Pelham Water Distribution System

ANNUAL SUMMARY REPORT

January 1, 2017 to December 31, 2017

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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2 GLOSSARY

ATP	Adenosine Triphosphate
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
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), and the municipal 'Summary Report' (O. Reg. 170/03 schedule 22).

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).

The MOECC Annual Report was prepared and submitted separately to Council.

This is the municipal 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 84.5 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 5 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 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 2017 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.

The Town responded to **25** water quality/supply complaints in 2017. All were resolved promptly, 14 related to low pressure concerns, and 11 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 results.

Table 1 – 2017 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
Free chlorine	7 per week	14 per week	>=0.05 mg/L, <=4.0 mg/L	--	None

Parameter	# Samples Required	Actual # Samples Taken	Legislated Requirement	Guideline	Actual # Samples Exceeding Limit
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
Haloacetic Acids	1 per quarter	3 per quarter	There is no limit for HAA running average at this time	--	None
Pressure	None	5 per month including 1 sample in each pressure zone	--	>=28psi	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 2017.

5.4 MOECC Drinking Water System Inspection Report

In January 2018, the Town's distribution system underwent an unannounced focused annual inspection by a MOECC Drinking Water Inspector. The inspection covered the period September 1, 2016 to December 31, 2017.

The Pelham Distribution System Inspection Report was received at the February 20th, 2018 Policy and Priorities meeting.

5.5 Regulatory Updates

Some regulatory changes occurred in 2017, which have a moderate effect on water operations.

5.5.1 Drinking Water Quality Management Standard

In February of 2017, the MOECC updated the Drinking Water Quality Management to Version 2.0. Key changes to the standard include that all system owners are aware of the risks of climate change and that they are considered in their infrastructure planning activities, and that both proactive and reactive approaches are taken to ensure continual improvement to the system. The changes are not anticipated to have a significant effect on the management system in place with the Town, and staff are continuing to work on updating the system as required.

5.5.2 Sampling and Reporting Requirements

Haloacetic Acid (HAA) O.Reg. 170/03: In 2017 Town staff began to sample for the concentration of (HAA) in our drinking water on a quarterly basis. 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 2017, 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 alternative disinfection techniques, confined space entry & rescue, pumps and pumping systems, use of Adenosine triphosphate (ATP) testing to confirm biofilm in distribution system, 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 2019.

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

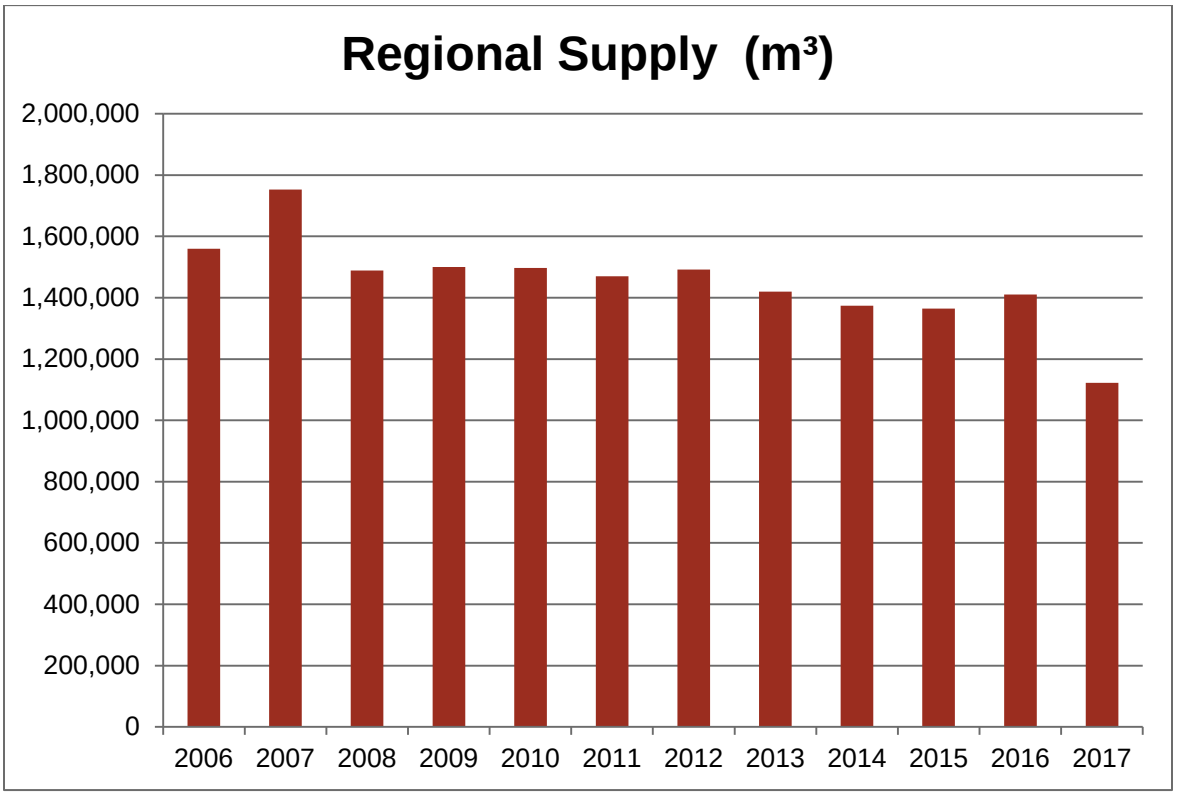
Water consumed by the Town of Pelham is measured by the Niagara Region, and provided monthly to the Town. In 2017, a total of 1,122,740 cubic meters (m^3) of water flowed to the Town of Pelham in total. (1 cubic meter of water = 1,000 litres). This quantity continues to decrease since 2006, as shown in **Table 2.**

Table 2 – Annual Totals

Year	Supply (m^3)
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
2017	**1,122,740**

The totals in this table are also reflected in the graph below, **Figure 1.**

Figure 1 –2017 Total Water Supplied by the Region of Niagara



It is anticipated that the decreasing general demand may be generally attributed to decreasing customer demand, and social conservation initiatives.

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 2017 average daily consumptions are shown in **Table 3,** along with the maximum daily flows for each month.

Table 3 –2017 Daily Water Usage

Month	Average Daily Quantity (m^3)	Max Flow in One Day (m^3)
January	2838	3280
February	2835	3410
March	2634	3800
April	2635	3160
May	2923	3630
June	**4057**	**6330**
July	3672	5020
August	3270	4780
September	3604	4530
October	2931	4300
November	2698	3720
December	2835	3690

The 2017 highest demand day occurred in June, which aligns with the typical high monthly demands in the summer months (especially observed with filling swimming pools).

No servicing concerns are noted. The Master Servicing Plan (MSP - 2016) lists 2016 firm capacity of the Shoalts high & low lift stations at 19,400 m^3/day, and existing max day demand (at the combined two zones of the BPS) at 6,700 m^3/day, which is lower than the actual 6,330 m^3/day max day usage. The MSP also identifies the projected 2041 maximum day demand at 11,500 m^3/day, and pump upgrades are thus planned for this pump station.

6.2 Water Loss (Unaccounted Water)

Although a water loss analysis is usually provided, data provided to Public Works raises concerns that must be further investigated, before presenting to Council. (First draft of loss calculations shows a discrepancy between volumes purchased from the Region and accounted volumes), so staff will continue to investigate the discrepancy before

reporting. As such, loss comparisons cannot be provided at this time. This is not a regulatory reporting parameter.

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, many allowances were necessary based on competing capital infrastructure needs.

Summersides (west end) watermain was constructed, and four new fire hydrants on Pelham Street to improve firefighting were installed.

Design of new and replacement watermain was also underway in 2017.

Developments involving construction of new watermain by developers included River Estates in East Fonthill, and the Woodlands on Balfour Road.

7.2 Rehabilitation and Repairs

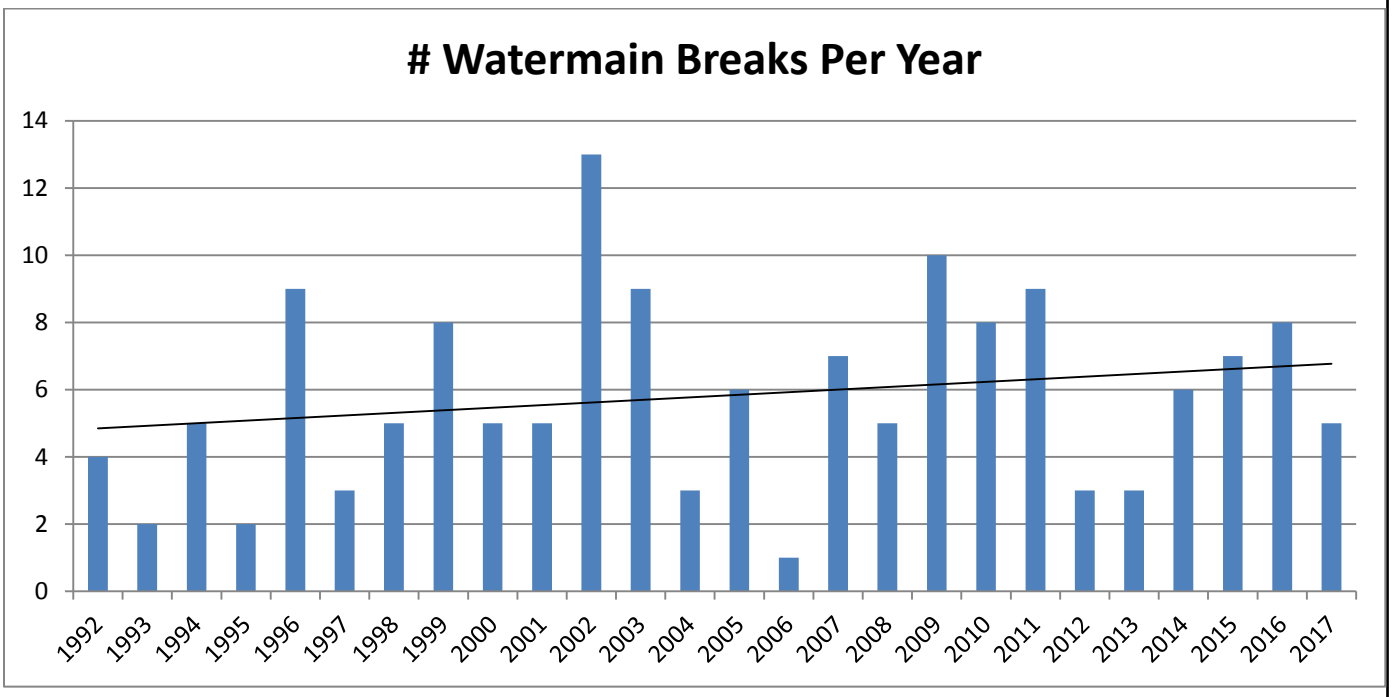
7.2.1 Water Main

A total of five main breaks occurred in 2017, summarized in **Table 4**. **Figure 2** shows the overall trend for the total number of water main breaks.

Table 4 – Water Main Break Summary

Date	Location	Type of Pipe	Suspected Cause	Replacement in 20-year Capital Plan
2/4/17	EMMETT STREET	CAST IRON	AGE & CONDITION	2024
2/18/17	BACON LANE	ASBESTOS CEMENT	SETTLEMENT DUE TO NEW SERVICE INSTALLATION	- -
7/6/17	CLARE AVENUE	CAST IRON	AGE, CONDITION, PRESSURE	2019
12/17/17	STATION STREET	CAST IRON	AGE & CONDITION	2018
12/22/17	LORIMER STREET	CAST IRON	AGE & CONDITION	2022

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 with an average age of 60 years.
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.

Table 5 shows the overall downward trend for the total remaining amounts of cast iron still in service in the system.

Table 5 – 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%
2017	13.8	17%

7.2.2 Booster Pumping Stations

Regular maintenance and repairs are required at our Chestnut Ridge Booster Pump Station. In 2017 these were completed by the Niagara Region through a Maintenance Agreement. This agreement, however, has expired, and will be updated by both parties, and brought to Council when drafted. 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.

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 MONITORING AND IMPROVEMENT INITIATIVES

In 2017, 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, inventory reviews, quality management improvements and improving the Hydrant & Valve Maintenance Program and Water Sampling.

8.1 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.

As approved in the 2018 budget, plans will commence in June for the creation of a backflow program. 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, drafting of a policy, bylaw or other enforceable document, an implementation and public education program, enforcement program and roll-out schedule.

8.2 Leak Detection

Flowmetrix Technical Service Inc. provided a small water leak detection survey for the Town Of Pelham in 2017. 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.

The 2018 budget includes funding for continuing the leak detection program.

8.3 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 2017 operating budget. This project is ongoing, and near completion.

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.

It will be regularly used to view changes in the system that may result, or may be needed, related to proposed developments.

9 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 6 lists the status of the key elements for water licensing.

Table 6 – 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 2017 completed (including supporting procedures and forms)
Accreditation	Maintained full accreditation, following an off-site verification audit by NSF in May 2017 - This accreditation certificate expires this year, on May 24, 2018. The contract with NSF will be renewed, and a full accreditation on-site audit will be carried out in May 2018.
Financial Plan	Updated in 2014, covering 2014 – 2020 inclusive.

10 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.

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

10.1 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.

Recommendations from the annual 2017 review (performed in Nov 2017) were translated accordingly into the 2018 water operational and capital budget requests, and into the 20-year Capital Plan updates, and are communicated in this report below.

Infrastructure Review Meeting Minutes	
Details / Discussion Points / Issues Identified	**Recommendation** *(for budget ask)* **/** **Action Items** *(to be tracked via QMS LIST 006)*
Watermain – servicing, replacement, monitoring, operating & capital needs, other	
• Reviewed 2016 infrastructure review summary, confirmed projects completed and those to be carried forward to the 2018 ask • Reviewed break histories: o Watermain Breaks (4-Feb, 18-Feb, and 5-Jul [Claire Street])—all category 1 breaks; the developer has been asked to replace the main that fronts the development • 20 year infrastructure replacement has been updated based on information identified above	**Recommendations:** • Clare Avenue Watermain Replacement - development driven • Haist Street: Welland Rd to Beckett Cres, including Welland Rd Haist to Edward • Station Street: Hwy 20 to Port

Infrastructure Review Meeting Minutes	
Details / Discussion Points / Issues Identified	**Recommendation** *(for budget ask)* **/** **Action Items** *(to be tracked via QMS LIST 006)*
and projects completed in 2016/2017 • Identified need to maintain an annual request for inventory, restoration and repairs • Reviewed MOECC inspector recommendation which identified potential for a backflow prevention program. Was included in 2017 budget ask. has been included in the 2018 budget. • MPW discussed recent ATP training and potential opportunity to add ATP to existing sampling and monitoring program.	Robinson, Watermain Replacement - trench only • Water System Repair Equipment • Backflow Prevention Program **Action Items:** • Investigate addition of ATP to existing sampling and monitoring program (includes the purchase of ATP Test Kit).
Hydrants – monitoring, servicing, operating & capital needs, other	No additional recommendations or action items.
• Reviewed 2016 infrastructure review summary, hydrant maintenance (due to staffing issues) have been rectified; valve program was adjusted to allow for dedication of resources to hydrant program (see details below). • Hydrant addition (Pelham Street – Merrit to Quaker) completed • Identified need to maintain an annual request for inventory, restoration and repairs	
Mainvalves – monitoring, servicing, operating & capital needs, other	No additional recommendations or action items.
• Shift in inspection program to accommodate hydrant inspection frequency (valves currently divided into 4 sections; each section to be completed every 4 years). • No changes in budgetary asks. Station Street ask for 2017 to be carried forward.	
Other appurtenances – operating & capital budget needs, other	No additional recommendations or action items.
• PRV at Church street completed early 2017 • Bulk station remains in 20 years capital however potential risks were discussed during meeting • 20-year capital has been adjusted • Highland Watermain Replacement completed • East Fonthill development continues	

Infrastructure Review Meeting Minutes	
Details / Discussion Points / Issues Identified	**Recommendation** *(for budget ask)* **/** **Action Items** *(to be tracked via QMS LIST 006)*
Inventory and Tools – operating & capital needs, other • pH Meter and Speed Shore Trench Box were purchased • Discussed implication for the inclusion of ATP in existing sampling and monitoring program (need for ATP Test Kit) • Management of inventory has been re-organized, intent to stock additional inventory (purchase of new shelving units) is being investigated (together with other divisions).	No additional recommendations or action items.
Software / hardware – capital needs, other • Water model upgrade is underway • Work order software is being investigated (would be combined for all Public Works Departments)	**Recommendations:** • Work order software
Pumping Station • Region installed pump early 2017 • Reviewed details of the agreement with the Region; monthly fee to operate and maintain the pumping station that is owned by Pelham. • Identified the need to better understand / identify how maintenance activities, and the effectiveness of the maintenance program at the Pumping Station are communicated to the DPW/MPW/Town of Pelham.	**Action Items:** • Investigate how the completion of maintenance activities / effectiveness of the maintenance program at the Pumping Station is communicated to the Town
Staffing • License upgrade plan, carried forward; training completed and emergency training; • Operating forecast includes a water student for 2019; forecast also includes QMS training, exam fees, association fees, and PPE.	No additional recommendations or action items.

10.2 Management Review

Management review is a required component of the DWQMS. In Nov 2017, 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 2018 water operational and capital budget requests, and into the 20-year Capital Plan updates, and are communicated in this report below.

Management Review Meeting Minutes *(completion of Action Items to be tracked via QMS LIST 006)*				
Input	**Details / Discussion Points / Issues Identified /Decisions Made**	**Action Item(s)**	**Responsibility**	**Proposed Due Date**
a.)	Incidents of regulatory non-compliance: No MOECC inspection has been completed for 2017. As per discussion, there are no concerns regarding compliance issues. The backflow program recommended during the 2016 MOECC inspection has been included in the 2018 budget ask.	n/a	-	-
b.)	Incidents of adverse drinking-water tests: No incidents of adverse drinking water tests have occurred since the previous Management Review completed.	n/a	-	-
c.)	Deviations from critical control point limits and response actions: One deviation from the identified CCLs was identified since the previous Management Review: • Low chlorine in East Fonthill was identified in the new development area (large main with little demand at the moment); details documented in the logbook (10-Nov-2017). Flushing was initiated (see logbook for additional details). As a result, area will be subject to increased continuous monitoring (flushed more frequently / for a greater period of time).	n/a	-	-

Management Review Meeting Minutes *(completion of Action Items to be tracked via QMS LIST 006)*				
Input	**Details / Discussion Points / Issues Identified /Decisions Made**	**Action Item(s)**	**Responsibility**	**Proposed Due Date**
d.)	The efficacy of the risk assessment process: A new risk assessment was completed 2-May-2017 and revised 24-May-2017. The following were details were noted: • Two new Distribution CCPs identified related to backflow (Item #11) and terrorism (18), based on MOECC Potential Hazardous Events for Municipal Residential Drinking Water System to Consider in the DWQMS Risk Assessment; it was decided that Items #11 and 18 not be identified as CCPs, in seeing that control measures cannot prevent or control the associated hazardous events for occurring. • Additional Transmission (supply (24)/pressure (25)) and Supply (pressure (22)) hazards added. • Expanded Distribution hazards (climate change (4), extreme temperatures (5), contractor watermain damage (8)) based on MOECC Potential Hazardous Events for Municipal Residential Drinking Water System to Consider in the DWQMS Risk Assessment. • Risk rating changes throughout (refer to individual notes in item #s 10, 11 and 12). Annual review of the risk assessment assumptions and currency is to be completed in May 2018 and has been added to the MPW and DPW's outlook calendars.	n/a	-	-
e.)	Internal / third-party audit results: • An Internal audit was completed by Tavares Group Consulting Inc.18-Nov-2016 with the report issued 25-Nov-2016. 5 Nonconformities (all have been closed) and 13 opportunities for improvement were identified (all have been closed). All audit findings were documented within QMS LIST 006. • An external audit was completed by NSF in May 2017, report received	n/a	-	-

Management Review Meeting Minutes *(completion of Action Items to be tracked via QMS LIST 006)*				
Input	**Details / Discussion Points / Issues Identified /Decisions Made**	**Action Item(s)**	**Responsibility**	**Proposed Due Date**
	September 2017. No corrective actions were identified. Opportunities for improvement identified include: i. Look into leakage protection ii. Keep a spend graph for amounts used to fix main breaks	i. Leakage protection (moderated pressure) will be investigated ii. Cast iron water loss, including a trend graph of water main breaks (and break, location, type of main, and reason) are being communicated to Council. Costs for emergency repairs and investment in infrastructure is not an issue, no further action required.	i. R. Cook ii. n/a	i. December 2018 ii. n/a
f.)	Results of emergency response testing: Emergency response training and testing completed 17-Nov-2017. One gap (to document reviews of emergency response procedures after actual events) was identified and is being tracked via QMS LIST 006.	n/a	-	-
g.)	Operational Performance: The system is operating well. Customer complaints are down since the installation of the PRV. 3 watermain breaks have occurred in the period. A concern regarding the placement of Municipal servicing without use (pre-development) was discussed however, recent CCL deviation has resulted in increased monitoring. No concerns re: the subject system's sampling program. Staffing and succession planning is underway (2020).	n/a	-	-
h.)	Raw water supply & drinking water trends: Quarterly meetings with the Region are			

Management Review Meeting Minutes *(completion of Action Items to be tracked via QMS LIST 006)*				
Input	**Details / Discussion Points / Issues Identified /Decisions Made**	**Action Item(s)**	**Responsibility**	**Proposed Due Date**
	being attended. A new treatment process (including UV) has been implemented and a new water/wastewater servicing plan has been issued. The Fenwick single feed is not addressed in the servicing plan (no concern due to the size of the main and ease of fix in the event of a break; Region has identified sufficient capacity and low risk. Details have been communicated to Council.	n/a	-	-
i.)	Follow-up on actions from previous Management Reviews: Previous action items include: • Improving the scheduling of internal audits – next internal audit to be completed 27-Nov-2017 (*complete*) • Need for upcoming emergency testing and outside DWQMS assistance (*complete*)	n/a	-	-
j.)	Status of management actions items identified between reviews: No formal action items have been identified between Management Reviews, the following issues have arisen since the past Management Review and were communicated to the Owner: • Station Street water main replacement approval • Fenwick single supply being omitted from the Region's Water/Wastewater Servicing Plan • Hurricane Street budgetary issue	n/a	-	-
k.)	Changes that could affect the Quality Management System: Growth (development) and succession planning (due to retirement and understanding operator to service connection ratio) is underway.	n/a	-	-
l.)	Consumer feedback (incl. complaints): 2016: 17 (12 related to low pressure, 5 to	n/a	-	-

Management Review Meeting Minutes *(completion of Action Items to be tracked via QMS LIST 006)*				
Input	**Details / Discussion Points / Issues Identified /Decisions Made**	**Action Item(s)**	**Responsibility**	**Proposed Due Date**
	colour/odour); all subsequently resolved 2017: 17 YTD (11 low pressure, 6 to colour/odour). No water quality concerns; complaints are not an indication of water quality and have been resolved			
m.)	The resources needed to maintain the Quality Management System: Resources are being communicated to the Owner through annual budgeting process / infrastructure review process (e.g. Water model, work order system, consulting assistance).	n/a	-	-
n.)	The result of the infrastructure review: Infrastructure review was completed by the DPW and MPW and documented using QMS FORM 026 on 17-Nov-2017. Results of infrastructure review have been communicated via the 2018 budget ask; action items identified during the infrastructure review are being tracked via the QMS LIST 006	n/a	-	-
o.)	Operational plan currency, content and updates (incl. need for re-endorsement): The Operational Plan was re-endorsed in 2016; changes in 2017 were mainly clerical in nature. The Operational Plan is current and there is no need for and no need for re-endorsement. A municipal election will be held in October 2018. The need to re-endorse the Operational Plan will be reviewed after the election.	n/a	-	-
p.)	Staff suggestions: Preventive maintenance for ICI metering (2010/11 replacement program identified many were old and not accurate) however there has been no follow-up since installation (water-loss is completed annually). A report and recommendations has been prepared.	Review report, discuss next steps, potential for inclusion in future infrastructure/budgetary planning, and responsibilities	R. Cook	December 2018

10.3 Internal Audit Results

Results from the QMS internal audit performed in November 2017 are summarized. The internal audit must be performed once per year (Annex A, an excerpt summary from the report, is shown on the following page).

No nonconformances were identified.

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.

Annex A – 2017 Internal Audit Findings

ID #	Type of Finding	Element	Description
2017-IA-01	OFI	5	There is an opportunity to: i. ensure records are completed consistently (e.g. Portable Analog Pressure Gauges QMS FORM 003 is not always being signed [Aug and Oct-2017], dated [Oct-2017], replacement column completed [May-2017], and unit of measurement used [psi or kPa] is not consistent); ii. ensure new QMS FORMs 026 and 027 are available in the Pelham>DWQMS>Forms folder; iii. update QMS PROC 014 and 020 to reference the use of new QMS FORMs 026 and 027; and iv. update QMS PROC 005 to identify the minimum retention time of HAA sampling results.
2017-IA-02	OFI	6	There is an opportunity to clarify, within PDS OP Element 6: i. the ownership (Town of Pelham) and maintenance/operation (Regional Municipality of Niagara) of the pressure boosting station; ii. the location of the pressure boosting station on the Process Flow Chart; and iii. the OA (Owner = City of Welland) of the Welland Distribution System.
2017-IA-03	OFI	8	There is an opportunity to clarify, within QMS PROC 016, the process for documenting deviations from CCLs (i.e. what information is to be recorded and where) and ensure implementation. For example, information recorded from the 10-Nov-2017 CCL deviation was included on the work order (identified chlorine residual of .7 mg/L was achieved after 3 hrs of flushing; initial chlorine residual not identified), and in the facility logbook (chlorine residual of .15 mg/L was documented however location [i.e. East Fonthill] was unclear, 'unusual conditions' and 'action taken' sections in the logbook were not completed, etc.).
2017-IA-04	OFI	10	Consider revising QMS LIST 011 to identify and track completion of all QMS-related training for all applicable personnel (e.g. annual awareness training, emergency response training/testing, SOP reviews/training, etc.).
2017-IA-05	OFI	13	There is an opportunity to identify the following, and associated quality requirements, within QMS PROC 013's list of essential suppliers and service providers: i. SGS Lakefield (subcontracted HAA testing); and ii. Region of Niagara (operation/maintenance of the Booster Pumping Station).
2017-IA-06	OFI	15	There is an opportunity to: i. consider standardizing the input categories within the 'Maintenance Activities' tab of the Water Operations 2017 excel workbook, to allow for easier trending/data review and analysis; and ii. clarify QMS PROC 016's description of the monitoring/flushing program, and associated recording processes (e.g. use of work orders vs. QMS FORM 001 for monthly challenging location flushing).
2017-IA-07	OFI	17	There is an opportunity to identify within QMS PROC 017, the accuracy limits (e.g.+/- .10? .07? etc.) used during monthly colorimeter comparison and accuracy determination, that would initiate a second sample and potential removal from service / repair.
2017-IA-08	OFI	18	There is an opportunity to ensure emergency response training/testing is reviewed with applicable OA personnel who were unable to attend recently completed emergency response mock scenario.

10.4 External Audit Results

In May 2017, 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. No Opportunities for Improvement were suggested:

Summary of Findings	
Requirement	**Finding**
1. Quality Management System	C
2. Quality Management System Policy	C
3. Commitment and Endorsement	C
4. Quality Management System Representative	C
5. Document and Record Control	C
6. Drinking-Water System	C
7. Risk Assessment	C
8. Risk Assessment Outcomes	C
9. Organizational Structure, Roles, Responsibilities, and Authorities	C
10. Competencies	C
11. Personnel Coverage	C
12. Communications	C
13. Essential Supplies and Services	C
14. Review and Provision of Infrastructure	C
15. Infrastructure Maintenance, Rehabilitation & Renewal	C
16. Sampling, Testing & Monitoring	C
17. Measurement & Recording Equipment, Calibration & Maintenance	C
18. Emergency Management	C
19. Internal Audits	C
20. Management Review	C
21. Continual Improvement	C

Mj	Major Non-Conformity. The auditor has determined one of the following: (a) a required element of the DWQMS has not been incorporated into a QMS: (b) a systemic problem with a QMS is evidenced by two or more minor conformities; or (c) a minor non-conformity identified in a corrective action request has not been remedied.
Mn	Minor Non-Conformity. In the opinion of the auditor, part of a required element of the DWQMS has not been incorporated satisfactorily into a QMS.
OFI	Opportunity for Improvement. Conforms to requirement, but there is opportunity for improvement.
C	Conforms to requirement.
	Not Applicable to this audit
*	Additional Comment added by auditor in the body of the report.