

| | |
|--|--|
| | |
|--|--|

| | |
|-----------------|---|
| TO: | CHAIR AND MEMBERS CIVIC WORKS COMMITTEE MEETING ON JANUARY 5, 2016 |
| FROM: | JOHN LUCAS, P.ENG. DIRECTOR – WATER & WASTEWATER |
| SUBJECT: | RESPONSE PLAN FOR FROZEN WATER SERVICES |

RECOMMENDATION

That, on the recommendation of the Director, Water & Wastewater, the following report **BE RECEIVED** for information regarding London’s Response Plan for frozen water services.

PURPOSE

This report summarizes the Response Plan that has been implemented as a result of two consecutive severe winters that produced numerous frozen water services.

2015–19 STRATEGIC PLAN

This report supports the Strategic Plan with respect to Building a Sustainable City – Robust Infrastructure, through investments in infrastructure to reduce customer service disruptions.

BACKGROUND

Water services are the pipes that carry water from the municipal water mains into each building connected to the water system. Water services must be buried between 1.7 and 1.9 m deep, in order to prevent the water from freezing in the winter.

Winter temperatures cause moisture in the soil to freeze solid. This freezing starts at the surface and progresses downward. The frost depth that is reached each winter depends upon the severity of the cold temperatures experienced.

In typical winters, frost penetration does not affect water services. However, in very cold winters, the frost can reach depths that cause some water services to become frozen, leaving the building with no running water.

The winter of 1993/94 was extremely cold, and 258 water services froze in London. Smaller numbers of frozen water services were experienced in the cold winters of 1995/96 and 2006/07. All of these water services were subsequently excavated and rehabilitated, either by being lowered or insulated.

The winters of 2013/14 and 2014/15 were extremely cold in Ontario; in fact, February 2015 was the coldest month ever recorded in London. Once again, large numbers of frozen water services were experienced.

| | |
|--|--|
| | |
|--|--|

| |
|-------------------|
| DISCUSSION |
|-------------------|

The winter of 2013/14 was very cold in London, causing 348 frozen water services. London had never before experienced this many frozen services in one season. Remarkably, the winter of 2014/15 was even colder, resulting in 531 frozen service calls, with an additional 32 calls for frozen customer plumbing. The response effort by London’s Water Operations Division was complicated by the fact that all of the frozen services occurred within a relatively short time frame. The winter was not unusually cold at first, but in mid-February, the temperature plummeted and remained extremely low for nearly two weeks. Frozen service calls came in slowly at first, then escalated to total over 200 in a single week.

Below is a table summarizing the public right-of-way frozen service calls that were received.

| Date | Number of Frozen Service Calls | Cumulative Total |
|-------------------|--------------------------------|------------------|
| February 3, 2015 | 4 | 4 |
| February 15, 2015 | 1 | 5 |
| February 17, 2015 | 2 | 7 |
| February 19, 2015 | 1 | 8 |
| February 20, 2015 | 3 | 11 |
| February 21, 2015 | 1 | 12 |
| February 22, 2015 | 17 | 29 |
| February 23, 2015 | 40 | 69 |
| February 24, 2015 | 17 | 86 |
| February 25, 2015 | 17 | 103 |
| February 26, 2015 | 91 | 194 |
| February 27, 2015 | 28 | 222 |
| February 28, 2015 | 22 | 244 |
| March 1, 2015 | 22 | 266 |
| March 2, 2015 | 40 | 306 |
| March 3, 2015 | 47 | 353 |
| March 4, 2015 | 33 | 386 |
| March 5, 2015 | 25 | 411 |
| March 6, 2015 | 12 | 423 |
| March 7, 2015 | 13 | 436 |
| March 8, 2015 | 9 | 445 |
| March 9, 2015 | 15 | 460 |
| March 10, 2015 | 8 | 468 |
| March 11, 2015 | 5 | 473 |
| March 12, 2015 | 3 | 476 |
| March 13–21, 2015 | 30 | 506 |
| March 22–31, 2015 | 22 | 528 |
| April 1 – 7, 2015 | 3 | 531 |

Over a 2-month period, emergency response measures were implemented, utilizing all available Water Operations personnel, equipment, and supplies to remedy customers’ loss of water. Remediation measures included the following:

- Using hoses to connect to a neighbour’s plumbing, where possible, using outside taps. These temporary connections reinstated water service, although with reduced flow and pressure. In these cases, an inside faucet would need to be left running to prevent the hose connection from freezing.

| | |
|--|--|
| | |
|--|--|

- Excavating and utilizing hot-water thawing equipment to restore water supply through the building’s service. Once a service was thawed, customers were instructed to leave a faucet running to prevent the service from re-freezing.
- Excavating and replacing sections of frozen service piping within the public road allowance.
- Where temporary connections were not possible, providing totes of water in the interim for those who were queued and awaiting assistance.
- Maintaining contact with affected customers, and making repeated return visits to some locations which re-froze.

As a result of these efforts, the Water Service Area expended approximately \$730,000 beyond the 2015 Water Operating Budget. Nearly \$300,000 was attributed to staff overtime costs, with an additional \$430,000 for external equipment rentals, material purchases, and surface restoration.

The following is a summary of frozen services on public right-of-way from the previous two winters.

| Winter | Total Services Frozen | Services Receiving Water via Connection to Neighbour | Repeat Frozen Services |
|---------------|------------------------------|---|-------------------------------|
| 2013/14 | 348 | 63 | N/A |
| 2014/15 | 523* | 85 | 160 |

*Some customers did not follow instructions to continuously run a faucet and their services subsequently re-froze as a result.

Considering that 160 of these services froze in both winters, a total of 711 separate water services were identified as prone to freezing within the public right-of-way. The reasons that these particular services froze were primarily shallow burial depth, improper construction practices in proximity to storm sewers, and inadequate heating of spaces within buildings for frozen internal plumbing.

Learning from the 2014/15 experience, and to help alleviate future frozen water service issues, a Response Plan was developed. It contains 4 key areas: Education, Notification, Prevention, and Remediation.

Education

- Information regarding frozen water services, causes, and prevention, including a “what-to-do” section for customers experiencing water loss, is being posted to the City’s website at:
<http://www.london.ca/residents/Water/Water-System/Pages/default.aspx>

Notification

- Every customer who experienced a frozen service in the last two years has been placed onto a contact list. Customers on this list will receive a letter by early-January outlining London’s remediation strategy and interim prevention measures.

| | |
|--|--|
| | |
|--|--|

- London Hydro, the water billing service provider, has been informed of the protocol for customers with services prone to freezing, and for neighbours who provide temporary by-pass connections.

Prevention

- Standard design specifications for watermains and services have been revised, requiring a deeper depth of burial and enhanced insulation when in proximity to storm sewers and Private Drain Connections (PDCs).
- Staff will be monitoring temperatures, frost penetration depths, and watermain break activity to determine if the potential for frozen water services is developing.
- If a threat of freezing services develops, customers with a previously frozen service (not yet rehabilitated through the work plan), will be notified by staff to continuously run a pencil-sized stream of water, usually from a laundry tap. Customers will be notified to stop the flow once the threat subsides. Notification to start and stop the flow will come directly from the City's Water Service Area by telephone.
- Where customers are instructed to leave a tap running, they will only be charged the minimum monthly water and sewer bill. They will not be responsible for consumptive charges during the period in which they have been instructed to run their water. Only those customers specifically notified by the City's Water Service Area will be granted this exemption.

Remediation

- A prioritized work plan has been developed to excavate and rehabilitate every service that froze in 2014 and 2015.
- To date, 187 services have been rehabilitated based on this prioritization (51 in 2014; 136 in 2015). The first targets were those on septic systems, where continuous running of water would be detrimental.
- Rehabilitation efforts will mainly utilize in-house staffing. External contractors will be considered where frozen service locations overlap with capital replacement contracts, or in other advantageous situations.

The rehabilitation of frozen services is being funded from the "Lead and Copper Service Replacement" Account EW3482. This program has been utilized for all rehabilitation and/or replacements of water services, regardless of material type or mode of failure. The transitioning of the use of these funds is timely, since lead service replacements are now most commonly completed in conjunction with Capital Works projects, such as the watermain relining program, where efficiencies have been realized through coordinated activities.

In 2015, the volume of water that was used by customers continuously running taps to prevent freezing was tracked. These were either customers who were connected to a neighbour, or who had been thawed and instructed to run water to prevent re-freezing. A total of 101,000 cubic metres of water passed through the water meters of these customers. The cost to the City for this water was just under \$88,000, based on lost revenue and wholesale cost recovery. Using these values, it is estimated that it would cost \$84 per month to have a customer run a continuous flow of water to prevent their

| | |
|--|--|
| | |
|--|--|

service from freezing. Assuming a two and a half month run time, it will cost approximately \$210 per customer, if this strategy needs to be implemented.

In 2015, 136 water services were rehabilitated at a total cost of approximately \$720,000, translating to an average cost of \$5,300 per service. The projected cost to remediate the remaining 524 services is therefore approximately \$2,780,000, to be expended over the next four years.

| |
|----------------|
| SUMMARY |
|----------------|

Due to record-breaking cold weather over the past two winters, municipalities across Ontario experienced an overwhelming number of customers with frozen water services. The Water Service Area has developed a 5-year work plan to rehabilitate all the services that were frozen in London, in order to reduce their susceptibility to freezing in the future.

In the interim, staff have created a customer service protocol that will instruct at-risk customers to run a faucet if frost penetration into the soil poses a risk to their water services. In these cases, a minimum water billing structure will be employed so that customers will not be asked to cover the cost of the additional water used.

For future construction, improved design specifications have been implemented to prevent freezing in water services that cross storm sewers and Private Drain Connections (PDCs).

Acknowledgements:

This report has been prepared with input from Scott Koshowski, P. Eng. - Environmental Services Engineer.

| | |
|--|---|
| PREPARED BY: | RECOMMENDED BY: |
| | |
| JOHN SIMON, P.ENG. DIVISION MANAGER, WATER OPERATIONS | JOHN LUCAS, P.ENG. DIRECTOR – WATER & WASTEWATER |
| CONCURRED BY: | |
| | |
| JOHN BRAAM, P.ENG. MANAGING DIRECTOR – ENVIRONMENTAL & ENGINEERING SERVICES & CITY ENGINEER | |

- c.c. Cathy Saunders - City Clerk
 Scott Koshowski – Water Operations Engineer
 Dan Huggins – Water Quality Manager – Water Operations
 Steve Irwin – Water Meter Supervisor – Water Operations
 Rick Grenier – Water Services Supervisor – Water Operations