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**TO:** GENERAL COMMITTEE

**SUBJECT:** WATER OPERATIONS BRANCH 2014 ANNUAL REPORT, SUMMARY REPORT AND MANAGEMENT REVIEWS

**PREPARED BY AND KEY CONTACT:** S. BRUNET, B.SC., MANAGER OF WATER OPERATIONS EXTENSION 6140

**SUBMITTED BY:** J. THOMPSON, P.ENG., DIRECTOR OF ENVIRONMENTAL SERVICES 

**GENERAL MANAGER APPROVAL:** RICHARD FORWARD, GENERAL MANAGER OF INFRASTRUCTURE & GROWTH MANAGEMENT 

**CHIEF ADMINISTRATIVE OFFICER APPROVAL:** CARLA LADD, CHIEF ADMINISTRATIVE OFFICER 

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**RECOMMENDED MOTION**

1. That the City of Barrie, Environmental Services Department, Water Operations Branch, Annual Report for 2014 be received for information purposes.
2. That Staff Report ENV002-15 concerning the 2014 Municipal Summary Report and Annual Drinking Water System Report regarding the City of Barrie's Drinking Water System be received for information purposes.
3. That the Water Operations Branch Management Reviews, dated May 15<sup>th</sup>, 2014, August 21<sup>st</sup>, 2014, December 5<sup>th</sup>, 2014, and January 14<sup>th</sup>, 2015 be received for information purposes.

**PURPOSE & BACKGROUND**

4. The purpose of this Staff Report is to apprise Council of the operational and compliance status for the 2014 reporting year for the City of Barrie Drinking Water System and to solicit from Council an acknowledgement of their receipt and understanding of this Report.
5. There are two (2) specific reporting requirements related to the Drinking Water Systems Regulation (O.Reg. 170/03) under the Safe Drinking Water Act (SDWA).
  - a) Section 11 requires an Annual Drinking Water System Report be prepared not later than February 28<sup>th</sup> of each year. This Report provides a brief description of the drinking water system; chemicals used; a breakdown of monetary expenses related to required equipment; a summary of all test results; and a summary of adverse reports and corrective actions taken. In addition, this Report entitled '2014 Drinking Water System Report' must be available to the public upon request and be posted on the City of Barrie website.
  - b) Schedule 22 requires a Municipal Summary Report be prepared not later than March 31<sup>st</sup> of each year and a copy forwarded to members of Municipal Council. This Report lists the non-compliances in respect to the SDWA, the Drinking Water System Regulation, the Municipal Drinking Water License, Drinking Water Works Permit and orders applicable to the drinking water system received, and the corrective measures that were taken in respect to the non-compliances. In addition, it summarizes the quantities and flow rates of the water supplied during the reporting year, including monthly average and maximum daily flows along with a comparison to rated capacities.

6. In addition, under the Drinking Water Quality Management Standard, there is an obligation for the Operating Authority to communicate the results of Management Reviews, the adequacy of the infrastructure necessary to operate and maintain the drinking water system, and the infrastructure maintenance programs to the Owner.
7. The Municipal Summary Report, the Annual Drinking Water System Report and details regarding Management Review, infrastructure adequacy and maintenance programs are components of a larger more comprehensive report entitled the Water Operations Branch 2014 Annual Report. A copy of which can be found in the Councillors' Lounge for review. A copy of the Executive Summary found in the Water Operations Branch 2014 Annual Report is attached as Appendix A of this Staff Report.

### **ANALYSIS**

8. The City of Barrie drinking water system consists of a Surface Water Treatment Plant (SWTP) and associated Low Lift Pumping Station (LLPS), 12 ground water wells, 3 in-ground storage facilities, 3 elevated storage reservoirs and 7 booster stations, distribution water mains and associated hydrants and valves in 5 major pressure zones throughout the City.
9. Source water from the SWTP is drawn from Kempenfelt Bay at a depth of approximately 22m. The intake is situated on the south west side of Lake Simcoe, where lake water is conveyed through the LLPS and pumped to the SWTP for treatment. Water supplied from the ground water system relies on wells drilled into a deep aquifer that is not under the direct influence of surface water.
10. The Surface Water Treatment Plant provides water to Barrie's two south pressure zones. Its regulatory approved treatment process employs primary screening, flocculation, ultra-membrane filtration and granular activated carbon contactors (for taste and odour control) followed by disinfection using chlorine gas. Treatment at each of the well stations consists of iron sequestration by addition of sodium silicate and disinfection with chlorine gas (and in one case, ultraviolet disinfection). The two systems effectively operate as separate entities with provision for emergency backup augmentation. Key processes within the water supply, treatment and storage facilities are continually monitored, recorded and alarmed through the SCADA (Supervisory Control and Data Acquisition) system.
11. The distribution grid consists of approximately 3700 hydrants and approximately 620 km of water main and transmission main ranging from 150mm to 1200mm in size serving approximately 43,800 services providing water to approximately 145,000 customers.
12. The total annual production for 2014 was 13,360,470 m<sup>3</sup>, a very modest decrease from 2013 with the average daily flow being 36,502 m<sup>3</sup> (down by approximately 3% from 2013) and a peak day flow of 55,565 m<sup>3</sup> (down by approximately 2% from 2013) in the month of June.
13. The Ministry of the Environment and Climate Change (MOECC) inspection, conducted yearly, has partially been conducted in December 2014 for the 2014 operational year in the form of document requests. The remainder of the inspection is scheduled to occur in the first quarter of 2015. The primary focus of this inspection is to confirm compliance with the MOE legislation and control documents as well as conformance with the MOECC drinking water related policies for the inspection period.
14. The 2013 MOECC inspection identified three (3) non-compliances during the inspection period. A major SCADA system upgrade was the main contributor leading to two (2) of the non-compliances and at no time did the issues identified pose a risk to public health. The third non-compliance was associated with miscommunications resulting in samples not being submitted for

laboratory analysis in a timely fashion. The corrective actions included the resolution of the SCADA programming issues. As of January 2015, the SCADA System upgrade is complete and has been fully tested. In addition, processes have been reviewed to ensure clear and concise understanding of expectations.

15. Under the Water Operations Branch Quality Management System (QMS) Top Management (Water Operations Branch Management Team) is responsible for ensuring that a Management Review is conducted at least once every twelve months. This continual improvement process is a requirement under the Drinking Water Quality Management Standard (DWQMS) with the objective of identifying deficiencies and establishing action plans to address those deficiencies.
16. Management Reviews were conducted May 15<sup>th</sup>, 2014, August 21<sup>st</sup>, 2014, December 5<sup>th</sup>, 2014, and January 14<sup>th</sup>, 2015. The following results are based on data up to and including December 31<sup>st</sup>, 2013.
  - i. There were eleven (11) reported Adverse Water Quality Incidents, down by 4 from 2013. These incidents were the result of mechanical, programming and communications failures and sampling techniques (operator and/or lab).
  - ii. More than 39.8 km of water main were swabbed in 2014 under the Swabbing Program representing approximately 6.4% of the water mains in Barrie.
  - iii. Raw water and drinking water quality trending revealed no major changes from 2013.
  - iv. One Permit to Take Water exceedance occurred at Well 15 on August 27<sup>th</sup> in which the well pumped approximately 7% over its rated capacity. The Surface Water Treatment Plant pumped an average of 27.3% of its daily permitted capacity while the ground water system pumped an average of 20.4% of its daily permitted capacity.
  - v. With the addition of the surface water source, Centennial Wells 12 and 15, and Heritage Wells 11 and 14 have been demonstrating noticeable increases in artesian condition over the past few years.
  - vi. A total of 36,720 work activities were performed in 2014 between the Groundwater Supply, Surface Water Supply, Water Customer Services and Water Distribution Services sections of the Water Operations Branch.
  - vii. A historical first of 70 main breaks occurred in 2014. The 56% increase in main breaks from 2013 could be explained by the impact of a very harsh winter and ongoing infrastructure aging issues.
  - viii. Curb box and valve box repairs achieved only 81% of the 2014 target as a result of the increase in emergency response incidents and the associated staff resource shortfalls.
  - ix. A number of backflow alarms were identified through the Automated Meter Reading Program (AMI); however through an individual review of each occurrence it was determined that the alarms were false. These false alarms were related to a software issue that the software provider is continuing to work to address with a target date of December 2015.
  - x. In 2014, an average of 22 customer complaints were received per month (compared to 28 in 2013). There were a total of 267 quality complaints that could not be resolved on the phone and required further action. The majority of 2014's customer complaints were associated with coloured water and pressure.
  - xi. A new risk assessment of our drinking water system was conducted as part of the requirement set out in the Drinking Water Quality Management Standard. Water Operations re-evaluated the 'Likelihood and Consequence Rating Matrix' and available control measures associated with the risks/hazards within the drinking water system. The 'Risk Assessment Table', 'Explanatory Notes' and 'Risk Assessment Outcomes Table' were updated to reflect any required changes. One new critical control point was identified.

- xii. One emergency mock scenario was conducted on December 19<sup>th</sup>, 2014. The mock scenario tested the ability to maintain supply to the two south pressure zones during a multiple infrastructure failure event. The data generated from this mock scenario helped test the currency of our contingency plans and emergency response procedures. Results confirmed there was no need for updating our procedures at this time.
  - xiii. One (1) Internal Audit was conducted yielding seven (7) major Corrective Action Reports (CARs), three (3) minor Corrective Action Reports and seven (7) Opportunities for Improvement. These numbers decreased compared to the 2013 audit year with the majority of the CARs related to sampling and calibration/verification documentation.
  - xiv. The 2014 Year 2 Surveillance Audit was conducted through a desk top surveillance audit of the City of Barrie Operational Plan in December 2014. The external auditor did not identify any non-conformances and accreditation has been maintained for the 2014/2015 operating year.
  - xv. Through the Staff Suggestion Box, Crew Meetings and General Staff Meetings, staff suggested ways to improve communications within and between the sections of the Branch, provided ideas for training opportunities and requested better exposure with the public.
17. Pursuant to the Safe Water Drinking Act, 2002, the Municipal Drinking Water Licence and Drinking Water Works Permit were set to expire on November 18<sup>th</sup>, 2014. The application for renewal was sent on May 16<sup>th</sup>, 2014. A new licence and permit were issued on October 21<sup>st</sup>, 2014 with an expiry date of October 20<sup>th</sup>, 2019.
18. Copies of the Ontario Drinking Water Systems Regulation 170/03; the City of Barrie Municipal Drinking Water License, Drinking Water Works Permit and Permit to Take Water; the 2014 Drinking Water System Report and the 2014 Municipal Summary Report; the Water Operations Branch Management Review meeting minutes, and a copy of this Staff Report have been attached as Appendices to the Water Operations Branch Annual Report to be presented to Council.

#### **ENVIRONMENTAL MATTERS**

19. There are no environmental matters related to the recommendation other than regulatory compliance.

#### **ALTERNATIVES**

20. As this Report is being presented, as required legislatively, for information purposes only, no alternatives are presented.

#### **FINANCIAL**

21. There are no direct financial implications associated with the recommended motions.

#### **LINKAGE TO COUNCIL STRATEGIC PRIORITIES**

22. The recommendations included in this Staff Report are not specifically related to any of City Council's Strategic Priorities but is a requirement of ongoing service delivery.

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**APPENDIX "A"**

**Executive Summary**

In 2014, 13,360,470 m<sup>3</sup> of drinking water was produced and distributed to the City of Barrie residents. This volume of water is equivalent to 13.3 billion litres of water. Using the average volume of a household swimming pool to be 20,000 gallons, this amounts to approximately 175,675 swimming pools full of water that the Water Operations Branch pumped, treated and distributed in 2014.

The City of Barrie Drinking Water System is comprised of the Surface Water Treatment Plant (SWTP) and associated Low Lift Pumping Station (LLPS), 12 ground water wells, 3 in-ground storage facilities, 3 elevated storage reservoirs and 7 booster stations that provide treatment, storage and pressures for firefighting purposes. Approximately six hundred and twenty kilometers (620km) of water main deliver water through 5 pressure zones to 43,800 services that provide water to approximately 145,000 customers whose consumption is measured by water meters.

The total annual production for 2014 was 13,360,470 m<sup>3</sup>, a very modest decrease from 2013 with the average daily flow being 36,502 m<sup>3</sup> (down by approximately 3% from 2013). In 2014, peak day flow for the year occurred in June and was 55,565 m<sup>3</sup> (down from 2013's peak day by approximately 2%). It has been estimated that, of the total water produced, 1.53% was used for non-metered functions.

The total cost to operate the City of Barrie Municipal Drinking Water System was approximately \$1187/ML with 91% of the projected budget being spent and 97% of the projected water revenues being collected. This allowed for the transfer of approximately \$1,580,320 to the Water Rate Reserve Fund. \*\*

The 2014 Operating Budget for the Surface Water Supply Section was under spent by approximately 20%. The major expenses (hydro and chemicals costs) associated with running a treatment plant of this size are directly related to the operation of the plant and are influenced by demand. As was done in 2013, conservative numbers were used for the 2014 budget because of the unpredictability and trend towards declining demand. Over 100% percent of the Ground Water Supply Sectional budget was spent with approximately \$250,000 spent on SCADA upgrades, \$100,000 on well and pump maintenance, \$15,000 on booster pump maintenance and \$21,000 spent on tower maintenance. The total 2014 production and treatment costs amounts to approximately \$465.00/ML. \*\*

Distribution crews repaired 70 main breaks, representing a 56% increase from 2013. The harsh winter and ongoing aging infrastructure contributed to the increased numbers, with an average cost of \$5200.00 per main break. The Water Distribution Services Sectional forecasted budget was approximately 95% spent in 2014. The main expenditures were due to the increase in the cost of parts and materials, such as hydrant parts and asphalt associated with main breaks. In addition, staff resources were taxed with the number of main breaks, resulting in the need to acquire assistance from outside forces. With >\$200,000 being spent on Contracted Services. Total distribution system operating costs for 2014 amounted to approximately \$3924.00/km of water main. \*\*

The Water Customer Services Sectional budget was 10% under spent in 2014. Cost of customer care in 2014 increased by approximately 23 percent based on the combined average of "cost per service" and "cost per customer" values. This increase can be attributed to a couple of factors that include; the extremely cold and prolonged winter which resulted in a record number water main breaks (70) and frozen water meters/services (105). These infrastructure failures often occur outside of regular business hours and subsequently increased overtime spending during the first two quarters of 2014. As well, the addition of three new staff members charged with the locating of all buried corporate infrastructure gave rise to increased spending within the Wages and Salaries, Minor Capital, and Staff Development accounts within the Section as the requisite training, equipment and materials associated with locating

were acquired. The total cost of customer care amounts to approximately \$24.55/service or \$7.43/population served. \*\*

As per the Underground Infrastructure Notification System Act, all owners of underground infrastructure within the province of Ontario were required to become Ontario 1Call members in June of 2014. Water Operations became an active 1Call member on June 19, 2014. This mandatory membership means that residents or contractors interested in excavating in Ontario are now able to make a single request (to Ontario 1Call) for locates of buried infrastructure.

The move to the 1Call system in June resulted in a change in the criteria that defines a 'locate'. As a result, locate statistics for 2014 appear to show a significant decrease of 24%.

In 2014, water quality complaint investigations averaged 22 complaints/month, an increase of 47% from 15 complaints/month in 2013. The observed rise can be directly attributed to the brutally cold winter experienced in 2014, which resulted in a ninety percent (90%) increase in "No Water Calls" received during the first two quarters of the year due to frozen water meters and/or services. Positive feedback from field staff and customers regarding the level of service continues with the use of previously implemented programs like the use of a Field Liaison Person ("Green Vest") and increased public communications prior to and during the annual Swabbing Program.

Approximately 3000+ samples were taken for analysis to be used to assess and optimize system performance, develop corrective actions, ensure safe water for consumption and to meet legislative requirements. Ninety-nine point nine percent (99.9%) of all samples met regulatory compliance.

There were eleven (11) reported Adverse Water Quality Incidents (AWQI) down by four (4) from 2013. These incidents were the result of mechanical, programming and communications failures and sampling techniques (operator and/or laboratory contractor).

Pursuant to the Safe Water Drinking Act, 2002, the City of Barrie's Municipal Drinking Water Licence and Drinking Water Works Permit were set to expire on November 18, 2014. The Water Operations Branch applied for renewal with the MOECC on May 16, 2014. A new licence and permit were issued on October 21, 2014 with an expiry date of October 20, 2019.

The 2014 Year 2 Surveillance Audit was conducted through a desk top surveillance audit of the City of Barrie Operational Plan in December 2014. The external auditor did not identify any non-conformances and accreditation has been maintained for the 2014/2015 operating year.

Management Reviews are a requirement of the MOECC's Drinking Water Quality Management System (DWQMS) and assist in identifying deficiencies and establishing action plans. Management Reviews were conducted in May, August and December of 2014 and January of 2015, the details of which can be reviewed in the *Year in Review* Section of this report.

The development, implementation and continual improvement of processes and projects within the Water Operations Branch are driven by the following 5 priorities:

- 1. To ensure the delivery of Safe Drinking Water that meets or exceeds regulatory requirements.**
- 2. To ensure the delivery of Safe Drinking Water that meets or exceeds expectations and promotes customer confidence.**
- 3. To employ and retain a respectful, competent, motivated and adaptive workforce that is 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.**

A review of these priorities and associated programs and projects completed in 2014 can be found in the *Year in Review* Section of this Report.

**\*\*References to financials are based on the 2014 ledger before it was finalized (YTD November) – excluding debenture costs.**

