



# Flood Mitigation Measures Assessment

Stakeholder Report Back: What We Heard

December 2016

## Project overview

The 2013 floods caused significant social and economic disruption and unprecedented damages. The road from recovery to resiliency is a complex, long-term process over many years with short-, medium- and long-term milestones. Managing Calgary's significant flood risk and building flood resilient communities requires a combination of different types of measures, including infrastructure, operational strategies, land use policy and citizen-focused strategies, delivered by both The Province and The City.

In July 2013, The City of Calgary created an expert management panel on river flood mitigation that developed 27 recommendations aimed at achieving a safer, more flood resilient city. As a result of the panel's recommendations The City undertook a study, using a triple bottom line approach, to assess all structural and non-structural flood mitigation measures for Calgary. Mitigation measures may include: upstream reservoirs, operational and structural improvements to dams, permanent barriers, land use changes, removal of buildings, etc. Through the Flood Mitigation Measures Assessment study, we are determining the best combination of solutions for the Bow and Elbow rivers within Calgary.

Public engagement is an important aspect of this project and The City is taking a collaborative, citizen-focused approach to develop flood resiliency recommendations. Community needs and impacts on potential structural and non-structural mitigation measures are being considered when evaluating flood mitigation options. Once community input and all other factors are evaluated, Administration will bring forward a suite of recommended structural flood mitigation solutions to Council in Q1 2017.

## Engagement overview

The City held a series of in-person and online engagement events in October and November to gather thoughtful and informed opinions from citizens on proposed flood mitigation. The City will use and value feedback from citizens across Calgary, in areas both flood affected and not. Recommendations will be based on several decision factors including: science/expertise (planning principles, technical engineering studies, watershed management, subject matter expertise, other City policies etc.), citizen values and the Triple Bottom Line (TBL) considerations (environmental, social and economic impacts).

The City of Calgary held six workshops in flood-affected areas to collect input for the flood mitigation measures assessment:

- Workshop #1: Hillhurst/Sunnyside Community Association (October 18, 2016)
- Workshop #2: Riverbend Community Association (October 20, 2016)
- Workshop #3: Bowness High School (October 22, 2016)
- Workshop #4: Cliff Bungalow / Mission Community Association (October 24, 2016)
- Workshop #5: Southern Alberta Pioneers Memorial Building (October 27, 2016)
- Workshop #6: Alexandra Centre Society (November 1, 2016)

### Workshops:



6 Sessions



140 Participants



1,216  
Comments



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The City of Calgary held five drop-in sessions in flood affected and central areas to inform the public about upcoming workshops and to collect input for the flood mitigation measures assessment project:

- Pop-up Session #1: Bow River Pathway in Eau Claire (October 12, 2016)
- Pop-up Session #2: The CORE Shopping Centre (October 13, 2016)
- Pop-up Session #3: Elbow River Pathway in Stanley Park (October 15, 2016)
- Open House #1: Riverbend Community Association (November 3, 2016)
- Open House #2: Queen Elizabeth Elementary School (November 5, 2016)

### Pop-ups:



### Open Houses:



Along the same timeframe, The City of Calgary held online engagement where participants could provide their input on concepts 1, 2 and 3 and non-structural mitigation measures over a period of 23 days. The Engage Portal was setup to accommodate 140 character statements, and all comments were visible to online visitors. Participants were also able to 'heart' comments left by other participants.

### Online:





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## What we asked

After a presentation by City staff on the flood mitigation measures to date and an overview of three potential concepts:

Concept 1: Reservoirs on the Elbow River and on the Bow River upstream of Calgary,

Concept 2: Flood barriers along the Elbow River and the Bow River, and

Concept 3: An upstream reservoir on the Elbow River (Springbank Reservoir) combined with barriers along the Bow River.

Participants were asked to identify the strengths and weaknesses of each concept while considering what the benefits and impacts could be to:

- The way the community looks, feels, and moves;
- Providing equal protection from river flood to all citizens/communities;
- The amenities/services in their community;
- The health of the rivers and floodplain as it flows from the mountains, through the city and to other communities;
- The long-term supply and quality of water for Calgary;
- Protecting Calgary's economic core; and
- The city as a whole.

After being given an overview of the suite of potential non-structural measures (i.e.: policies, land-use planning, development regulations, emergency response and/or public training and awareness to reduce risk and improve resiliency) for long-term flood resiliency, participants were asked to provide input on the benefits and impacts of these measures while considering their social, economic and environmental implications, on the following:

- The way the community looks, feels, and moves;
- Reduction of damages from river flooding to all citizens/communities (impacts to personal property, business operation, public safety, etc.);
- The amenities/services in their community;
- Protecting Calgary's economic core; and
- The City as a whole.

To see all the information provided to participants, please see the [Participant Package](#), the [information boards from the open houses](#) and the [presentation by City staff](#).



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## What we heard

In-person participants were invited to share their feedback in small group discussions at the workshops, provide comments on sticky notes at the open houses, and were also asked to complete a comment form on which they could provide additional comments. The full summary of input has been categorized into the three TBL categories: social well-being, environmental and economic, an 'other' category and an additional workshop comments section for presentation consistency and clarity.

With respect to the participant feedback on structural measures included in Concepts 1, 2 and 3, the dominant themes are:

- Expedite implementation of flood mitigation measures to enhance flood protection;
- A combination of reservoirs and berms/barriers are required to provide sufficient flood protection, and;
- Berms are preferred to floodwalls along Calgary's rivers as berms are more aesthetically pleasing.

Major themes of public feedback on non-structural measures include:

- Restricting/limiting vulnerable uses in flood hazard areas as appropriate to reduce flood risk;
- Structural measures need to be combined with non-structural measures in order to provide sufficient flood protection;
- The types and extent of new non-structural measures should only be implemented once structural measures have been decided upon and implemented;
- More public education on reducing flood risk is needed; and
- Financial incentives, compensation programs, and cost-sharing opportunities between government and private landowners to flood proof homes and other buildings should be considered.

Additional in-person key themes not directly relating to the four concepts presented are:

- Concern about the costs related to both structural and non-structural flood mitigation and where the money for mitigation is going to come from;
- The City has a responsibility to protect flood prone communities; and
- Property owners have to accept the risk associated with living in a flood-affected areas.

Online, participants were asked to provide input on the three concepts and provide preliminary feedback on the non-structural measures, all detailed on the project page in the engage portal.

With respect to structural measures included in Concepts 1, 2 and 3, the dominant themes are:

- Expedite implementation of flood mitigation measures to enhance flood protection for all Albertans;
- A combination of reservoirs and berms/barriers are required to provide sufficient flood protection, and;
- With high costs of implementing either of the concepts or a combination of the concepts, it is important to ensure that structural flood protection has a positive return on investment for everyone it seeks to protect.

Major themes for non-structural measures include:

- Structural measures need to be combined with non-structural measures in order to provide sufficient flood protection;
- Non-structural measures have the potential to impact the look, feel and vibrancy of established, river communities in Calgary;
- Non-structural measures are important to reduce flood risk but should only be implemented once structural measures have been decided upon; and



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- Due to the belief that the burden to implement non-structural measures will fall on the property owners, financial incentives, compensation programs, and cost-sharing opportunities should be considered for property owners upon implementation.

Additional online key themes not directly relating to the four concepts presented are:

- Concern about the costs related to both structural and non-structural flooding mitigation and the sources of funding;
- The City has a responsibility to protect communities in the floodway;
- Consider alternative locations for upstream reservoirs;
- Property owners have to accept the risk associated with living in a floodway; and
- A fair process to decide which combination of measures to implement should be considered in order to provide flood mitigation across the province.

- ▶ For a detailed summary of the input that was provided, please see the [Summary of Input](#) section.
- ▶ For a verbatim listing of all the input that was provided, please see the [Verbatim Responses](#) section.



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## Next steps

Technical studies and public engagement activities concluded at the end of November 2016. The City will be reporting back to citizens and Council about what was heard through the public engagement program. The findings of the technical studies, citizen's input and a sustainability/Triple Bottom Line (TBL) analysis will be used to inform a final report to City Council with recommendations for flood mitigation in early 2017.



## Summary of Input

Concept 1: Springbank Reservoir (Elbow River) and a new reservoir upstream of Calgary on the Bow River

	Workshop #1	Workshop #2	Workshop #3	Workshop #4	Workshop #5	Workshop #6	Open House #1	Open House #2	Online
<b>Social Well Being</b>									
Calgarians would be afforded greater protection by mitigating flooding before it reaches the city.	✓			✓	✓		✓	✓	✓
Upstream flood mitigation maintains character, aesthetics, and connection to rivers for Calgary communities.	✓		✓	✓	✓			✓	✓
Provides flood mitigation to communities downstream of Calgary.	✓		✓	✓	✓				✓
Wet dams have potential for recreational opportunities.	✓				✓	✓	✓		✓
Severe impacts to multi-generational property owners upstream.		✓	✓					✓	✓
Rural communities suffer greater impacts in order to protect the urban centre.		✓		✓				✓	✓
<b>Environmental</b>									
Wet dams have potential for drought mitigation opportunities.	✓			✓	✓	✓			✓
Provides flood mitigation to communities downstream of Calgary.	✓		✓	✓	✓				✓
The size of the proposed location for Springbank Reservoir is substantial.		✓						✓	✓
Concerns about the impacts of sediment (mud and dust) left behind in a dry dam after use.		✓	✓	✓	✓	✓			✓
Impacts to fish and wildlife habitat in the proposed location for Springbank Reservoir.						✓			✓
<b>Economic</b>									
Cost-effective with a positive cost-benefit ratio.			✓	✓	✓	✓	✓	✓	✓
Protects the downtown core, Calgary's economic engine.	✓		✓	✓	✓			✓	✓
Wet dams have potential for hydro-electric power generation.	✓			✓	✓	✓	✓		✓
Provides flood mitigation to communities downstream of Calgary.	✓		✓	✓	✓		✓		✓
Springbank Reservoir would result in the loss of productive agricultural lands and ranch lands.			✓					✓	✓
Cost of acquiring land outside of The City of Calgary's boundary.					✓			✓	✓
<b>Other</b>									
Participants indicated that reservoirs alone do not provide sufficient flood mitigation. A combination of upstream reservoirs, barriers and non-structural measures should be recommended.	✓	✓	✓	✓	✓	✓	✓	✓	✓
Participants feel a responsibility to protect communities/municipalities downstream of Calgary.		✓	✓	✓					✓
Participants indicated that they appreciate when the responsibility for flood mitigation is shared across the province.						✓			✓
Many participants raised concerns about the timeline and would like to see implementation expedited due to the lack of interim flood protection.	✓	✓	✓	✓	✓	✓	✓	✓	✓
Participants indicated they feel a lack of trust for all levels of government to follow through with commitments for large scale flood mitigation.	✓		✓	✓	✓	✓			✓
Many people thought that by mitigating flood water upstream, groundwater flooding would be reduced in some areas throughout the city.	✓					✓	✓	✓	✓
Upstream reservoirs provide a good long-term solution for Calgary.	✓		✓	✓		✓	✓	✓	✓
Participants indicated concerns about the catastrophic effects on Calgary should one or both reservoirs fail.			✓	✓					

Concept 2: Barriers along the Elbow River and barriers along the Bow River

	Workshop #1	Workshop #2	Workshop #3	Workshop #4	Workshop #5	Workshop #6	Open House #1	Open House #2	Online
<b>Social Well Being</b>									
Barriers along the Bow and Elbow Rivers eliminate impacts to upstream property owners that would otherwise be impacted by reservoirs.									✓
Barriers and berms provide visual confirmation of protection from flooding.	✓	✓							
Barrier walls provide opportunities for public art.	✓		✓		✓	✓	✓		
Barriers and berms limit access and recreational uses on the rivers.	✓		✓	✓	✓	✓	✓	✓	✓
High barriers and berms create safety and crime concerns due to lack of surveillance/visibility and provide more opportunities for undesirable activities.		✓	✓	✓	✓				✓
<b>Environmental</b>									
Barriers and berms reduce disturbances to the rivers within the city limits.	✓							✓	
Barriers and berms can impact the rivers' natural abilities to move and flow.	✓			✓	✓	✓	✓	✓	✓
In the event of a larger flood, water could flow over the barriers and could be prevented from naturally draining back to the rivers.	✓		✓	✓	✓				✓
Barriers will impact wildlife access to the Bow and Elbow Rivers.				✓		✓			✓
Barriers and berms will negatively impact the riparian areas along the rivers.				✓		✓			✓
<b>Economic</b>									
By implementing barriers and berms along the Bow and Elbow Rivers, The City can prioritize infrastructure within Calgary, and remains in full control of the decision-making.		✓			✓			✓	
Unightly high barriers and large berms create negative impacts to property values in communities along the rivers.			✓	✓	✓	✓	✓	✓	✓
Participants feel that this concept may not be as effective as upstream reservoirs for flood mitigation and protection of Calgary.	✓	✓	✓		✓			✓	✓
Land acquisition negotiations with property owners and businesses can affect budgets and implementation timelines.	✓		✓	✓	✓	✓		✓	✓
Barriers that are built and installed to provide protection to communities from groundwater will almost double the cost to implement.			✓		✓	✓			✓
<b>Other</b>									
Participants indicated that barriers alone do not provide sufficient flood mitigation. A combination of upstream reservoirs, barriers and non-structural measures should be recommended.	✓	✓	✓	✓	✓	✓		✓	✓
Even with barriers and berms, evacuation of some communities along the rivers can still occur in a flood event.									✓
Participants prefer berms over barrier walls due to less visual/aesthetic impacts to their communities.	✓	✓	✓	✓	✓	✓		✓	✓
Participants indicated that barriers and berms would be more suitable along the Bow River because the river's physical attributes and access to City-owned land make implementation easier.	✓	✓		✓	✓	✓			✓
Barriers built into the ground provide groundwater protection for the communities where they are installed.								✓	

Concept 3: Springbank Reservoir (Elbow River) and barriers on the Bow River

	Workshop #1	Workshop #2	Workshop #3	Workshop #4	Workshop #5	Workshop #6	Open House #1	Open House #2	Online
<b>Social Well Being</b>									
Calgarians would be afforded greater protection by mitigating flooding before it reaches the city.			✓	✓	✓	✓	✓	✓	✓
Provides flood mitigation to communities downstream of Calgary.				✓	✓	✓			✓
Barriers and berms provide visual confirmation of protection from potential flooding.	✓								
Barrier walls provide opportunities for public art.						✓			
Severe impacts to multi-generational property owners upstream.							✓		✓
Barriers and berms limit access and recreational uses on the rivers.						✓	✓		✓
<b>Environmental</b>									
Provides flood mitigation to communities downstream of Calgary.				✓	✓	✓			✓
Concerns about the impacts of sediment (mud and dust) left behind in a dry dam after use.									✓
Impacts to fish and wildlife habitat in the proposed location for Springbank Reservoir.									✓
Barriers and berms will negatively impact the riparian areas along the rivers.						✓			✓
In the event of a larger flood, water could flow over the barriers and could be prevented from naturally draining back to the rivers.								✓	
<b>Economic</b>									
Most cost-effective with the best cost-benefit ratio of all three concepts presented.	✓			✓	✓	✓	✓	✓	✓
Protects the downtown core, Calgary's economic engine.	✓			✓	✓		✓	✓	✓
Provides flood mitigation to communities downstream of Calgary.				✓	✓	✓			✓
Springbank Reservoir would result in loss of productive agricultural lands and ranch lands.									✓
Cost of acquiring land outside of The City of Calgary's boundary.							✓		✓
<b>Other</b>									
Participants indicated that due to the unique characteristics of each river, flood mitigation solutions will differ. A combination of upstream reservoirs, barriers and non-structural measures specific to each river should be recommended.	✓	✓	✓	✓	✓	✓	✓	✓	✓
Upstream reservoirs represent a good long-term solution for The City of Calgary.	✓			✓	✓		✓	✓	✓
Participants feel a responsibility to protect communities/municipalities downstream of Calgary.					✓				✓
Flood mitigation needs to be implemented with a fair approach that addresses all river communities	✓			✓	✓		✓	✓	✓
Participants thought that by mitigating flood water upstream, groundwater flooding would be reduced in some areas throughout the city.	✓							✓	✓
Concerns about the timeline and would like to see implementation expedited due to the lack of interim protection.			✓	✓		✓		✓	✓
Participants indicated they feel a lack of trust for all levels of government to follow through with commitments for large scale flood mitigation.	✓				✓			✓	✓
Participants suggested a phased approach should be introduced (short-, medium-, long-term recommendations).	✓	✓	✓		✓	✓			✓
Even with barriers and berms, evacuation of some communities along the rivers can still occur in a flood event.		✓							✓

Non-structural Measures: Policies, land-use planning, development regulations, emergency response and public training and awareness to reduce risk and improve resiliency.

	Workshop #1	Workshop #2	Workshop #3	Workshop #4	Workshop #5	Workshop #6	Open House #1	Open House #2	Online
<b>Social Well Being</b>									
Restricting/limiting vulnerable uses in flood hazard areas reduces risk during a flood event (i.e. evacuation, for emergency services access, health and safety, etc.).	✓	✓	✓	✓	✓	✓		✓	✓
Opportunity for Calgary to implement alternative types of secondary suites such as laneway houses.	✓	✓	✓	✓					
Implementing non-structural measures can reduce safety risks for Calgarians who reside in a below grade secondary suite.			✓	✓	✓	✓		✓	
Implementing proposed design policies (i.e. raised homes) will impact the visual/aesthetic feel of communities.	✓	✓	✓	✓	✓		✓		✓
A lot of Calgary's historical and established neighbourhoods are in the flood hazard area, therefore non-structural measures should be considered on a community by community basis.	✓				✓	✓			✓
<b>Environmental</b>									
Opportunity to implement policies/design guidelines for green-roof installations and permeable surfaces.				✓		✓			✓
No comments received.	✓	✓	✓		✓		✓	✓	
Participants suggested adding more green spaces and trees instead of concrete walls in the flood impacted areas.						✓			✓
<b>Economic</b>									
Implementation of non-structural measures reduces future financial risk to Calgarians.			✓					✓	✓
Ensures sustainable development in the future; better to build smart rather than try to stop natural flood events.	✓		✓	✓	✓	✓		✓	✓
Implementing non-structural measures before structural flood mitigation decisions are made could result in unnecessary spending on redundant efforts.	✓	✓		✓	✓	✓		✓	✓
Limits income property opportunities (secondary suites) in flood hazard area.	✓	✓		✓	✓			✓	
Concern about property owners being burdened with the cost of implementing non-structural measures and impacts to property values.	✓	✓	✓		✓	✓	✓	✓	✓
<b>Other</b>									
Participants indicated that non-structural measures alone do not provide sufficient flood mitigation. A combination of upstream reservoirs, barriers and non-structural measures customized to the unique characteristics of each river are necessary.	✓	✓	✓	✓	✓	✓		✓	✓
Non-structural measures should only be implemented once structural measures have been decided upon.	✓	✓	✓	✓	✓	✓			✓
Concern that non-structural measures will be implemented without any structural flood mitigation.	✓								✓
Participants expressed a need for more education on reducing flood risk.	✓	✓	✓	✓	✓	✓		✓	✓
Participants indicated that it is important to implement structural measures before implementing non-structural measures/policies.	✓	✓	✓	✓	✓	✓		✓	✓
Implementing design policies greatly increases Calgary's capacity for resiliency during future flood events.	✓		✓	✓	✓	✓			✓
A lot of Calgary's established neighbourhoods that feature historic structures are located in the flood hazard area, therefore non-structural measures should be considered on a community by community basis in order to be sensitive to their unique context.	✓		✓	✓	✓				✓



Enforcement and inspection needs to be considered a requirement for implementation of all non-structural measures.	✓	✓	✓		✓				✓
Participants indicated that financial incentives, compensation programs, and cost-sharing opportunities should be considered for property owners upon implementation.	✓	✓	✓	✓	✓	✓			✓

Workshop Additional Comments

	Workshop #1	Workshop #2	Workshop #3	Workshop #4	Workshop #5	Workshop #6	Open House #1	Open House #2	Online
Any flood mitigation should be in coordination with public education to help inform residents of their responsibilities and how mitigate their risks.	✓	✓	✓			✓			
Participants felt that flood insurance is needed as an option for those who could be affected by a flood event and that it would be affordable when adequate mitigation measures have been implemented.	✓	✓	✓		✓	✓	✓	✓	✓
Participants felt that the available flood maps produced by the province are out of date.	✓		✓	✓		✓			
The Province of Alberta has an important role in implementing flooding mitigation for Calgary and the greater region.	✓		✓		✓	✓			✓
Flood forecast timelines and notification methods used to inform Calgarians about flood events can help to reduce risk.			✓	✓	✓				✓
Participants had concerns about the costs related to both structural and non-structural flooding mitigation and the sources of funding	✓	✓	✓	✓	✓	✓			✓
Participants felt there is opportunity for further public consultation when mitigation measures have been decided upon	✓		✓		✓		✓		✓
Past flood events have had a significant affect on the mental health and well-being of those affected.	✓		✓	✓	✓				✓
The City has a responsibility to protect communities in the floodway	✓	✓	✓	✓	✓	✓			✓
Property owners have to accept the risk associated with living in a floodway.	✓	✓	✓	✓	✓	✓			✓