APPENDIX "A"

City of Barrie
Water Operations Branch

Drinking Water System
Annual Report to Council

For the Period of

JANUARY 1 TO DECEMBER 31, 2016

System Rating:	Water Treatment Subsystem Class IV Water Distribution and Supply Subsystem Class IV Water Distribution Subsystem Class II
Drinking Water System No.:	220001192
Municipal Drinking Water Licence No.:	014-101, Issue No. 3

Effective Date: 2017-02-28

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1 Introduction

The purpose of this report is to summarize the City of Barrie (the City) Municipal Drinking Water System (the System) operating year from January 1 to December 31, 2016; provide information to the City Council on the performance of the System; and to satisfy the regulatory requirements of the Safe Drinking Water Act (SDWA), including the Drinking Water Quality Management Standard (DWQMS) and regulatory reporting requirements under Section 11 and Schedule 22 of Ontario Regulation (O.Reg.) 170/03. This report is a compilation of information that demonstrates the commitment of the Water Operations Branch (the Branch) to providing safe drinking water to end users while being transparent and financially accountable.

The development, implementation and continual improvement of processes and projects within the Branch were driven by the following five (5) priorities:

1. To ensure the delivery of safe drinking water that met or exceeded regulatory requirements
2. To ensure the delivery of safe drinking water that met or exceeded expectations and promoted customer confidence
3. To employ and retain a respectful, competent, motivated and adaptive workforce that was dedicated to teamwork, continual learning and improvement for the long term
4. To continually improve operational performance in a timely, sustainable and cost effective manner
5. To maintain an effective balance between expenditures and revenues

The following sections provide details of the 2016 achievements that support the Branch priorities listed above.

2 Program Review

2.1 Water Operations Branch

2.1.1 Branch Services

Automated meter reading technology provides for continuous water meter reading and analysis of consumption profiles and system dynamics. The Branch maintains customer water meters at peak performance for accurate water meter consumption readings, resulting in accurate revenue generation. Customer service is provided through service call processes relating to new meter installation, meter repair and replacement, leaking meter repairs, water quality complaints, service flushing, and high bill investigations.

Branch provides other services including assisting with flow testing for new building designs, subsurface infrastructure locates, review of design drawings, and the installation, inspection, and commissioning of water services on private property. Additionally, the Backflow Prevention Program allows for the protection of the drinking water system from cross connection contamination.

Compliance and conformance, is achieved using the Quality Management System (QMS). Training is an integral part of operating and maintaining the System. The Compliance and Technical Support Section, provides development and implementation of programs that ensure compliance and improves Branch efficiencies associated with regulatory and accreditation requirements.

2.1.2 Infrastructure Review

A description of the System is available in the Municipal Summary Report. A copy of the Municipal Summary Report is included in Appendix D for reference.

The Branch works in conjunction with the City Engineering Department to update the City of Barrie's Water Transmission and Distribution Policies and Design Guidelines (the City's Design Guideline) water infrastructure standard to reflect changes in industry standards and regulation. New infrastructure must be installed and commissioned according to regulatory requirements and the City's Design Guideline.

2.1.3 Computerized Maintenance Management System

All of the Operational Sections of the Branch utilize a Computerized Maintenance Management System (CMMS). A total of 27,893 work activities were performed in 2016, not including work orders completed by third party contractors.

2.1.4 Sampling and Testing

In 2016, more than 3,000 samples were collected for independent laboratory analysis under the regulatory sampling program for chemical and microbiological parameters. The analytical results are used to assess and optimize system performance, develop corrective actions, ensure safe water for consumption and to meet legislative requirements.

Additional information regarding the regulatory sampling program is available in the Annual Report. A copy of the Section 11 – Annual Report is included in Appendix B for reference.

2.1.5 Training

The Branch Management Team recognizes the importance of employee training as it improves performance, creates adaptability and is a legislated requirement. The System is comprised of 3 types of subsystems as defined under provincial O.Reg. 128/04: a Class 4 Water Treatment subsystem, a Class 4 Water Distribution and Supply subsystem and a Class 2 Water Distribution subsystem; therefore, water operators require up to 50 hours of training annually based on the highest system worked in per year. In 2016, approximately 3,228 hours of staff training occurred to satisfy minimum requirements of operator training. Twenty (20) operators were awarded licence renewals and six (6) operators were awarded licence upgrades during this reporting period.

2.1.6 Health and Safety

The Joint Health and Safety sub-committee meets on a quarterly basis to discuss and review issues ranging from basic housekeeping items and training to addressing near misses and risk mitigation. The Branch addressed health and safety concerns in a timely manner during the 2016 reporting period.

2.1.7 Community Outreach

The Branch provides sponsorship of the Natural Sciences and Engineering Research Council, this agency supports university students in advanced studies and promotes discovery research. The Branch is partnered with two (2) local Universities, University of Toronto and University of Waterloo. The partnership allows the Branch to participate in water treatment research, and helps guide the research conducted by these schools. To date, the focus has been on pre-membrane chemical dosage optimization and air diffusion systems, related to cleaning and customizing the membrane cleaning processes based on the raw water characteristics. The research work conducted by the Universities is located at the Surface Water Treatment Plant, which allows City staff to actively participate and be one of the first benefactors from research results.

2.1.8 Budget and Costs

In 2016, approximately 90% of the projected budget was consumed and approximately 102% of the projected water revenues were collected; therefore, approximately $8,257,838 was transferred to the Water Rate Reserve Fund. The majority of the under spending is attributed to contracted services, delay of minor capital expenses to 2017, gravel and sand, and overtime reduction initiatives. Additional details concerning the budgets relating to the Operational Sections are provided in the Sections 2.2, 2.3, 2.4, and 2.5 below.

The table below summarizes the performance of the Branch in 2016.

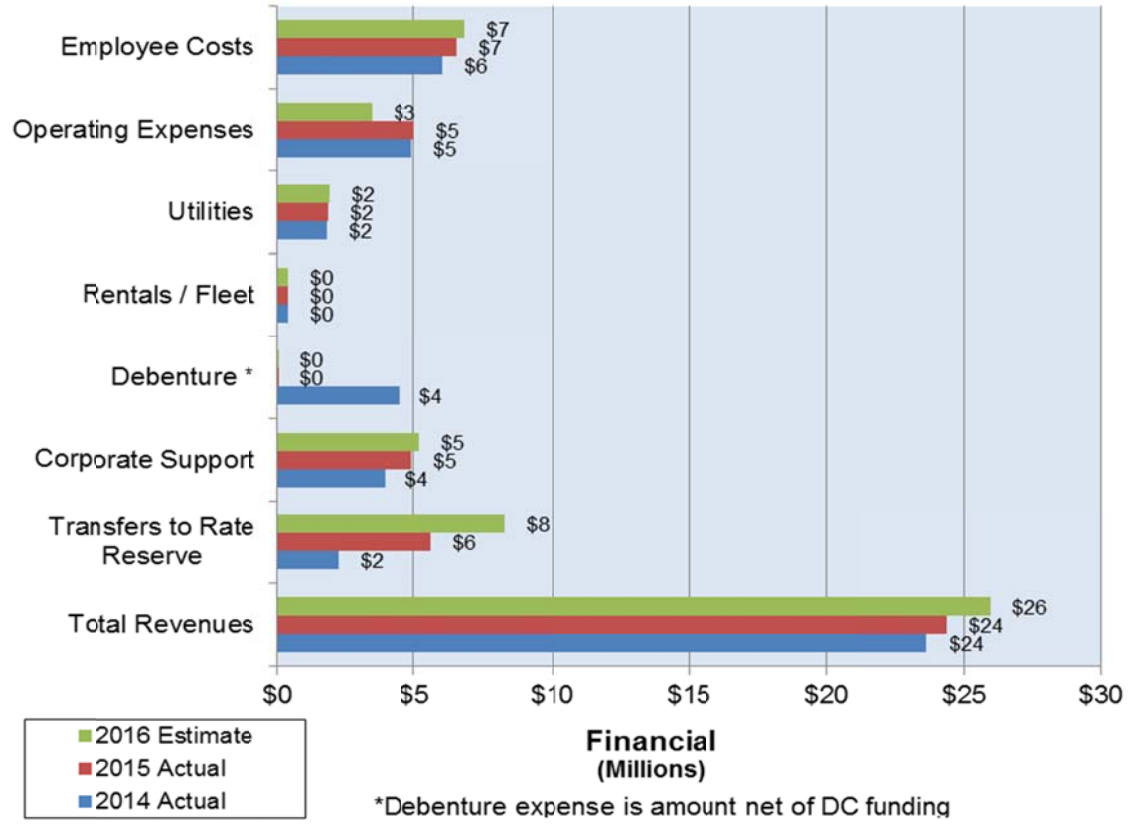
Table 1 – Water Operations Branch Key Performance Indicators

Description	Value
Total Annual Production in Megalitres (ML)	13,853
Total Treatment Cost per ML	$393.40/ML
Number of Main Breaks	36
Number of Staff Hours per Main Break	37.1
Average Cost per Main Break	$6,810/main break
Watermain Commissioned kilometers (km)	1.91
Total Distribution Cost per km of Watermain	$4,624/km
Cost of Customer Care per Service	$22.15/service
Cost of Customer Care per Customer	$6.59/customer
Total Operating Expenses	$17,732,732
Total Operational Cost per ML	$1,280.06/ML

Note: References to financials are based on the 2016 ledger before it was finalized (2016 Estimate) – excluding debenture costs

The graph below illustrates the total revenues of the Branch and demonstrates the distribution of revenues.

Figure 1: Water Operations Revenues and Fund Allocation



In accordance with O.Reg. 453/07, the Operating Authority developed a financial plan to promote sustainability of the drinking water system. The scope of the Financial Plan spans a six (6) year period; it contains details of the financial position, financial operations, and cash flow of the System. The Financial Plan is available to users of the System; it was updated in May 2014 in conjunction with the renewal of the Municipal Drinking Water Licence (MDWL) and was updated again in October of 2015.

A copy of the current Financial Plan is included in Appendix L for reference.

The operation of the System was primarily divided in four (4) groups of services which were distributed among the five (5) organizational sections of the Branch. These four (4) groups were:

- Water Treatment Services
- Water Distribution Services
- Water Customer Services
- Compliance and Technical Support

Details regarding the performance of each Operational Section are discussed in the sections below.

2.2 Water Treatment Services

Water Treatment is the first step to ensuring the production and distribution of safe drinking water. This includes water treatment, storage tank monitoring, operation and maintenance and treated water sampling.

Water treatment within the System consists of the operation and maintenance of the Ground Water System, which generally supplies the north service area, and the Surface Water Treatment Plant, which generally supplies the south service area, with potable water. Reservoir monitoring, operation, and maintenance activities were conducted to ensure the availability of adequate quantities and required pressures in the distribution system for consumption and firefighting purposes.

The Surface Water Treatment Plant completed its sixth (6^{th}) full calendar year of operation in 2016. Only minor challenges presented themselves and staff resolved all of them and provided uninterrupted service for the entire year. The Surface Water Treatment Plant was designed to meet 98% efficiency and during 2016, the annual efficiency of the Surface Water Treatment Plant averaged 97.3%. Although, the Surface Water Treatment Plant appears to be operating slightly below the designed efficiency, the remaining 0.7% is attributed to the pilot plant continual usage, service water usage and treated wastewater produced by filter backwashes discharging to the sanitary sewer.

The total annual production for 2016 was 13,853 ML, with the average daily flow of 38 ML, representing a slight increase from 2015. In 2016, a peak daily flow of 59 ML occurred in June 2016. Typically, changes in peak and maximum days are contributed to seasonal fluctuations in weather. For example, a hot, dry summer with drought-like conditions typically results in a higher than normal peak and maximum day production volumes; the opposite is also true, a colder, wet summer typically results in lower than normal peak and maximum day production volumes.

2.2.1 Infrastructure Review

In 2016, several infrastructure works were completed or initiated. These works include rehabilitation and infrastructure repair work outside of normal preventative maintenance work and are summarized as follows:

- Replace Pressure Regulating Valve vaults at Lewis Lane, Patterson Road and Broadfoot Road
- Drain, clean and inspect the Harvie Road reservoir
- Perform maintenance at the well stations, including:
    - Repair a motor due to excessive noise at Heritage Well 11
    - Repair a motor due to vibration and noise at Centennial Well 12
    - Repair a motor due to vibration and noise at Centennial Well 15
    - Replace flow meters for Sarjeant Well 7, Brownwood Well 16 and Innisfil Booster

- Surface Water Treatment Plant:
    - Replace a Low Lift Pump Variable Frequency Drive (VFD) including necessary programing improvements
    - Inspect and clean the Low Lift Wet Well to remove all mussels in order to gauge accumulation over the next operational year
    - Downsize the coagulant pumps to reduce chemical use, associated costs, and membrane fouling which is expected to increase membrane life expectancy

2.2.2 Maintenance Review

The following sections summarize the significant maintenance activities that were completed in 2016.

2.2.2.1 Groundwater Supply

In 2016, the Groundwater Supply Section completed the following significant maintenance activities:

- Performed an inspection and structural assessment on the Centennial Well 12 surge tank to determine if repair or replacement was required.
- Cleaned the chlorine contact chamber at Johnson Street Wells 9 and 13, Brownwood Drive Well 16, Heritage Park Well 11 and Sarjeant Drive Well 7.
- Calibrated all system flow meters and pressure transmitters.
- Continued development and implementation of the Supervisory Control and Data Acquisition (SCADA) reporting software.
- Overhauled all turbidity monitoring equipment.
- Cleaned all silicate tanks within the System.
- Completed annual safety inspection at Mapleview, Bayfield and Ferndale Towers.
- Initiated upgrades to plumbing at all well stations to comply with the Backflow Prevention and Cross Connection Control By-law.

2.2.2.2 Surface Water Treatment Plant

In 2016, the Surface Water Supply Section completed the following significant maintenance activities associated with the Surface Water Treatment Plant:

- Contracted camera inspections of the Low Lift wet well and intake pipe.
- Purchased a remote camera and completed video inspections of internal tanks and reservoirs.
- Conducted multiple rounds of membrane repairs to maintain filter integrity.
- Improved the level of service of the internal laboratory by expanding the suite of parameters being analyzed which allowed Operators to realize efficiencies in the treatment process.
- Ongoing studies completed in partnership with University of Toronto realized efficiencies which extended the life span of the Granular Activated Carbon (GAC) media while still achieving a high rate of taste and odour removal.

2.2.3 Supervisory Control and Data Acquisition

Visual inspections and the SCADA communications technology assist the Branch in monitoring water supply and treatment processes. Using these methods, process monitoring and evaluation leads to optimizing system operations and meeting regulatory requirements. The SCADA system is in a constant state of improvement and programming for the both the Groundwater Supply and Surface Water Supply Sections, which allows for the continued improvement of operational control and trending. Staff monitor SCADA on a continuous basis including after-hours response to generated alarms.

2.2.4 Budget and Costs

In 2016, the Groundwater Supply Section budget was underspent by approximately 19% due to projects which were delayed until 2017, including well maintenance, tank painting and pump replacements.

The Surface Water Supply Section budget was under spent by approximately 3% in 2016.

The total 2016 production and treatment costs amounts to approximately $393.40/ML

2.3 Water Distribution Services

The potability of drinking water in the distribution system is controlled through water quality monitoring, and preventative and reactive maintenance. Staff conduct various activities on a routine basis, including field inspections, sampling, and testing, as a means of monitoring the performance of the distribution system. The Branch conducts system flushing to ensure that the water quality at the extents of the distribution system remains fresh and potable.

Maintenance activities are conducted during normal working hours and after-hours. Regular maintenance and repairs of mains, connections, hydrants, valves, and controls preserve the integrity of the infrastructure. After-hours investigations preserve the integrity of the infrastructure and potability of the drinking water; in addition, provide emergency response to main breaks and other issues to minimize service disruption to end users. The Branch is responsible for hydrant repairs, while contractors perform general hydrant maintenance, including snow removal and fitness checks.

2.3.1 Infrastructure Review

New infrastructure is installed and commissioned in accordance with the City's Design Guidelines, in addition to the new MOECC Watermain Disinfection Procedure. In 2016, the Branch updated applicable Policies, Standard Operating Procedures (SOPs) and other documentation to reflect the regulatory change and applicable staff were trained in the implementation of the SOPs and Policies. One (1) staff member continues to be dedicated to design review and updated associated asset data. In 2016, approximately 30% of Water Distribution Services staff time was spent on commissioning processes, with that amount expected to increase with the development of the annexed lands, anticipated to start in 2017.

In 2016, several infrastructure works were completed or initiated. These works included rehabilitation and infrastructure repair work outside of normal preventative maintenance work, are summarized as follows:

- A large, 750mm diameter ductile iron watermain was partially installed in 2016 with commissioning anticipated in 2017. The main was located on Mapleview Drive East, between Country Lane and Huronia Road. The new main was designed to create redundancy of water supply to Zone 3S, and eventually connect supply from the Surface Water Treatment Plant to a proposed drinking water storage facility on Salem Road.
- Several projects resulted in the commissioning of 1.91km of watermain 2016.

2.3.2 Swabbing Program

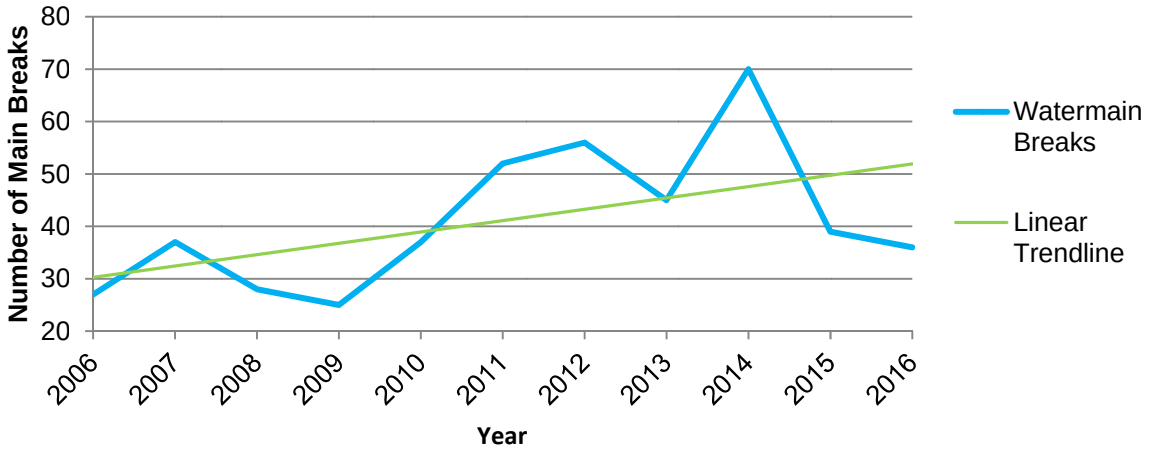
In 2016, 27km of watermain swabbing was completed in the north-west portion of the City, representing approximately 6.3% of the System. The program is assisted by a Field Liaison person ('Green Vest') assigned to ensure customers are informed and concerns were addressed immediately. Positive feedback from field staff and customers regarding the level of service continue with the use of programs like the use of a Field Liaison Person ("Green Vest") and increase public communications prior to and during the annual Swabbing Program.

2.3.3 Watermain Breaks and Frozen Services

The number of watermain breaks decreased by 8% in 2016 compared to 2015, with thirty-six (36) main breaks in 2016 compared to thirty-nine (39) main breaks in 2015. There were zero (0) incidents of frozen services in 2016 compared to 239 in 2015. The reduced rate of incidents of main breaks and frozen services is attributed to a particularly mild winter.

The graph below illustrates the historical trend of main breaks that occurred in the preceding ten (10) years.

Figure 1 - Watermain Breaks



2.3.4 Extreme Cold Strategy

A special Frozen Service Mitigation project was approved by Council in the spring of 2015 to repair or replace services known to be prone to freezing, initiated as a result of the hundreds of water services that froze during the winter of 2014 and 2015. In most cases, the work entails moving the service underneath a storm culvert and insulating between the service and the culvert. This project is now administered by the Engineering Department. The duration of the project is anticipated to extend at least four (4) years to mitigate approximately three hundred and thirty-two (332) services prone to freezing. To date, approximately seventy-two (72) water services have been lowered or otherwise adjusted to prevent future freezing. It is estimated that there are approximately 260 services remaining which require mitigation. Twenty (20) services were mitigated in 2016, with more than sixty (60) planned for 2017, upon budget approval.

2.3.5 Budget and Costs

The Water Distribution Services Section budget was approximately 19% underspent for 2016. Asphalt, sand, gravel, field supplies and contracted services comprised the largest portion of the underspent budget; combined, the aforementioned accounts represent approximately $200,000 of under spending budget, compared to the same accounts which were overspent by approximately $400,000 in 2015. The underspending is attributed to a particularly mild winter which resulted in a lower than normal number of main breaks (36) and zero (0) frozen services.

The table below summarizes the performance of the Water Distribution Services Section in 2016.

Table 2 - Water Distribution Services Key Performance Indicators

Description	Value
Number of Main Breaks	36
Number of Staff Hours per Main Break	37.1
Average Cost per Main Break	$6,810
Hydrants Inspected and Repaired	7,989
Main Valves – Inspected and Maintenance Cycled	605
Service Repairs/Replacements	62
Curb Box Repairs/Replacements	452
Water Services Reported Frozen	0
Frozen Service Mitigation Project (Services Upgraded)	19
Industrial/Commercial/Institutional Main Tappings	32
Watermain Commissioned (km)	1.91
Cost of Swabbing Program	$79,360
Cost of Leak Detection Program (contracted)	$3,330
Total Cost of Operating the Distribution System/km of Watermain	$4,624/km

Note: References to financials are based on the 2016 ledger before it was finalized (2016 Estimate) – excluding debenture costs

2.4 Water Customer Services

Customer Service continues to be a priority for the Branch, striving to provide added value by offering a wide range of services. Customers are able to obtain information regarding drinking water quality and regulatory requirements, and obtain access to call out and scheduled appointment services for the resolution of water quality, water meter, and billing related concerns.

Nine (9) certified water operators are responsible for ensuring approximately 43,729 services maintain access to quality water at the tap. In 2016, a total of 253 new water meters were installed in residential and Industrial, Commercial, Institutional (ICI) applications, representing a 26% decrease from the previous year. This decrease is attributed to a reduction in the amount of new development within the City in 2016; however it is anticipated that the amount of new water meter installations will increase significantly in the coming years as development projects are initiated in the annexed lands.

2.4.1 Automated Metering Infrastructure (AMI)

In 2016, the majority of the service calls completed by Water Customer Services staff continued to be attributed to the ongoing maintenance of the AMI system, with operators being dispatched to address alarms and notifications generated by the AMI system (i.e., stale meters, relocate SmartPoint, replace SmartPoint, troubleshoot communication with SmartPoint, etc.). These continued efforts ensure that greater than ninety-nine percent (99%) of all water meters provide up-to-date and accurate meter readings for billing purposes throughout each quarter of 2016.

2.4.2 Water Quality Complaints

Water quality complaint investigations that required action from field staff averaged just over twenty-four (24.8) complaints per month in 2016, a substantial decrease over the value reported in 2015 (45.41 complaints per month). The observed decrease is attributed, in large part, to two factors; the first, being an average to mild winter; and the second factor being the deployment of automated flushing stations (flush boxes). In 2016, zero (0) "No Water" complaints were received resulting from frozen services due to a mild winter. The deployment of flush boxes was completed based on 2015 water quality complaint data that was logged and geographically mapped using data extracted from CMMS. As a result, water quality complaints in the areas where flush boxes are deployed are greatly reduced throughout their deployment.

2.4.3 Computerized Maintenance Management System

Continuing development and implementation of the CMMS allows for the collection of additional data and development of reports on all Water Customer Services work activities to be more readily available. As a result, the data parameters that were discussed in previous iterations of this report have been updated to better reflect current processes and work flows. Some of the changes that were implemented allowed for an "activity based costing" approach in an effort to better understand resourcing requirements needed to maintain assets. Total Service Calls completed by Water Customer Services staff show an increase of approximately 11.12% over the values reported in 2015 due in part to the implementation of the above mentioned changes.

2.4.4 Watermain Flushing Program

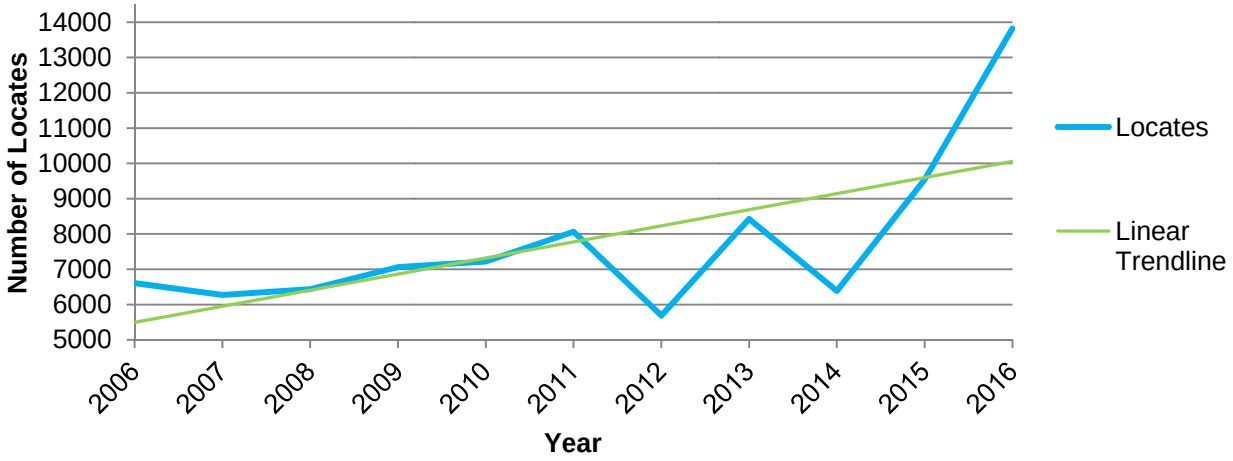
In 2016, Water Customer Services continued to focus its flushing efforts on areas of the distribution system that were prone to water quality complaints, serviced by aging infrastructure, as well as areas that had not been flushed recently. As part of these efforts Water Customer Service staff were able to complete 2,463 individual flushing work orders in the year, an increase of over 18% from 2015. This included zone valve, blow off and dead end flushing, as well as flushing activities to address water quality complaints, post swabbing flushing, and the larger scale project of system flushing individual pressure zones throughout the City. Flushing staff completed, in its entirety, pressure Zone 1 (includes the Downtown core) and 816 of the 973 hydrants located within pressure Zone 2 South. The increase in flushing activities during 2016 are in part attributed to milder winter temperatures, which allows flushing to continue longer than normal into the winter months. Additionally, thirty-four (34) flush boxes were installed in April 2016 and remained in service until November 2016. Each flush box operates on a daily basis for approximately one (1) hour each which assisted with maintaining adequate chlorine residuals and aesthetic water quality objectives. A total of 1,735 flush box related work activities were completed in 2016, including regular checks to ensure proper operation and de-chlorination of flushed water entering the natural environment.

2.4.5 Infrastructure Damage Prevention Program

As an Ontario 1Call member, the Branch utilizes three (3) Utilities Technicians within the Water Customer Services Section to ensure locates are provided for all corporately owned buried infrastructure. As per the Underground Infrastructure Notification System Act (UINSA), locate requests received are completed within the mandatory five (5) business days, unless otherwise negotiated with the locate requestor. A total of 13,821 locate requests were received and completed in 2016, which represents a 45% increase over the total for 2015. Receipt of locate requests have increased nearly 100% since the implementation of the UINSA in 2014. The notable increases are attributed in large part, due to greater public knowledge of the requirement to obtain locates before beginning an excavation as result of advertising and "dig safe" initiatives. It is anticipated that requests for locates will continue to increase in the coming years as development of the annexed lands commence and excavation works begin.

The graph featured below illustrates the historical trend of locate requests that were initiated for the previous ten (10) years.

Figure 2 - Total Locates

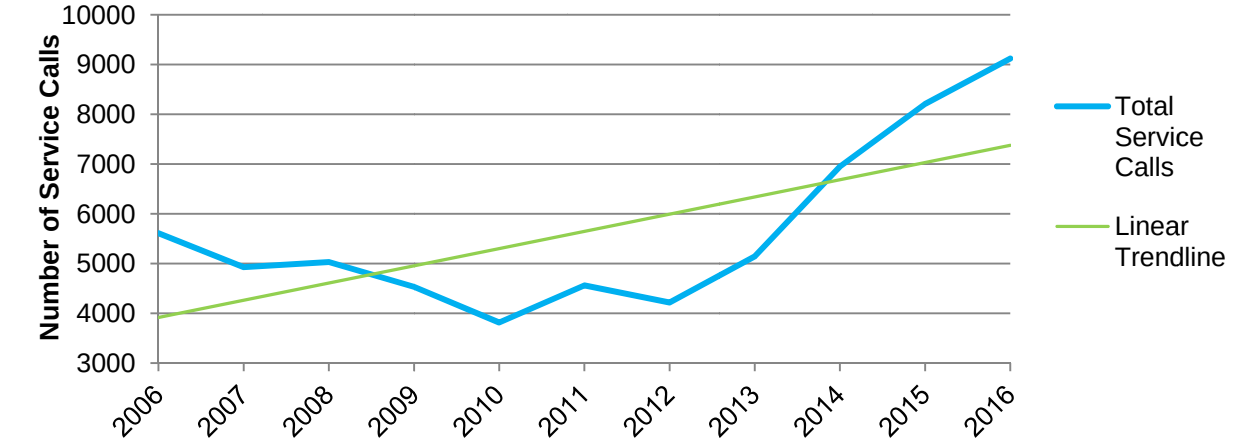


2.4.6 Budget and Costs

The Water Customer Services budget for 2016 was approximately 21% underspent, though accounts for Materials Costs – Recovered and Purchases for Resale were overspent, largely due to the disparity associated with the U.S. dollar exchange rate. Fortunately some of these costs were offset by increases in Bulk Water revenues. Sales of Bulk Water through either the Bulk Water Filling Station or Hydrant Metered Gate Valves saw an increase of nearly 77.65% compared to 2015. The main drivers of the observed reduction include: increases in these Bulk Water revenues; and a winter with warmer than average temperatures that did not require large amounts of resources and contracted services. It is anticipated that these revenues will continue to stay strong as development of annexed lands begins. Total Service Calls completed by the Water Customer Services Section increased by 11% in 2016, as a result the cost per customer increased slightly to $6.59 per person.

The graph below illustrates the historical trend of service calls that were received by the City for the past 10 years. The marked increase was attributed to the reasons described above.

Figure 3 - Total Service Calls



The table below summarizes the performance of the Water Customer Services Section in 2016.

Table 3 – Water Customer Services Key Performance Indicators

Description	Value
Water Meters – Residential and ICI (Includes: leaking meters, meter replacements, re-sealing meters, meter upgrades).	532
New Water Meter/SmartPoint Installations – Residential and ICI	253
Water Meter Alarm Investigation – Residential and ICI (Includes: leak alarms, backflow alarms, broken pipe alarms, high consumption, low consumption, stopped meters, confirm meter readings, frozen meters, noisy meters).	330
Water Quality Investigations – Residential and ICI (Includes: coloured water, low pressure/flow, no water, taste, odour).	187
AMI Maintenance Investigation – Residential and ICI (Includes: stale and low battery, relocate SmartPoint, replace/upgrade SmartPoint, troubleshoot communication issue, re-wire SmartPoint, re-mount SmartPoint,).	2,494
Chargeable Service Calls – Residential and ICI (Includes: illegal use of water, replace service valve, turn service off/on, financial turn off/on, pool fills, gate valves).	796
Non chargeable service calls – Residential and ICI (Includes: Other, lead sampling, service flushes, house to house connections, data loggers, investigate service leak, flush box maintenance).	367
Hydrant Flushing and Flush Box Installation/Maintenance (Includes all hydrant flushing, flush box installations and weekly checks).	4,927
Fire Flow Tests	33
Locates Completed	13,821
Total Non-chargeable Service Calls Completed	9,123
Cost Per Service (43,729 service connections)	$22.15
Cost Per Customer (population 147,000)	$6.59

Note: References to financials are based on the 2016 ledger before it was finalized (2016 Estimate) – excluding debenture costs

2.5 Compliance and Technical Support

The Compliance and Technical Support Section is responsible for regulatory conformance/compliance and reporting with respect to the System, as well as, development and implementation of quality/risk management and optimization functions for the Branch. The core responsibilities of the Compliance and Technical Support Section include the: Backflow Prevention Program, CMMS, QMS and technical support as it relates to water infrastructure.

Significant achievements of the Compliance and Technical Support Section for the 2016 year are detailed under each of the following subsections.

2.5.1 Backflow Prevention Program

The Backflow Prevention Program has completed its eighth (8th) year of a 5-10 year implementation period. In 2016, the program focuses on increasing communication efforts to Barrie's ICI/Multi-residential community. As a result of an increased focus and staff efforts, 29% (598) of ICI/multi-residential properties have completed cross connection control improvements this year to mitigate risks to the System. This increase represents a 73% revenue increase compared to 2015 which demonstrates the efficacy of the program.

2.5.2 Computerized Maintenance Management System

The CMMS was primarily used to facilitate the maintenance of the System to ensure that the System remains in a fit state of repair, in accordance with the requirements of the SDWA. The CMMS ensures that appropriate information is recorded regarding work completed on the System assets. In 2016, the Branch focused on streamlining and improving processes and procedures related to CMMS. As a result, the City was awarded the "Exemplary User Award" by Azteca System. The award honours outstanding efforts and achievements from within the CMMS user community and was presented to the City due to extraordinary use of the CMMS, addressing the critical needs of the community and for providing support and guidance to fellow CMMS users.

2.5.3 Quality Management System

The MDWL Program pursuant to the SDWA and the associated DWQMS requires the Operating Authority to establish a QMS. The QMS set Standard Operating Procedures and Policies to ensure work associated with the System is completed in a consistent manner that aligns with regulatory requirements.

The QMS was subject to an external audit in December 2016 that evaluated the degree of conformity that the QMS had with regulated requirements. The re-accreditation audit included an off-site desktop audit of the Operational Plan. There were zero (0) non-conformances identified by the external auditor, indicating 100% conformance with regulatory requirements, and accreditation is maintained for the 2016/2017 operating year.

To ensure compliance with the SDWA and all applicable regulations, the MDWL and the Drinking Water Works Permit (DWWP) are valid until October 20, 2019. Prior to expiry, the Branch will submit an application for renewal.

2.5.3.1 Management Review

The Branch continued to implement procedural and process improvements in 2016. A component of the continual improvement process was Management Review, which identifies deficiencies and establishes action plans. Management Review meetings were conducted on May 13, 2016, August 19, 2016, November 24, 2016, and January 18, 2017.

The following summarizes the minutes of the Management Review meetings for the reporting period.

1. There were fourteen (14) reported Adverse Water Quality Incidents (AWQIs). The incidents were the result of precautionary station operations, new infrastructure installation, infrastructure repairs, communications failures, and sampling techniques.
2. Raw water and drinking water quality trending revealed no major changes compared to 2015. As expected, turbidity was higher in the north service area due to the hardness of the ground water source. The surface water in the south service area had reduced concentrations of a number of parameters that allowed for decreased demands for chlorine, while still maintaining regulatory compliance and customer satisfaction.
3. The voluntary Ground Water Monitoring Program was administered by Environmental Operations of the Environmental Services Department of the City. The program that monitored Volatile Organic Compounds (VOCs) will continue in 2017 as recommended by the third party consultant, Golder Associates Ltd.
4. The total annual production volumes of 13,853 ML in 2016 remained consistent with usage trends of the last few years, with only a slight increase in production compared to 2015.
5. With the addition of the surface water source in 2011, Centennial Park Wells 12 and 15, and Heritage Park Wells 11 and 14 continued to demonstrate noticeable increases in artesian conditions.
6. A combined total of 27,893 work activities were performed in 2016 by the Groundwater Supply, Surface Water Supply, Water Customer Services and Water Distribution Services Sections of the Branch.
7. An emergency mock scenario was conducted on November 10, 2016. The mock scenario involved a severe tornado affecting both the groundwater and surface water systems and involved several other functional groups within the Corporation including Roads, Corporate Communications, Emergency Management and Environmental Operations.

8. One (1) Internal Audit focused on the Backflow Prevention Program. Results yielded two (2) Continual Improvement Process (CIP) Reports and three (3) Opportunities for Improvement relating to staff not properly referencing documented processes.
9. The 2016 External Audit was a "year one" (Y1) audit in the three (3) year cycle, and was conducted through an off-site desktop review. There were zero (0) non-conformances identified by the external auditor and the System accreditation was maintained for the 2016/2017 operating year.
10. The Branch used many tools such as staff suggestion boxes, crew meetings and Branch-wide staff meetings, to improve and strengthen communications within the Branch and throughout the operational Sections to ensure that all staff contributed to the success of the Branch.

A copy of the Management Review Meeting Minutes are included in Appendix K for reference.

2.5.4 Budget and Costs

As the Compliance and Technical Support Section is a relatively new Section within the Branch, precise budget allocations for individual line items are still being refined. As such, the Compliance and Technical Support Section was approximately 8% underspent in 2016; however, the Section saw a significant increase in revenue (approximately 52%) as it relates to the Backflow Prevention Program.

3 Closure

It is the belief of the Branch that this report satisfies the requirements of Council. If you have any questions concerning the contents of this report, please contact the Supervisor of Compliance and Technical Support at the Branch.

The Branch staff listed below contributed to the preparation and review of this document.

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