

Bearspaw South Feeder Main break response report



Contents

Purpose	1
Scope	1
Introduction	1
Overview of response actions	2
Emergency coordination response	2
Service disruption and repair response	3
Bearspaw South Feeder Main break timeline overview	4
Strengths and opportunities for improvement	5
Methodology	5
Strengths	5
The City's overall response	5
Emergency Operations Centre (EOC)	5
Water Tactical Operations Centre (H ₂ OC)	6
Opportunities for improvement	7
The City's overall response	7
Emergency Operations Centre (EOC)	7
Water Tactical Operations Centre (H ₂ OC)	8
Related actions/next steps	8
Conclusion	9



Purpose

The purpose of this report is to provide a high-level summary of The City of Calgary's (The City's) response to the Bears paw South Feeder Main break, and to outline the themes identified from this event that will be used to improve any future large emergency responses.

Scope

This report focuses on The City's response to the Bears paw South Feeder Main event from the initial break on June 5, 2024, to the restoration of water service in late September. It includes a review of actions taken by the Emergency Operations Centre (EOC) and the Water Tactical Operations Centre (H₂OC), which both played roles in the different phases of the response, including the emergency phase and the service disruption and repair phase to restore water services. Finally, this report includes a summary of strengths of the response, and opportunities for improvement that will be used to strengthen The City's ability to respond and mobilize the city, community and region during future emergencies.

This report does not include information on the Bears paw South Feeder Main failure analysis or plans to improve infrastructure reliability in the future. It also does not include information on the Independent Review Panel for the Bears paw South Feeder Main break. These topics are being addressed through separate reviews and reports.



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Introduction

The Bears paw South Feeder Main break was one of the most significant and complex critical infrastructure emergency events The City has experienced. Although the break was localized, there were broader impacts across Calgary and to neighbouring communities (the City of Airdrie, City of Chestermere, Tsuut'ina Nation, and the Town of Strathmore). The emergency event lasted from June 5 to September 23, 2024, and required a coordinated City and regional response facilitated by opening The City's EOC and H₂OC. The EOC was opened for the emergency phase of the event, which lasted from June 5 until July 6. The H₂OC was opened for the entire event including the emergency phase as well as the service disruption and repair phase which lasted from July 6 to September 23. This critical infrastructure response required over 700 staff from across the organization, as well as substantial coordination and collaboration from over 50 Calgary Emergency Management Agency (CEMA) members at EOC, and several engineering and construction contractors. In addition, the Mayor and Council, businesses, industries and neighbouring communities all played a role by amplifying messages and reducing water usage in both simple and innovative ways. This collective effort contributed to The City's ability to respond to the overall emergency, maintain public health life safety, and restore water services to Calgarians and neighbouring communities.

The Bears paw South Feeder Main break was challenging due to its broad impacts and complex factors. The declining potable water supply and fire suppression concerns threatened the life safety of both Calgarians, critical customers (like hospitals), and neighbouring communities. The impacts to various industries put pressure on The City to not only respond rapidly and effectively but also to maintain water quality and restore water services quickly. The need to immediately change public behaviour with respect to water consumption was challenging as the scope and nature of the emergency was unknown in the first hours of the emergency. Water use dropped following the initial Alberta Emergency Alert (AEA) and helped The City avoid the need for broader city-wide boil water advisories. As the event progressed and more information became available, the response needed to pivot, and The City's communication and response strategies evolved.

By opening both the EOC and H₂OC, The City was able to quickly respond and manage the event through a variety of actions and strategies in two phases. The two operations centres worked hand in hand to ensure The City was able to mitigate harmful impacts to Calgarians and neighbouring communities that use Calgary's water. The rapid mobilization of resources, continued communication, and successful stabilization of the emergency demonstrates that The City is capable of handling complex emergencies.

Overview of response actions

Both the EOC and H₂O_C were opened on the same day, each performing different functions to support the response to the break, which is the normal process when the EOC is open along with any Tactical Operations Centres (TOCs).

The following is a high-level overview of the actions and strategies that were used by both operations centres to manage the response in the distinct phases. These actions followed established processes and procedures and were aligned with the Municipal Emergency Plan, State of Local Emergency requirements, the Emergency Management Bylaw, and the Corporate Business Continuity Policy.

Emergency coordination response

Municipal Emergency Plan (MEP)

The MEP was activated to assist with responding to and recovering from the Bearspaw South Feeder Main break.

Alberta Emergency Alert (AEA)

A broadcast intrusive alert was issued by The City notifying Calgarians of the feeder main break and the need to conserve water. The AEA was later updated to a non-broadcast intrusive alert to include the neighbouring communities and was updated regularly to ensure the alert remained in effect and reflective of current conditions.

Boil Water Advisory

A Boil Water Advisory was issued to the community of Bowness. The City continued to sample, test and monitor drinking water quality, while working with Alberta Health Services. Water Wagons were deployed to the community to provide water to residents.

State of Local Emergency (SOLE)

A SOLE was declared due to the necessary repair of five additional pipe sections⁽¹⁾ (hot spots) that were discovered during the investigative work to support emergency repairs.

Recovery Steering Committee

The Recovery & Resilience Taskforce was activated to assist with recovery and business continuity activities.

Restrictions and bans

Stage 4 outdoor water restrictions were declared for Calgary and neighbouring communities that use The City's water services. The public was also asked to limit non-essential indoor water use. A temporary fire ban was implemented in Calgary to reduce the risk of additional fires.

Communications

- The Crisis Communications team was activated to create awareness and provide information to reduce water use throughout the response, utilizing drought management strategies already developed by The City.
- The H₂O_C team reached out to regional and large water using customers and provided additional communications support and updates to the EOC on stabilization of the repair sites and traffic impacts.

Water distribution sites

The City set up water distribution sites to allow Calgarians access to non-potable water for use in their gardens, construction and landscaping businesses.

(1) Specific sections of the pipe exhibited significantly higher levels of corrosion and damage, particularly to the prestress wires, requiring urgent repair before the pipe could be safely refilled with water.

Service disruption and repair response

Pipe repair

Emergency repairs to the initial break and five hot spots were conducted to bring the Bearspaw South Feeder Main back to service at reduced pressure to mitigate the risk of subsequent failures.

Alterations to water operations

Teams reconfigured the flow of water coming from the Glenmore Water Treatment Plant to ensure enough water could be supplied to all Calgary and neighbouring communities.

Customer outreach

Staff provided continuous engagement with industrial, commercial, and institutional customers and neighbouring communities including the City of Airdrie, City of Chestermere, Tsuut'ina Nation, and the Town of Strathmore to explore opportunities to reduce water consumption.

Community outreach

Tailored outreach provided residents and businesses heavily impacted by construction with information, updates related to water usage, and support as required, such as non-potable river water stations for construction businesses and gardeners.

Pipe inspection

Tailored outreach provided residents and businesses heavily impacted by construction with information, updates related to water usage, and support as required, such as non-potable river water stations for construction businesses and gardeners.

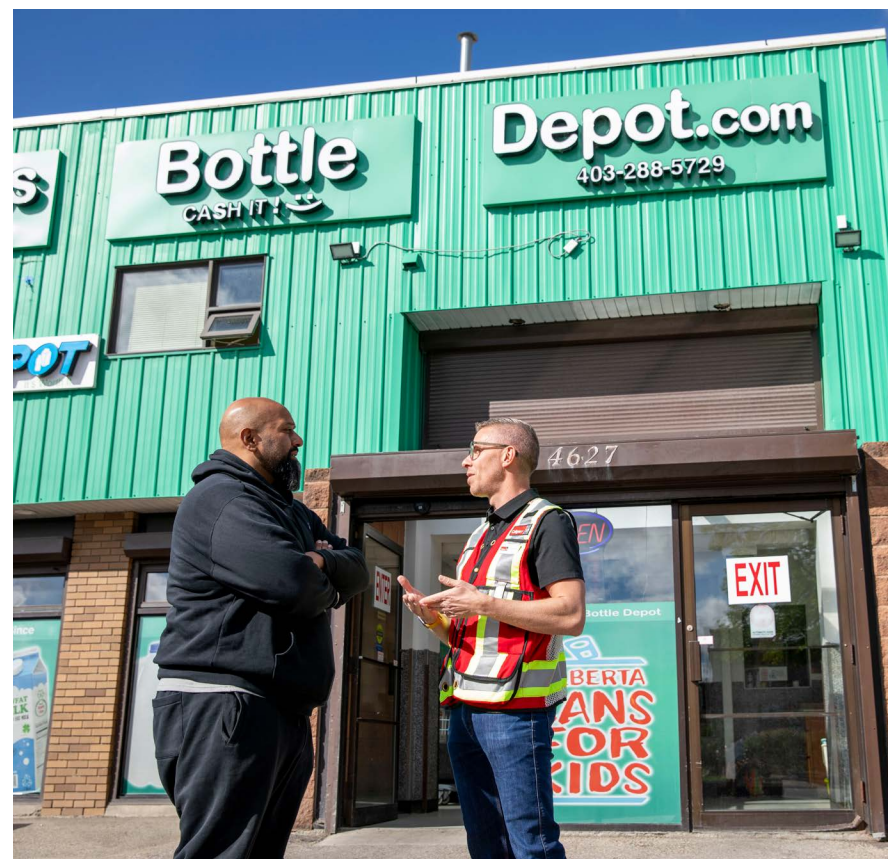
Planned repairs

The results of the pipe inspection analysis determined the need to repair 21 additional sections of pipe to mitigate the risk of any additional failures of the Bearspaw South Feeder Main. The urgent repairs in this part of the response were different from previous emergency repairs in that additional time to plan out and manage the repairs was available due to an increased stability in the water system.

Return to service

A phased approach to the return to service was implemented that included filling, flushing, testing, and stabilizing to maintain the integrity of Calgary's water system and to ensure water quality met health standards.

The State of Local Emergency (SOLE) expired on July 4 and the EOC closed on July 6 when water restrictions were lowered to Stage 3. The MEP was also deactivated on July 6 as the response no longer met the criteria to keep the EOC open. The repair phase did not require EOC resources and was more about infrastructure repair and system recovery. The H₂OCC continued to operate to monitor the Bearspaw South Feeder Main, coordinate public information on water restrictions, report on the repair of the Bearspaw South Feeder Main and restore full water services. During this time, many City business units provided support and collaboration.



Bearspaw South Feeder Main break timeline overview

Key response actions taken

Emergency phase

June 5 – June 15

Emergency repair of Bearspaw South Feeder Main failure

Focus on locating and repairing the initial break site and reconfiguring the drinking water distribution system to ensure adequate water supply for indoor consumption and fire protection.

Major actions

- Emergency Operations Centre (EOC) and Water Tactical Operations Centre (H₂OC) opened.
- Municipal Emergency Plan activated.
- AEA Broadcast Intrusive Alert issued.
- Boil Water Advisory issued.
- Stage 4 water restrictions put in place as well as a fire ban.
- Boil Water Advisory lifted.

June 15 – June 26

Hot spot repairs

Focus on risk-based identification, repair of five hot spots and continued water reduction measures through communications, customer outreach and alternative water sources for outdoor use.

Major actions

- State of Local Emergency (SOLE) declared.
- Recovery Plan activated and submitted to ELT to form a Recovery Steering Committee.
- Non potable water distribution locations open.
- Repairs on hot spots completed.

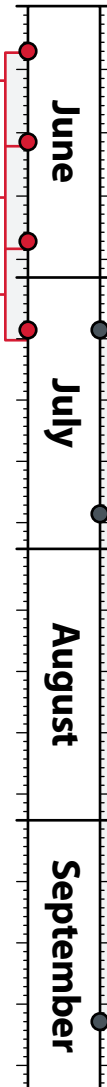
June 26 – July 6

Return to service

Focus on returning the system to normal configuration at reduced pressures while meeting all regulatory requirements.

Major actions

- SOLE expired.
- EOC closed.
- MEP deactivated.



Service disruption and repair phase

July 6 – July 27

Monitor and inspect

Focus on monitoring and inspection of the remaining 11 km length of the Bearspaw South Feeder Main. This inspection data revealed risks to other sections along the scanned leg of the Bearspaw South Feeder Main.

Major actions

- Water restrictions moved from Stage 4 to Stage 3.
- Fire ban lifted.
- Inspection and monitoring of the Bearspaw South Feeder Main.
- Regular public and Council updates.
- Customer outreach and preparations for planned repairs.
- Maintenance on the Glenmore water treatment plant in advance of the next repairs.

July 27 – September 23

Bearspaw South Feeder Main urgent, planned repairs

Focus on using a complex risk-based approach to selecting sites for repair, planning activities to ensure efficiencies, and executing the repairs. This phase concluded with the return to service of the Bearspaw South Feeder Main.

Major actions

- Selection, staging and completion of the multiple repair sites.
- Outreach with impacted communities, businesses and industries.
- Daily media availability and Council updates (repair progress, city wide water demand and traffic interruptions).
- Meetings with large water using customers and industries on continued indoor water reductions and outdoor restrictions.
- Repairs completed.
- Bearspaw South Feeder Main filled.
- All stages of water restrictions lifted (September 22).
- H₂OC closed on September 23.

Strengths and opportunities for improvement

Through an analysis of the event, the EOC and the H₂OC identified separate and combined strengths and opportunities for improvement. These will be used to ensure The City can continue best practices and respond even more effectively to future emergencies.

Methodology

Both the EOC and H₂OC conducted surveys and debriefs with staff and Agency members to identify areas of strengths and opportunities for improvement. From the information gathered, the data was analyzed and strengths and opportunities for improvement were grouped into themes and subthemes. Action items from these subthemes are in development to improve future responses. For this report, the main themes are presented as follows.

Strengths

Survey and debrief analysis identified several frequently cited strengths.

The City's overall response

Effective collaboration

Teamwork, collaboration, and coordination in the EOC and H₂OC combined with support from all responding parties contributed to a strong and positive work environment, allowing all team members to feel confident to respond to a situation that was rapidly changing. City Council supported the city-wide messaging with their constituents and in the communities impacted by the construction. Councilor feedback helped Administration adapt and pivot quickly to minimize impacts, such as traffic interruptions, wherever possible. The business community responded by innovating in their operations and leading wise water use with their customers.

Public communications

A typical part of evolving incidents is the amount of information available about the scope and scale of an emergency. In the initial hours of the feeder main break, incomplete information was available to provide to the public that would clarify the extent of the emergency. Although there was public confusion, the use of multiple channels to communicate to the public was a success in changing the public's water consumption behaviour. The use of subject matter experts also assisted in helping the public understand the gravity of the situation and need to reduce water consumption.

Internal communications

Having strong, effective internal communication was critical for enhancing strategic coordination and ensuring timely updates were provided to responding parties to the Bears paw South Feeder Main break.

Emergency Operations Centre (EOC)

CEMA staff roles and responsibilities

Effective team environment, good communication, and successful onboarding and training assisted with the flow of information and ensuring CEMA staff understood their roles and responsibilities.

Overall operations

Constructive feedback, consistent leadership, detailed briefing emails, timely updates, and good team collaboration were all identified by debrief participants as factors that contributed to successful operations.

Transition to recovery

Early recovery conversations combined with the support of experienced staff, and use of templates and documents assisted with the transition from the EOC's response to recovery.



Water Tactical Operations Centre (H₂OC)

Staffing

The technical competency, ability and dedication of those involved working long shifts, altering work schedules to allow for a 24/7 operation as required, and amending regular work schedules over 111 days (about 3 and a half months) of activation. To support the required response pivots and timelines, several different partners were engaged and activated, including engineering firms and construction contractors.

Customer outreach/engagement

Daily updates were sent, and regular calls made to engage with regional customers to keep them informed on the response and align plans to communicate water restrictions. As a result, there were significant water reductions from regional partners. Direct contact with top commercial and industrial water users (emails, phone calls, one on one meetings) to communicate

the need to reduce water and learn about actions they were taking to reduce consumption also took place regularly. Business and industries innovated and adjusted their processes and practices (e.g. cut back production, reduced non-essential activities, etc.) to contribute whatever they could to find additional water savings. Many large water consumers were able to implement water saving measures quickly as they are experts in their regular business practices.

Subject matter experts

Applying the subject matter expertise of City staff was crucial to the response success. The operational and engineering feats to innovate and move water in new ways the system was not designed for to critical areas of the drinking water distribution system were instrumental to maintaining safe potable water supply to all customers. Staff connections within the water industry assisted in sourcing required parts. New approaches were taken working with communities during impactful repair phase.



Opportunities for improvement

Analysis also identified opportunities for improvement to enhance The City's response to future emergencies.

The City's overall response

Broader roles and responsibilities

Having the H₂O open along with the EOC presented new learnings. Throughout the debriefs, clarity around roles and responsibilities was a significant discussion point, and it was identified there is a need to have a strong delineation in roles and responsibilities and clarity around how groups such as the EOC, H₂O, Communications and Crisis Communications will work together in future responses.

Communicating during emergencies

Communicating with the public was an essential component to this response. One of the key communication challenges of the response was helping the public understand the scale and nature of the event as well as the number of communities impacted. As the event progressed and the impacts became apparent, messaging needed to change; this negatively impacted the public trust of citizens who felt more information should have been given. Future communications would more clearly describe the uncertainty and technical complexity of the situation.

Operational staffing

The community response to the Bearspaw South Feeder Main break was one of The City's longest, which created challenges and took a toll on City staff, external Agency members, citizens, businesses, and many industries. With respect to staff, there was significant demand to maintain operations on a 24/7 basis. There is an opportunity to investigate and develop plans to support staff resourcing and wellness and the impact on City operations for future prolonged events.

Emergency Operations Centre (EOC)

Roles and responsibilities

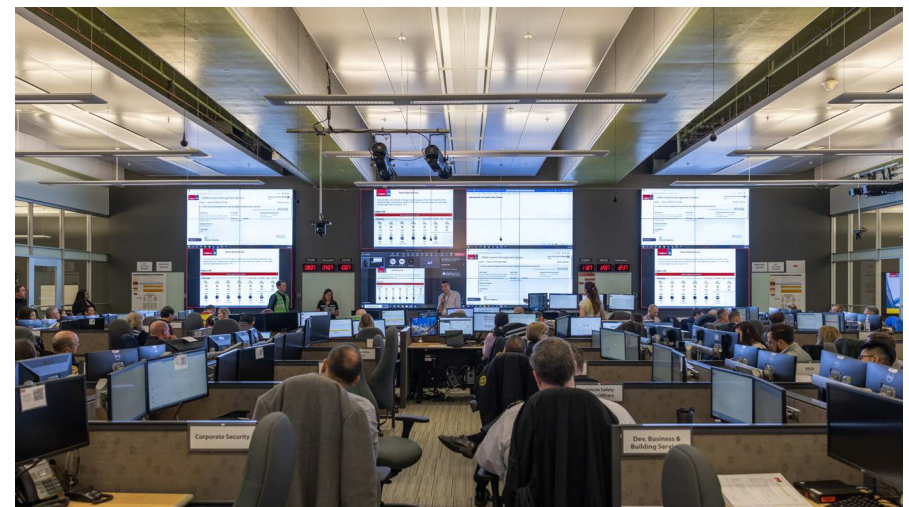
The debrief sessions identified certain roles throughout the organization and Agency members that lacked clarity in terms of their responsibilities during this emergency or disaster. It is recommended to clearly develop and outline how these groups will be engaged in future emergencies or disasters to effectively support the response and recovery efforts accordingly.

EOC operations

Although operations worked as intended throughout the response to the Bearspaw South Feeder Main break, there are some recommendations that would improve future EOC openings. Sub-themes included developing staffing bench strength and improving certain EOC processes to strengthen operations in future emergencies.

Information sharing

Although internal communications within the EOC was identified as a strength, there is an opportunity to improve communication pathways and the overall flow of information between groups in the EOC. Future responses would benefit from improvements to information sharing processes and procedures.



Water Tactical Operations Centre (H₂OC)

Incident response structure

The Incident Command System (ICS), a standardized approach to incident management, is an essential component to the H₂OC's response. The dynamic nature of complex incidents requires continuous planning and revision of plans, strategies and communications including the resources and personnel to support that planning process. The H₂OC can further leverage the planning functions in ICS to address the potential scenarios and challenges presented by highly complex and evolving incidents in the future.

Staffing

This emergency required highly specialized expertise in key positions to effectively respond to the emergency; however, this limited the options on who could staff those positions. Future large-scale emergencies would benefit from increasing the pool of H₂OC-trained staff with specific expertise (i.e. engineering, customer service, water conservation, regional relationships) within the Water lines of service to ensure adequate resourcing is available.

Complexity of incidents

Incidents vary in size, scope, and complexity, making it challenging to establish a consistent operational rhythm for the EOC and H₂OC. This variability complicates the coordination of communication, often requiring limited personnel to connect with multiple groups to provide information. Look for opportunities to streamline connection points, and support information sharing and operations awareness, ensuring key personnel can focus on critical tasks.



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Related actions/next steps

The EOC and H₂OC are already undertaking several actions to ensure a robust response to future emergencies. These actions include:

Completed

Water bylaw changes

clarifies permitted activities through the four stages of Outdoor Water Restrictions in the event of a drought or system failure that could impact water security in Calgary. These updates modernize wording and clarify current uses versus demands and allow for closer control of enforcement actions related to the Water Utility Bylaw for water uses like residential watering, window washing, and cleaning required for public health reasons.

Underway

General EOC and H₂OC operational processes

Includes updating and developing processes for the interaction between EOC and Tactical Operations Centres (TOCs).

Municipal Emergency Plan (MEP) update

Includes developing clarity around roles and responsibilities for specific positions and Agency members, as well as updating the MEP to align with the changes resulting from the corporate realignment.

Communications

Includes developing greater role clarity for communications support and customer outreach activities between the EOC and H₂OC as well as expanding and developing the Crisis Communications team.

Staff wellness

Collaborate with Human Resources and Occupational Health, Safety and Wellness to create and implement additional psychological safety and wellness initiatives for employees before, during and after an event.

The EOC and H₂OC will collaborate to address opportunities for improvement and will integrate identified strengths into current processes. Action items will be added to staff work plans, discussed, and regularly reviewed to ensure timely completion, enhancing The City's emergency response and preparedness.

Conclusion

Although the Bearspaw South Feeder Main break was a significant and complex response with many challenges, it highlighted the resilience of our city, region and community. The City was successful in providing continued essential water services and the community came together to meet the extraordinary challenge we faced. The City's ability to quickly and effectively open both its EOC to coordinate the larger overall emergency and its H₂OC to coordinate the restoration of services is a testament to The City's preparedness and its capacity to manage and respond to emergencies. The speed with which The City was able to respond to this emergency and bring Calgarians together demonstrates its ability to mitigate harmful impacts to Calgarians in future emergencies. Cities and water utilities across Canada continue to reach out to hear about The City's experience and learn about the strengths and lessons learned from the response. Over the coming months, both the EOC and H₂OC will take the appropriate actions to further strengthen future responses.

