3. BACKFLOW PREVENTION PROGRAM

PROGRAMME DE PRÉVENTION DES REFOULEMENTS

COMMITTEE RECOMMENDATION

That Council approve the development of a Backflow Prevention Program in accordance with the parameters and consultation strategy described in this report, and report back to Committee and Council with program details in Q1 2016.

RECOMMANDATION DU COMITÉ

Que le Conseil approuve la mise sur pied d'un Programme de prévention des refoulements, conformément aux paramètres et à la stratégie de consultation décrits dans le présent rapport, et de présenter au Comité et au Conseil les détails du programme dans le T1 de 2016.

DOCUMENTATION / DOCUMENTATION

1. Acting Deputy City Manager's report, City Operations, dated 28 September 2015 (ACS2015-COS-ESD-0013).

   Rapport de la Directrice municipale ajointe par intérim, Opérations municipales, daté le 28 septembre 2015 (ACS2015-COS-ESD-0013).

2. Extract of Draft Minute, 5 October 2015 (follows French version of report - currently available in English only).

   Extrait de l'ébauche du procès-verbal, le 5 octobre 2015 (suit la version française du rapport - en ce moment, disponible uniquement en anglais).

Report to
Rapport au:

Environment Committee
Comité de l'environnement
5 October 2015 / 5 octobre 2015

and Council
et au Conseil
14 October 2015 / 14 octobre 2015

Submitted on September 28, 2015
Soumis le 28 septembre 2015

Submitted by
Soumis par:
Susan Jones, Acting Deputy City Manager / Directrice municipale adjointe par intérim, City Operations / Opérations municipales

Contact Person
Personne ressource:
Dixon Weir, General Manager / Directeur général, Environmental Services / Services environnementaux
(613) 580-2424 x22002, Dixon.Weir@Ottawa.ca

Ward: CITY WIDE / À L'ÉCHELLE DE LA VILLE

File Number: ACS2015-COS-ESD-0013

SUBJECT: BACKFLOW PREVENTION PROGRAM

OBJET: PROGRAMME DE PRÉVENTION DES REFOULEMENTS

REPORT RECOMMENDATIONS

That Environment Committee recommend Council approve the development of a Backflow Prevention Program in accordance with the parameters and consultation strategy described in this report, and report back to Committee and Council with program details in Q1 2016.

RECOMMANDATIONS DU RAPPORT

Que le Comité de l'environnement recommande au Conseil d'approuver la mise sur pied d'un Programme de prévention des refoulements, conformément aux paramètres et à la stratégie de consultation décrits dans le présent rapport, et de présenter au Comité et au Conseil les détails du programme dans le T1 de 2016.

BACKGROUND

The Backflow Prevention Program, (formerly known as the Cross-Connection Prevention Program), is intended to prevent the backflow of contaminated water into the City's water supply from buildings connected to the City's drinking water system.

The 2005 and 2009 Auditor General's reports regarding the City's Drinking Water, recommended that *"The City should implement a cross-connection control program in accordance with the Infraguide's Best Practice of Methodologies for implementing a Cross-Connection Program".*

Implementation of a Backflow Prevention Program is an outstanding Priority 1 action per the *2014 Drinking Water Quality Management System Annual Report* to Environment Committee on October 5, 2015 (ACS2015-COS-ESD-0013).

Also, in 2015, the Ministry of the Environment and Climate Change (MOECC) inspection of the Britannia Water Purification Plant also recommended moving forward with implementation of a Backflow Prevention Program, in accordance with *A Guide for Drinking Water Systems Owners Seeking to Undertake a Backflow Prevention Program,* as a Best Management Practice.

Technical and Regulatory Framework

A cross-connection is "an actual or potential connection between a potable water system and any environment that would allow other substances to enter the water

system, such as chemicals, water products, steam, water from other sources, and any matter that could change the quality, colour, taste or add odour to the water".[1] Backflow is the mechanism through which those other substances enter the potable water system as a result of a cross-connection.[2] Backflow can occur as a result of back siphonage (when negative pressure exists within the water system) or back pressure (when the building water pressure is greater than the water system pressure.) Consumers can be exposed to hazards from cross-connections posing serious health risks, depending on the substance(s) that may backflow into the building or municipal water system.[3]

The Federation of Canadian Municipalities' InfraGuide "*Methodologies for Implementing A Cross-Connection Control Program*" discusses the elements of a comprehensive program, and provides guidance for program development and implementation. The guide addresses cross-connections that may be present on both municipal and private property, and states that "*…the municipality has a responsibility to implement a program to eliminate or minimize the potential for contamination to occur*".

The City's *Water By-law No*. 2013-360 includes provisions that allow the City to require the installation of a backflow prevention device. However, a full program implementation by-law is required to adequately protect the central water supply from backflow and contamination from private systems.

The *Ontario Building Code, 2012* references CSA Standard B64.10.1-07 which addresses cross-connection control and backflow prevention in greater detail, but is only applied to new construction by the City's Building Code Services Branch pursuant to the *Building Code Act* and *Code*. Some relevant aspects of the *Building Code*[4] include:

- Connections to potable water systems must be designed and installed to prevent backflow to the system;

[1] American Water Works Association (AWWA), 2004. "*Recommended Practice for Backflow Prevention and Cross-Connection Control*", Manual of Water Supply Practices, M14, Third Edition.
[2] AWWA, 2004.
[3] InfraGuide, Oct. 2005. Best Management Practice – "*Methodologies for Implementing A Cross-Connection Control Program*".
[4] *Ontario Building Code*, Chapter 7 – Plumbing.

- Premise isolation must be installed where a potentially severe or moderate health hazard could result from backflow into the central supply;
- Industrial processes connected to an internal plumbing system must be designed and installed so that the water supply system is protected against contamination; and

Small residential buildings are exempt from the above unless they have access to an auxiliary water supply (e.g. well supply).

The Canadian Standards Association (CSA) has developed two standards intended as guides for the selection, installation, testing and maintenance of backflow prevention devices: CSA B64.10-07, "*Selection and Installation of Backflow Preventers*" (which is referenced in the *Ontario Building Code*); and CSA B64.10.1-07, "*Maintenance and Field Testing of Backflow Preventers*". As with the *Ontario Building Code*, these guides pertain to new construction, but do not adequately address the challenges of retrofitting the existing building stock to ensure universal backflow prevention.

Numerous Ontario municipalities now have Backflow Prevention Programs in place. Staff looked at programs in Toronto, Hamilton, London, Markham, Waterloo, and Halton Region, amongst others, to assess the type of program, when it was initiated, the number of devices and fees (See Document 1 for details).

In summary, there is a strong public safety, regulatory and technical foundation upon which to implement a Backflow Prevention program for the City of Ottawa.

DISCUSSION

The intent of a Backflow Prevention Program (BPP) is to:

- Protect Ottawa's drinking water system and reduce public health risks;
- Demonstrate due diligence and regulatory compliance; and
- Align the City with current practices in Ontario, e.g. the MOE CC's *Guide for Drinking Water Systems Owners Seeking to Undertake a Backflow Prevention Program*.

To prevent the backflow of contaminated water into the City's drinking water supply, it is necessary to regulate the installation, registration, and inspection of back flow

prevention devices (BPD's) in severe and moderate risk facilities that are connected to the municipal drinking water system.

The purpose of this report is to seek Council's support for a BPP that will:

- Commence in 2017;
- Be a full cost-recovery program;
- Be phased-in over five years, initially focusing on 'severe' and then moderate risks, as defined by the Canadian Standard Association (CSA B64 .10.11), and on perimeter/premise protection;
- Focus on businesses, institutions and multi-residential buildings (excluding low-density); and
- Include City-owned 'severe' and 'moderate' facilities.

Full or Perimeter Approach

In developing a municipal BPP, the Canadian Standards Association recommends three alternative approaches and specific backflow prevention devices depending on the type of application and risk level.

1. **Property/Premise Isolation**: Installation of a backflow prevention device on an incoming water service. This allows for protection of the municipal water supply from potential contamination from private water systems, and uses a minimum number of backflow preventers. Properties with more than one connection to the municipal water supply require backflow prevention devices at the property line at each connection point. This approach does not, however, protect those working at a facility from cross-contamination within the property.

2. **Internal Protection:** Installation of a BPD either on individual water usages (e.g. chemical feed pumps) or zones of usage (e.g. laboratories). This approach protects private water systems from internal contamination, but may not provide adequate protection for the municipal potable water system if used without premise isolation due to the complexity of industrial and commercial plumbing systems.
3. **Combined Premise, Zone and Individual Protection:** Installation of premise backflow preventers with additional devices installed within a property to ensure

that both the public and private potable water systems are protected from contamination.

Based on research findings and internal consultation, it is recommended that the City focus on a property/premise approach. This approach will satisfy the City's responsibility to protect the municipal water supply from cross-contamination and mitigate the higher administrative and implementation costs associated with zonal and individual protection options.

Program Scope

The Canadian Standards Association defines three categories of hazards for potential backflow (Severe, Moderate, and Minor), and recommends alternative approaches and devices suitable for each hazard rating[5]. For example, the guide identifies the following activities as posing a potentially "Severe" hazard: automotive repair shop, carwash, dock and marine facility, hospitals, laboratory, a wide range of manufacturing and water and wastewater treatment plants. "Moderate" hazard premises include apartment buildings, hotels/motels, schools and swimming pools.

The City has approximately 225,000 water billing accounts. The vast majority, approximately 212,000, are low-density residential accounts that will be excluded from the Backflow Prevention Program as they represent a very low potential risk to the municipal water supply.[6] The program will target Industrial, Commercial, Institutional (IC&I) and Multi-Residential water accounts (refer to Table 1), in accordance with the hazard ratings identified by CSA. This could represent over 13,000 accounts, including City-owned buildings. It is not possible to accurately estimate the number of "Severe" "Moderate" and "Minor" hazard buildings at this time.

Table 1 – Ottawa's Industrial, Commercial, Institutional and Multi-residential Water Accounts

[5] Canadian Standards Association (CSA), July 2007. CSA B64.10-07 "Selection and Installation of Backflow Preventers".

[6] There will be a few exceptions, however, where backflow prevention will be required due to direct connection of a residential service to a trunk watermain.

Building / Facility Type	Zoning Codes	No. of Accounts	Potential Hazard Ratings[7]
Commercial	C1, C2, C3	5,044	Severe, Moderate, Minor
Schools and Universities	I1, I2, I3	463	Severe, Moderate
Hospitals, Rehab and Nursing homes	I4	131	Severe, Moderate
Other Institutions	I5	534	Severe, Moderate, Minor
Industrial and Manufacturing	M1, M2	172	Severe, Moderate
Government and Private Offices (may include Labs)	OF	453	Severe, Moderate
Residential-Commercial	RC	916	Moderate, Minor
Utilities	UT	23	Severe, Moderate
IC&I Sub-total		**7,736**	
Apartments <5 Floors (>4 units)	R7	4025	Moderate, Minor

[7] The City's water billing account categories do not directly correspond to the various activities identified in the CSA Guideline, therefore the "Potential Hazard Rating" may not be identical to that identified in the Guideline.

Building / Facility Type	Zoning Codes	No. of Accounts	Potential Hazard Ratings[7]
Apartments >4 Floors	R8	1,830	Moderate
Residential Sub-total		**5,855**	
TOTAL		**13,591**	

Implications for Businesses, Institutions, and the Multi-Residential Sectors

Severe hazards will be addressed first, and are least numerous. The majority of facilities in Ottawa fall into the "moderate" category including apartment buildings, arenas, colleges, dental offices, shopping malls, schools, nursing homes, restaurants, office buildings, and more.

The costs incurred by affected businesses and institutions will be influenced by factors such as the service size, the number of water service connections, and whether structural work is required. As noted in Document 1, the cost estimates varied widely, from $500 to more than $20,000.

Impact for City Facilities

Without assessing each site, these are rough estimations based upon incomplete information. The cost to bring City facilities into compliance (including Public Works, Environmental Services, OC Transpo, and Ottawa Community Housing), is estimated at approximately $3M (see Document 2 for details). . Many City facilities pose a 'moderate' risk and would have five years to become compliant under the program.

In addition to the above capital cost, Public Works estimates an annual operating cost of $250K for on-going installation, maintenance and repair including 2 Plumber FTE's (1 in 2016 and a second in 2017) as well as accompanying vehicles at approximately $55K each.

Accredited Service Providers

The installation, inspection, and repair of backflow prevention devices require skills that necessitate specialized training and certification. The City's program would prescribe those requirements and who may submit reports verifying the installation and proper functioning of the devices.

Program Implementation and Maintenance

The *Ontario Building Code* references CSA Standard B64.10.1-07 that specifies maintenance and testing requirements for backflow prevention devices. However, once a building passes the final building inspection and receives approval, the *Building Code* does not provide authority for the City's Building Code Services Branch to re-enter the building at a later date to ensure that backflow prevention devices are maintained and tested in accordance with the Standard. This is primarily due to the legislation assigning on-going responsibility for buildings to the building owners and limiting the interference of proprietary rights to the time of construction, renovation or demolition of a building. The City therefore has no assurance that testing and maintenance activities are conducted as recommended, and the *Building Code* does not provide authority to inspect existing buildings for backflow prevention requirements.

To address this issue, Ontario municipalities have introduced a By-law providing the authority to:

- Enter premises for the purpose of inspecting for cross-connections;
- Require the completion of plumbing system surveys by approved professionals at the owner's expense;
- Order the correction of cross-connections with appropriate backflow prevention devices;
- Enact enforcement actions for non-compliance; and
- Develop a certified installer and tester registry.

The By-law can also be used to address requirements such as:

- Land use subject to program requirements;
- Frequency of cross-connection control surveys;
- Minimum mandatory level of protection (e.g. premise isolation only);

- Training and certification requirements for professionals engaged in testing and maintaining backflow prevention devices;
- Testing frequency;
- Maintenance requirements;
- Reporting requirements; and
- Program fees for cost recovery.

Accordingly, the Q1 2016 report will address the requisite By-law and allow the City to close the regulatory gap regarding the on-going inspection, testing and maintenance of backflow prevention devices.

The Implementation report will also provide details on the estimated program costs to the Environmental Services Department and proposed fee structure, based on a full cost recovery model. Based on research from other municipalities, typically, the program requires 1-2 full-time staff and some part-time staff. Hamilton, Waterloo and London have two full-time staff coordinating the program. Nearly all Ontario municipalities charge fees for different elements of the program, such as permit/ inspection/ registration fees. At this point, the Environmental Services Department estimates total start up costs of $50K for 2 vehicles as well as annual operating costs of $200K in 2016 and an additional $85K in 2017 (subject to annual inflationary increases) including a total of 2.5 FTE's (1.5 in 2016 and 1 in 2017). However, these costs would be fully recovered under the proposed fee structure.

Implementation Plan Development:

1. Staff will consult with stakeholders as described below.

   With the approval of this report, staff will consult with affected on the following aspects of the Program:

   - *Phased Implementation* – 2017-2020, with focus on 'severe' and then 'moderate' risk facilities, commencing the Program in 2017
   - *Owner Responsibilities* – site assessment/survey, installation, testing/inspection, registration, ongoing maintenance, fees
   - *Accreditation of Inspectors/ Installers*

- *Compliance Time* – time required to comply after Notification (Toronto allows 120 days; Waterloo allowed 30 days for severe and 90 days for moderate; Markham allowed 60 days, but 40% requested an extension)

- *Program Administration and Reporting Process*

Program Promotion – effective means of promoting the Program

The following stakeholders would be consulted in developing the Implementation Plan:

Public Works/ESD/OC Transpo as Facility Owners/Operators

- Install BPDs as required
- Register BPDs
- On-going operating and maintenance costs

Building Owners and Plumbers

- Install a proper BPD by a "qualified tester".
- Register each BPD for a fee.
- Arrange for annual inspection of each BPD by a "qualified tester".
- Keep all annual inspection results for each BPD, on-site, for compliance inspection by the City.
- Provide an updated plumbing survey once every 5 years for facilities relying upon premise isolation and an annual updated survey for those facilities relying upon point of use isolation.
- Pay an annual fee for BPD administration.
- Owners that do not comply with the above will be subject to fines up to $5,000/day
- Plumbers will need to obtain proper training to become a "qualified tester".

2. Staff will determine the detailed financials, including costs, staffing and fee requirements.

3. Staff will determine the timing for the implementation, focusing on facilities with a "severe" risk first.
4. Staff will report back in Q1 2016 with the full program implementation recommendations.

RURAL IMPLICATIONS

The rural areas that would be impacted would be those areas connected to the municipal water service.

CONSULTATION

There were no consultations undertaken in association with this report recommendation.

COMMENTS BY THE WARD COUNCILLOR(S)

Not applicable as it is a city-wide issue.

ADVISORY COMMITTEE(S) COMMENTS

There were no consultations undertaken in association with this report recommendation.

LEGAL IMPLICATIONS

There are no legal impediments to implementing the recommendation in the report. Members of Council have oversight responsibility for the City's drinking water system under the *Safe Drinking Water Act, 2002*.

RISK MANAGEMENT IMPLICATIONS

A BPP will allow the City to better mitigate risks to water customers from potential cross contamination within the drinking water system that can arise due to drops in watermain pressure (e.g. due to a main break), or backpressure from individual customers (e.g. from process pumps set to pressures greater than the municipal water supply).

ASSET MANAGEMENT IMPLICATIONS

Comprehensive Asset Management (CAM) is an integrated business approach involving planning, finance, engineering, maintenance and operations geared towards effectively managing existing and new infrastructure to maximize benefits, reduce risk

and provide safe and reliable levels of service to community users. This is accomplished in a socially, culturally, environmentally and economically conscious manner.

The recommendations documented in this report are consistent with the City's Comprehensive Asset Management (CAM) Program (City of Ottawa Comprehensive Asset Management Program) objectives. The implementation of the CAM program results in timely decisions that minimize lifecycle costs and ensure the long-term affordability of assets. To fulfill its obligation to deliver quality services to the community, the City must ensure that assets supporting City services are managed in a way that balances service levels, risk and affordability.

The development of a Backflow Prevention Program, as described in this report, protects Ottawa's drinking water system and reduces public health risks. The multiyear phased approach and alignment with current practices in Ontario supports a forward looking approach to meet future challenges, including legislative requirements and environmental factors. By concentrating on 'severe' and then 'moderate' risk facilities, risks are managed by focusing on resources, expenditures and priorities while recognizing public safety is a priority.

FINANCIAL IMPLICATIONS

Detailed costs will be outlined in the implementation report to follow in Q1 2016. In the meantime, upon approval of this report, the operating and capital budget requirements as outlined in the report, including a total of 4.5 FTE's (2.5 in 2016 and 2 in 2017), will be identified and included in the 2016 Draft Tax and Rate Supported Operating and Capital Budget to be tabled later in 2015.

ACCESSIBILITY IMPACTS

Accessibility is not impacted by this program.

ENVIRONMENTAL IMPLICATIONS

A BPP will allow the City to better protect the health of its water customers from potential cross contamination within the drinking water system that can arise due to drops in watermain pressure (e.g. due to a main break), or backpressure from individual customers (e.g. from process pumps set to pressures greater than the municipal water supply.)

TECHNOLOGY IMPLICATIONS

There are no technology implications associated at this stage of the report. Technology implications will arise from the implementation of Backflow Prevention devices at which point Environmental Services Department will use the corporate IT governance process to assess them. IT will need to participate in scoping the technical impacts upon project approval.

TERM OF COUNCIL PRIORITIES

The recommendations of this report align to the 2015-2018 Strategic Priority – Sustainable Environmental Services, specifically Strategic Objective ES1 – Support an environmentally sustainable Ottawa.

SUPPORTING DOCUMENTATION

Document 1: Comparative Summary of Ontario Municipalities with Backflow Prevention Programs (Previously distributed to all Members of Council and held on file with the City Clerk)

Document 2: Ottawa City Facilities Preliminary Cost Estimates (Previously distributed to all Members of Council and held on file with the City Clerk)

DISPOSITION

Environmental Services Department will work with impacted departments to undertake consultations with community stakeholders and bring a report back in Q1 2016, with Program Implementation details.