

Setting the stage...

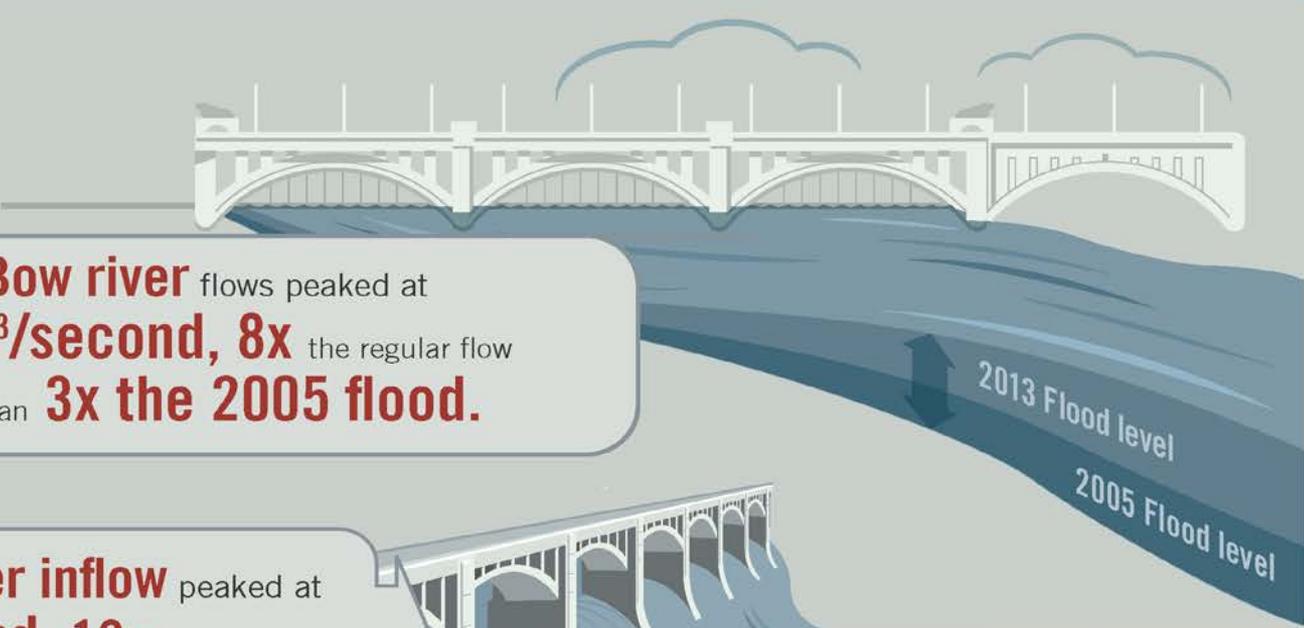


- Calgary population:
1.2 million

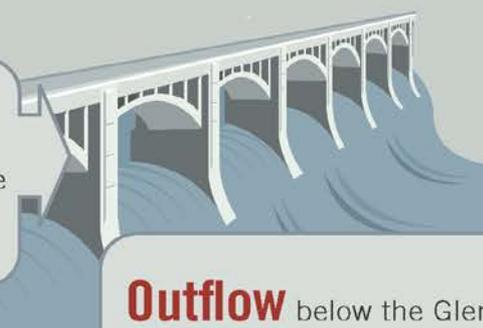
- Located at confluence of
two mountain rivers

Calgary 2013

1 THE FLOOD



The Bow river flows peaked at **2,400 m³/second, 8x** the regular flow and more than **3x the 2005 flood.**



The Elbow river inflow peaked at **1,240 m³/second, 12x** the regular rate and more than **3x the 2005 flood.**



Outflow below the Glenmore Dam was **700 m³/second,** about **7x normal** and about **2.5x the 2005 flood.**

2 THE FALLOUT

Evacuations in **26 communities** affected **110,000** Calgarians.



16 LRT stations were closed.

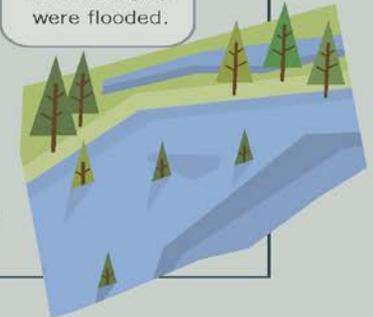


More than 50 bus routes were cancelled or detoured.

More than 20 bridges were closed.



30 parks across Calgary were flooded.



34,000 locations were without power.

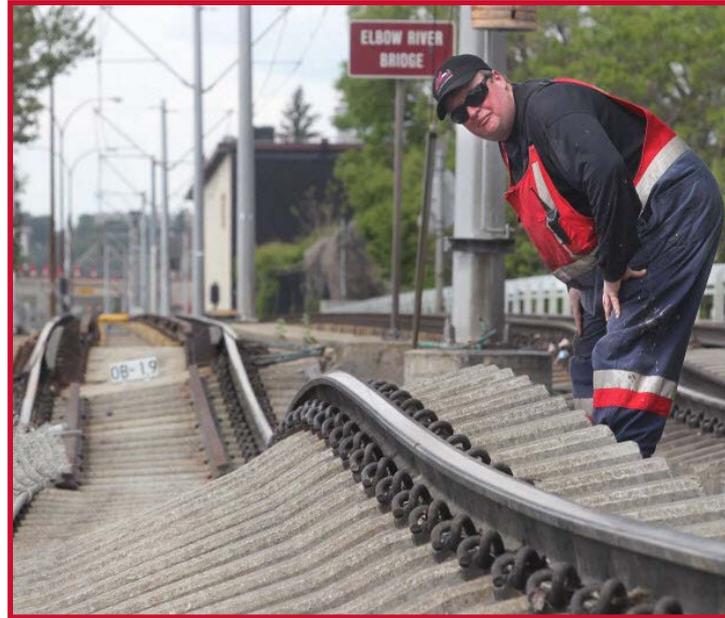


More than **1,600 people** registered at community support centres on the first day.



- Calgary's largest flood since 1932.
- \$5 billion in damages across Alberta
- \$400 million damage to municipal infrastructure.

Flood Impacts



Recovery

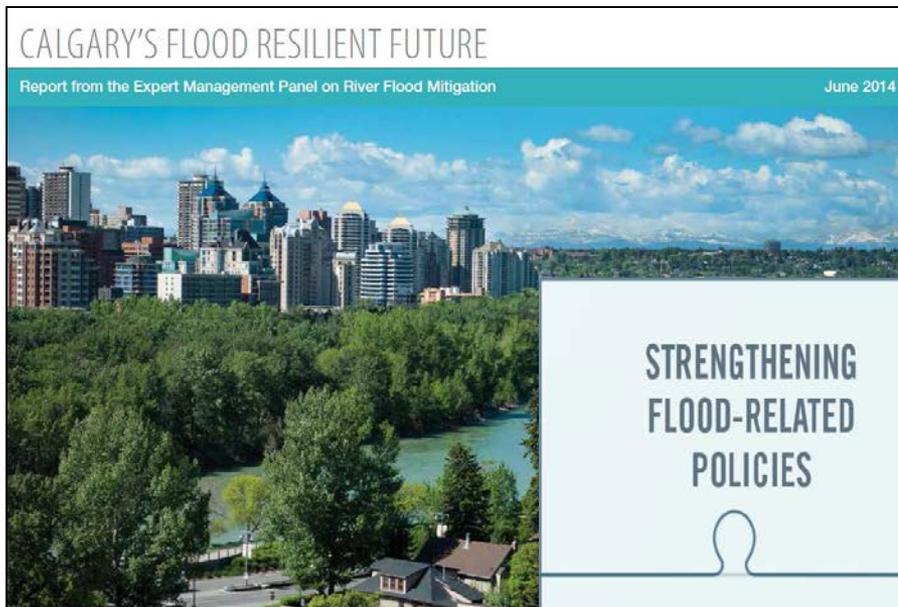
- Centralized Recovery Operations Centre
- Framework is critical to coordinate leadership, track progress, maintain communications, and reach out to community.

Recovery framework includes:



Building resiliency

- As recovery proceeded, a River Flood Mitigation Program was established.
- 27 recommendations from an **Expert Management Panel** now being implemented by The City of Calgary team.

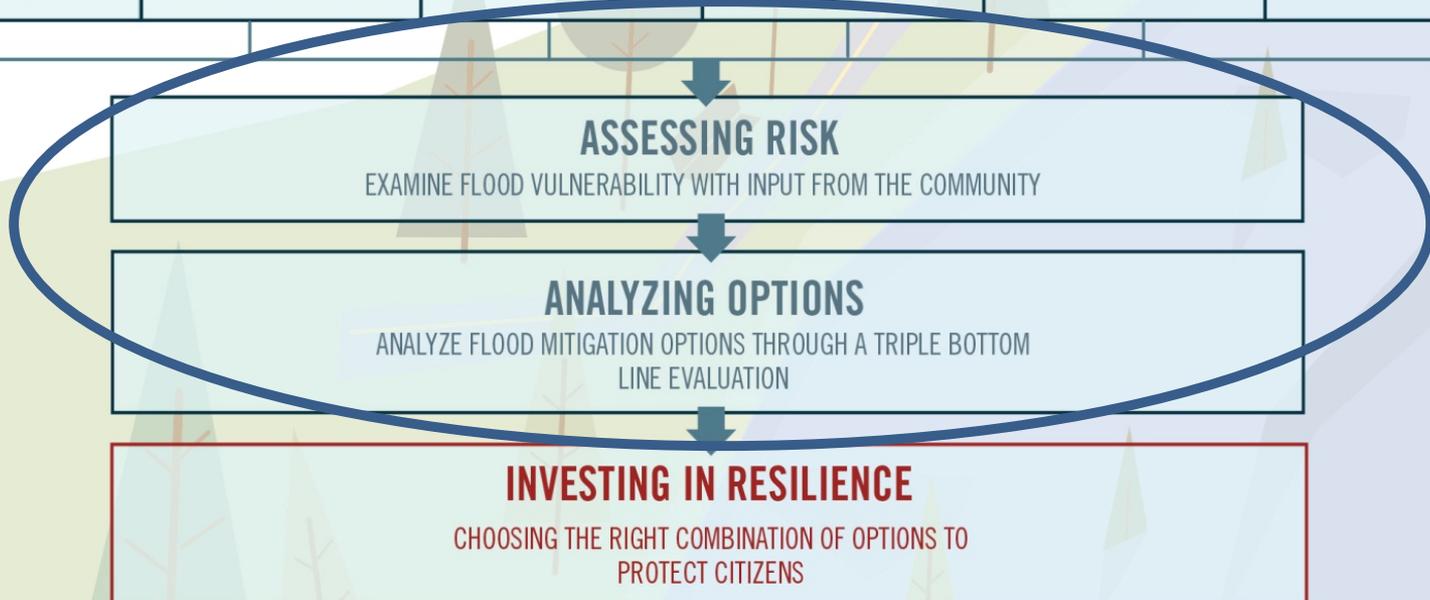




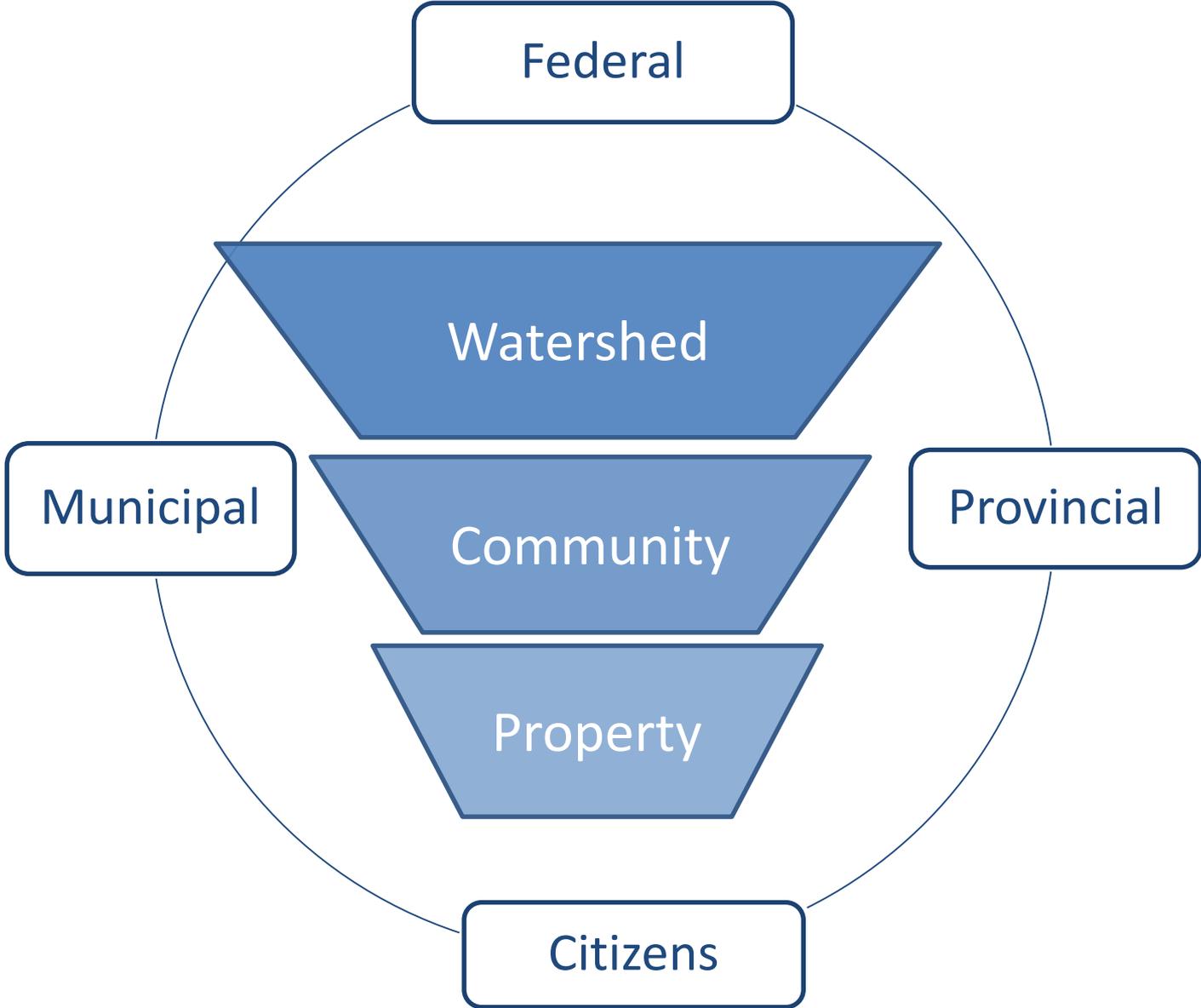
Inputs to determining the best combination of flood mitigation measures

UNDERSTANDING CALGARY'S FLOOD RISK

INPUTS TO ASSESSING FLOOD RISK



Approach: Resiliency through integrated levels of flood mitigation

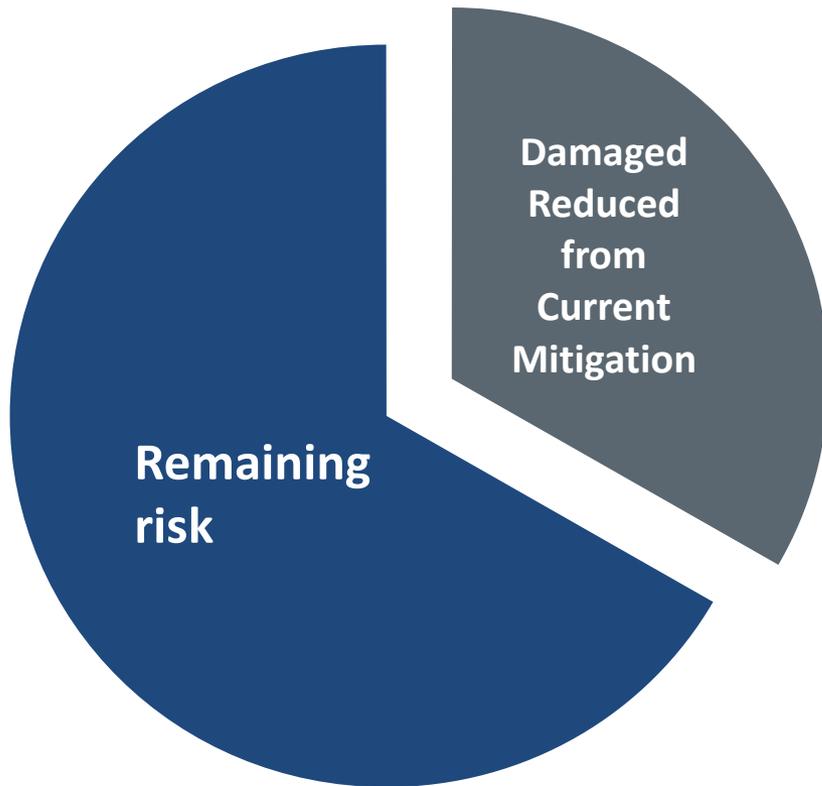


Capturing the Voice of the Citizen

- Public Survey
 - Citizens' values on the role of the river and their perception of flood risk
- Community Advisory Group
 - Input into mitigation options and designing community engagement.
- Community and stakeholder feedback on flood mitigation measures
 - Feedback on mitigation options and impacts on their communities.



Flood mitigation projects to date



City Projects:

- Raising gates on our water supply dam
- Reinforce existing barriers
- New local barriers
- Drainage improvements
- Emergency response improvements

Others:

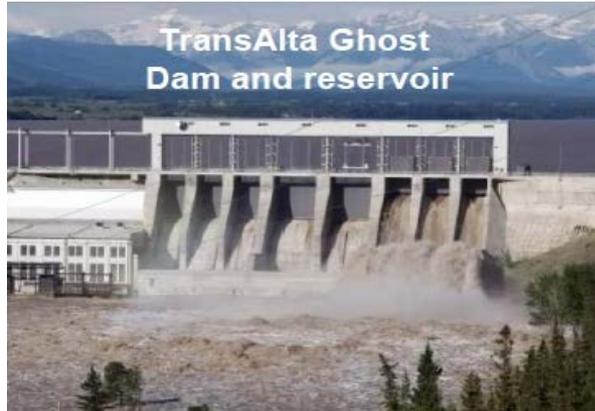
- TransAlta Operating Agreement
- Upstream reservoir project on Elbow River

Elements of flood mitigation

New reservoirs upstream



New operational efficiencies



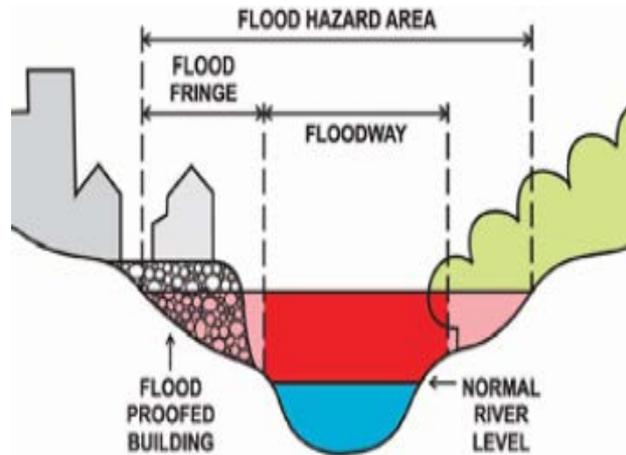
New community flood barriers



New property –level programs



Update land use policy & development



Improve forecasting/emergency response



Challenges

- Reliance on Provincial/Federal funding to help implement flood mitigation measures.
- Upstream reservoirs could take up to 30 years to build.
- Changing land use impacts on runoff
- Coordinating large group of actors
- Politicians – how soon they forget

Key Lessons

- Cities are for the long term, continue to grow and evolve and risk and impact are magnified
- Climate models and Medium term weather indicators provide evidence for potential catastrophic weather
- Upstream flow monitoring must withstand extreme events
- Basin wide governance and management to manage/minimize the peak flows to minimize impacts
- Independent risk assessment to engineered, social and economic infrastructures with mitigative strategies to be planned, designed, implemented and maintained
- Dedicate staff to risk mitigation and disaster response, and recovery
- Annual reporting and preparedness training

**For more information on the Calgary flood
contact:**

**Carolyn Bowen, Manager, Watershed Planning
The City of Calgary**

Email: carolyn.bowen@calgary.ca

All images and photos courtesy of The City of Calgary