRV installation underway in Fenwick, in response to pressure complaints. Not considered a performance concern, simply a user preference.

Raw water supply and drinking water quality trends:

- Discussed THM and general concerns as MPW discusses at regional DWQMS group meetings – no actions at this time
- THM did climb in warmer months, but MPW noted Region filter issues, and no concerns at this time

Follow-up on action items from previous management reviews:

- Follow up actions taken
- **MPW or alternate to seek DWQMS training in spring 2016 to take on new rep duties – this item remains open as staffing/resource issues were further investigated in 2016. Consultant help or staffing increase being requested through budget.**

The status of management action items identified between reviews:

- Management action items have been dealt with accordingly as documented through email, meeting minutes or council communication. No concern of open action items.

Changes that could affect the Quality Management System:

- No changes identified that could affect the QMS. Development in East Fonthill requires significant mapping updates. New staff brought on in November for retiring operator. One operator on disability leave has posed operational challenges, but not affecting the QMS. Disinfection

SUMMARY REPORT PELHAM WATER DISTRIBUTION SYSTEM

procedure from MOE has been incorporated and communicated, THM and lead regulatory changes have been discussed and integrated.

Consumer feedback:

- **Summary of PSRs to be included in annual report being prepared in January. No concerns of significant trends from review of water PSRs (rusty water, pressure – investigated, but not considered to be an indication of poor quality or other concern).**

The resources needed to maintain the Quality Management System:

- **Resource requirements are being communicated through Operating and Capital budget needs, to be finalized through Council - DPW.**
- Replacement operator – resources required to hire and shadow retiring operator provided

The results of the infrastructure review:

- All infrastructure review concerns noted and identified through 2016 Operating, Capital and 20-year Capital forecast.

Operational Plan currency, content and updates:

- **Currency and maintainability were raised as major concerns, and addressed through fall/winter 2015/2016, as noted in the internal audit. Staff are implementing changes with anticipation that systemic breakdowns cannot occur in the future, and this will be communicated to Owner through staffing request Nov/Dec 2016.**

Staff suggestions:

- Reviewed Corrective Action list, No direct action items or decisions to be communicated on this matter. Staff suggestions investigated and followed through whenever practical.

Suitability:

The new QMS seems much more suited to Pelham operations.

Adequacy:

The new QMS operational plan, policy and procedures in place seem adequate to meet the requirements the standard.

Effectiveness:

It appears that the QMS still has not matured to an effective level, perhaps at this point due to resource strain. Staff /consultant help being requested through budget.

11.3 External Audit Results

In May 2016, the Town engaged NSF as a third party auditor to the QMS, in accordance with the Town's drinking water license requirements.

No nonconformances were identified. Three Opportunities for Improvement were suggested:

Opportunities for Improvements (DWQMS)-01

Document & Records Control- Description Retention period of 6 years could be considered for the retention of Docs. & Records - to coordinate with the re-certification time.

Opportunities for Improvements (DWQMS)-05

Organization Structure, Roles, Responsibilities and Authorities.; The appointment of DWQMSR could be described in OR chart. Description Operational Manual could show the position in the organization chart. Could document the responsibilities for Calling the management review meetings and arranging for the Internal Audit.

Ontario's Drinking Water Quality Management Standard

Leakage detection program could be instituted more rigorously.

11.4 Internal Audit Results

Results from the QMS internal auditor, required to audit the system once per year.

Mn = minor nonconformance (not in conformity with the drinking water quality management standard)

OFI = opportunity for improvement. These are suggestions from the auditor that may improve the system, and the scope of these suggestions shifts as the QMS matures.

As a result of discussions of findings with the auditors, a request for external contractor assistance will be forwarded through the operating budget for water, as the staffing request could not be supported at this time.

Annex A – 2016 Internal Audit Findings

ID #	Type of Finding	Element	Description
2016-IA-01	Mn	2	A current version of the QMS Policy was not posted, as required by the Operational Plan Element 2: <ul style="list-style-type: none"> i. At the Town Office (17-Mar-2014 obsolete version), and ii. Online (obsolete QMS-INT-002-VIS-001 version 1, approved June 2012).
2016-IA-02	Mn	5	<ul style="list-style-type: none"> i. A version number and date is not recorded on every page of the Operational Plan (and by extension, associated QMS PROC procedures), as required by the Director’s Directions, 2007 Section 3.4.1 (1). ii. Obsolete form QMS-INT-015-FRM-001 ver.4, Dec-2014 is currently being used to document hydrant maintenance activities. iii. Retention requirements (e.g. timelines, hardcopy/softcopy, location etc.) associated with various QMS documents (e.g. obsolete <u>Operational Plans</u>) and records (e.g. maintenance/calibration records, previous internal/external audits, previous records of management review) have not been identified.
2016-IA-03	Mn	10	QMS awareness training has not been provided to all new personnel whose duties directly affect drinking water quality (i.e. Operator in place for 1.5 years).
2016-IA-04	Mn	20	Results of Management Review are not being communicated in their entirety to Council (i.e. deviations from CCLs, efficacy of risk assessment, internal/third party audit results etc. were not included within the Annual Report communicated to Council 4-Apr-2016).
2016-IA-05	Mn	21	There is no evidence that all nonconformities (i.e. 2015 internal audit) are being addressed as these were not included in the Corrective Action List, as required by Operational Plan Element 21.
2016-IA-06	OFI	1	Ensure a current NSF certificate is posted; version observed to be posted expired 11-June-2015.
2016-IA-07	OFI	3	Consider identifying the date Top Management endorsed the Operational Plan.
2016-IA-08	OFI	5	<ul style="list-style-type: none"> i. Ensure data is transcribed properly into the excel logbook. For example, colorimeter comparison decimals were missing on the record taken 31-Jul-2015 and numbers inverted on the record taken 27-Nov-2015. ii. Ensure QMS related records are accessible. For example, Leak Detection Report was unavailable at the time of the audit. iii. Consider revising the Document Management List to identify the current version number and date of all QMS related documents, lists and forms. iv. Ensure consistency among QMS related documents. For example: <ul style="list-style-type: none"> a. “PRO” instead of “PROC” has been identified in the Operational Plan for elements 12,13, and 16, and 18, and in the header of PROC 013, and b. Header of PROC 007 incorrectly refers to FORM 007. v. Clarify how obsolete documents are to be destroyed (i.e. shredding?). vi. Consider streamlining the information documented within Operational Plan Element 2 and S801-01 to avoid duplication.
2016-IA-09	OFI	6	Clarify the subject-system’s challenging conditions. None have been identified within element 6 however, PROC 016 identifies dead ends as challenging conditions.
2016-IA-10	OFI	7	Clarify ‘last overall assessment’ and ‘last review’ frequencies (i.e. 3 year vs. annual) on QMS LIST 001 as both events have the same dates.

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Town of Pelham – Internal DWQMS Audit Report

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ID #	Type of Finding	Element	Description
2016-IA-11	OFI	9	Clarify Operational Plan element 9: i. Figure 3, as the blue hashed-line box appears to identify only Top Management as the “Operating Authority”, and ii. The Administrative Assistant’s role within the QMS (currently identified a ‘QMS Representative designate’).
2016-IA-12	OFI	10	i. Ensure: a. personnel are aware of the location of the QMS Policy and Operational Plan; and b. records to confirm the competencies of internal auditors are in place (e.g. records of Director of Public Works WESA audit experience was unavailable at the time of the audit). ii. Consider including the 2015 emergency scenario exercise in the training summaries.
2016-IA-13	OFI	13	Consider: i. listing suppliers (i.e. for Anchor 12) and associated full contact information (e.g. email, phone, etc.) in the ‘Essential Services and Supplies List’ for emergency purposes; ii. linking to the emergency list for borrowed equipment; iii. clarifying the circumstances (e.g. quantities) under which products need to be ordered; iv. identifying access to NSF website to accurately verify quality of products (e.g. Anchor 12); v. retaining evidence to confirm the quality of back-up / emergency services (e.g. HACH); and vi. clarifying communication of equipment quality requirements (e.g. Vancor Supply Packing Slip dated 24-Apr-2015 identifies ‘no lead’ curbstops only, no mention of AWWA).
2016-IA-14	OFI	16	Clarify PROC 016 to: i. identify dead end flushing frequencies. Only certain dead ends are flushed monthly, remaining are performed semi-annually; and ii. dead end flushing procedure. As per interview with Lead Hand, watermains are flushed first and chlorine residual taken afterward.
2016-IA-15	OFI	17	Clarify the calibration frequencies (internal/external) of the turbidimeter and TELOG Hydrant Pressure Recorder, and the use of their associated forms (QMS FORM 003 – Portable Pressure Gauge Calibration Form and QMS FORM 011 Turbidimeter Calibration, Calibration Verification and Turbidity Measurement).
2016-IA-16	OFI	18	Consider: i. documenting emergency response testing conclusions (e.g. success/failure, procedure revisions etc.); and ii. identifying the specific procedures tested.
2016-IA-17	OFI	19	Clarify QMS PROC 019 (i.e. use of audit checklist, auditor follow up) in the event the internal audit is conducted by an external party.
2016-IA-18	OFI	21	i. Consider, within the Corrective Action List: a. tracking management review actions, actions from risk assessment process, concerns raised during Council meetings, and actions from emergency response testing to ensure traceability. b. including: a. the source of action (e.g. Internal audit, staff observation etc.); b. the type of finding (e.g. action, nonconformity, OFI, etc.); c. a finding number; d. associated DWQMS Standard element number; and

APPENDIX A

Quality Management System
Certificate of Accreditation



Certificate of Registration

This certifies that the Quality Management System of

The Corporation of the Town of Pelham

20 Pelham Town Square
Box 400
Fonthill, Ontario, L0S 1E0, Canada

has been assessed by NSF-ISR and found to be in conformance to the following standard(s):

Ontario's Drinking Water Quality Management Standard

Scope of Registration:

Pelham Distribution System, 072-OA1, Entire Full Scope Accreditation



Certificate Number: C0122277-DWQ4
Certificate Issue Date: 26-MAY-2015
Registration Date: 25-MAY-2015
Expiration Date *: 24-MAY-2018

Carl Blazik,
Director, Technical
Operations & Business Units,
NSF-ISR, Ltd.

NSF International Strategic Registrations

789 North Dixboro Road, Ann Arbor, Michigan 48105 | (888) NSF-9000 | www.nsf-isr.org

APPENDIX B

Quality Management System Policy

Solution Title:	Pelham Distribution System Quality Management System Policy	
Last Updated:	June 20, 2016	S801-01

HOW MIGHT WE:

How might the Town of Pelham establish a policy that provides the foundation for the Quality Management System of the Pelham Distribution System, in conformance with the Drinking Water Quality Management Standard (DWQMS)?

KEY FACTS:

1. The Pelham Drinking Water Distribution System is owned and operated by the Corporation of the Town of Pelham. It is a Class 2 water distribution subsystem which provides potable water to lands within the designated service area through a network of water mains. The Regional Municipality of Niagara supplies treated water to the system by way of a transmission pipe line from the Welland Water Treatment Plant to the Shoalts Drive Reservoir. The distribution system commences at the reservoir discharge pipes.
2. The Municipal Drinking Water Licensing Program was implemented under the Safe Drinking Water Act. This program requires owners of water systems to obtain a license to operate their systems as well as incorporate the concept of quality management into their operations.
3. This policy forms the foundation for the Town’s Drinking Water Quality Management System.
4. The DWQMS, legislated under the Safe Drinking Water Act, prescribes the commitment requirements that must be included in the policy, and other requirements about communication and appropriateness.
5. The commitments in the solution statement support the Town’s Strategic Plan goals:
 - Protect People and Property
 - Build Trust in our Corporation
 - Become financially resilient for the next 20 years

SOLUTION STATEMENT:

The Town of Pelham is committed to providing a safe, consistent supply of drinking water to the consumers in the Town of Pelham. The Town has implemented and continues to maintain a Quality Management System (QMS), and will endeavour to

Solution Title:	Pelham Distribution System Quality Management System Policy	
Last Updated:	June 20, 2016	S801-01

continually improve the QMS through regular review, evaluation, and action.

The Town commits to complying with all applicable legislation and regulations in pursuit of high quality water and efficient distribution.

APPENDIX C

MOECC Annual Report



OPTIONAL ANNUAL REPORT TEMPLATE

Drinking-Water System Number:	260001604
Drinking-Water System Name:	Pelham Distribution System
Drinking-Water System Owner:	The Corporation of the Town of Pelham
Drinking-Water System Category:	Large Municipal
Period being reported:	January 1, 2016 to December 31, 2016

<p><u>Complete if your Category is Large Municipal Residential or Small Municipal Residential</u></p> <p>Does your Drinking-Water System serve more than 10,000 people? Yes [X] No []</p> <p>Is your annual report available to the public at no charge on a web site on the Internet? Yes [X] No []</p> <p>Location where Summary Report required under O. Reg. 170/03 Schedule 22 will be available for inspection.</p> <table border="1" style="width: 100%;"> <tr> <td> Pelham Municipal Building 20 Pelham Town Square Fonthill, Ontario www.pelham.ca </td> </tr> </table>	Pelham Municipal Building 20 Pelham Town Square Fonthill, Ontario www.pelham.ca	<p><u>Complete for all other Categories.</u></p> <p>Number of Designated Facilities served: <input style="width: 100px; height: 20px;" type="text"/></p> <p>Did you provide a copy of your annual report to all Designated Facilities you serve? Yes [] No []</p> <p>Number of Interested Authorities you report to: <input style="width: 100px; height: 20px;" type="text"/></p> <p>Did you provide a copy of your annual report to all Interested Authorities you report to for each Designated Facility? Yes [] No []</p>
Pelham Municipal Building 20 Pelham Town Square Fonthill, Ontario www.pelham.ca		

Note: For the following tables below, additional rows or columns may be added or an appendix may be attached to the report

List all Drinking-Water Systems (if any), which receive all of their drinking water from your system:

Drinking Water System Name	Drinking Water System Number
None	Not applicable

Did you provide a copy of your annual report to all Drinking-Water System owners that are connected to you and to whom you provide all of its drinking water? Yes [] No [Not Applicable]



Indicate how you notified system users that your annual report is available, and is free of charge.

Public access/notice via the web

Public access/notice via Government Office

Public access/notice via a newspaper

Public access/notice via Public Request

Public access/notice via a Public Library

Public access/notice via other method _____

Describe your Drinking-Water System

The Corporation of the Town of Pelham operates a water distribution system which is supplied with treated water by the Regional Municipality of Niagara from the Welland Water Treatment Plant, located at #4 Cross Street in Welland. The source of the water for the treatment plant is the Welland Recreational Waterway.

The treated water is transported to the Town by way of a 750mm diameter watermain to the Shoalts Drive Reservoir located at #5 Shoalts Drive in Fonthill. Water is distributed from the reservoir by way of a series of watermains and a Regional elevated tank located at #177 Highway #20 West in Fonthill, to lands within the designated service area.

The Pelham Distribution System is comprised of approximately 81 kilometers of watermain varying in size from 50mm to 400mm diameter. In addition there is a 300mm diameter watermain, 6.5 kilometers in length owned by the Regional Municipality of Niagara which is connected to the Pelham Distribution System and also distributes water to lands within the service area.

List all water treatment chemicals used over this reporting period

Not applicable

Were any significant expenses incurred to?

Install required equipment

Repair required equipment

Replace required equipment



Please provide a brief description and a breakdown of monetary expenses incurred

(1) Installation of new PVC watermain in new development in East Fonthill, on Summersides and River Estates, south of Regional Road Highway 20. \$1,115,021
 (2) General repairs and maintenance of watermain and appurtenances \$ 82,000.00
 (3) Replacement of watermain on Highland Avenue \$ 85,805.00

Provide details on the notices submitted in accordance with subsection 18(1) of the Safe Drinking-Water Act or section 16-4 of Schedule 16 of O.Reg.170/03 and reported to Spills Action Centre

Incident Date	Parameter	Result	Unit of Measure	Corrective Action	Corrective Action Date
None					

Microbiological testing done under the Schedule 10, 11 or 12 of Regulation 170/03, during this reporting period.

	Number of Samples	Range of E.Coli Or Fecal Results (min #)-(max #)	Range of Total Coliform Results (min #)-(max #)	Number of HPC Samples	Range of HPC Results (min #)-(max #)
Raw					
Treated					
Distribution	555	0 - 0	0 - 0	555	0 - 320

Operational testing done under Schedule 7, 8 or 9 of Regulation 170/03 during the period covered by this Annual Report.

	Number of Grab Samples	Range of Results (min #)-(max #)	Unit of Measure
Turbidity			
Chlorine	846	0.20 – 1.19	mg/l
Fluoride (If the DWS provides fluoridation)			

NOTE: For continuous monitors use 8760 as the number of samples.



Summary of additional testing and sampling carried out in accordance with the requirement of an approval, order or other legal instrument.

Date of legal instrument issued	Parameter	Date Sampled	Result	Unit of Measure
Not Applicable				

Summary of Inorganic parameters tested during this reporting period or the most recent sample results

Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Antimony				
Arsenic				
Barium				
Boron				
Cadmium				
Chromium				
*Lead				
Mercury				
Selenium				
Sodium				
Uranium				
Fluoride				
Nitrite				
Nitrate				

*only for drinking water systems testing under Schedule 15.2; this includes large municipal non-residential systems, small municipal non-residential systems, non-municipal seasonal residential systems, large non-municipal non-residential systems, and small non-municipal non-residential systems.

Summary of lead testing under Schedule 15.1 during this reporting period

(applicable to the following drinking water systems; large municipal residential systems, small municipal residential systems, and non-municipal year-round residential systems)

Location Type	Number of Samples	Range of Lead Results (min#) – (max #)	Unit of Measure	Number of Exceedances
Plumbing	Exempt			
Distribution	8	0.00002 – 0.00023	mg/l	0

Summary of Organic parameters sampled during this reporting period or the most recent sample results



Parameter	Sample Date	Result Value	Unit of Measure	Exceedance
Alachlor				
Aldicarb				
Aldrin + Dieldrin				
Atrazine + N-dealkylated metabolites				
Azinphos-methyl				
Bendiocarb				
Benzene				
Benzo(a)pyrene				
Bromoxynil				
Carbaryl				
Carbofuran				
Carbon Tetrachloride				
Chlordane (Total)				
Chlorpyrifos				
Cyanazine				
Diazinon				
Dicamba				
1,2-Dichlorobenzene				
1,4-Dichlorobenzene				
Dichlorodiphenyltrichloroethane (DDT) + metabolites				
1,2-Dichloroethane				
1,1-Dichloroethylene (vinylidene chloride)				
Dichloromethane				
2,4 Dichlorophenol				
2,4-Dichlorophenoxy acetic acid (2,4-D)				
Diclofop-methyl				
Dimethoate				
Dinoseb				
Diquat				
Diuron				
Glyphosate				
Heptachlor + Heptachlor Epoxide				
Lindane (Total)				
Malathion				
Methoxychlor				
Metolachlor				
Metribuzin				
Monochlorobenzene				
Paraquat				
Parathion				
Pentachlorophenol				



Phorate				
Picloram				
Polychlorinated Biphenyls(PCB)				
Prometryne				
Simazine				
THM (NOTE: show latest annual average)	Dec. 2016	37.0	micrograms/l	None
Temephos				
Terbufos				
Tetrachloroethylene				
2,3,4,6-Tetrachlorophenol				
Triallate				
Trichloroethylene				
2,4,6-Trichlorophenol				
2,4,5-Trichlorophenoxy acetic acid (2,4,5-T)				
Trifluralin				
Vinyl Chloride				

List any Inorganic or Organic parameter(s) that exceeded half the standard prescribed in Schedule 2 of Ontario Drinking Water Quality Standards.

Parameter	Result Value	Unit of Measure	Date of Sample
Not Applicable			