Flood Mitigation Measures Assessment: Community Advisory Group Meeting 2

Flood 101

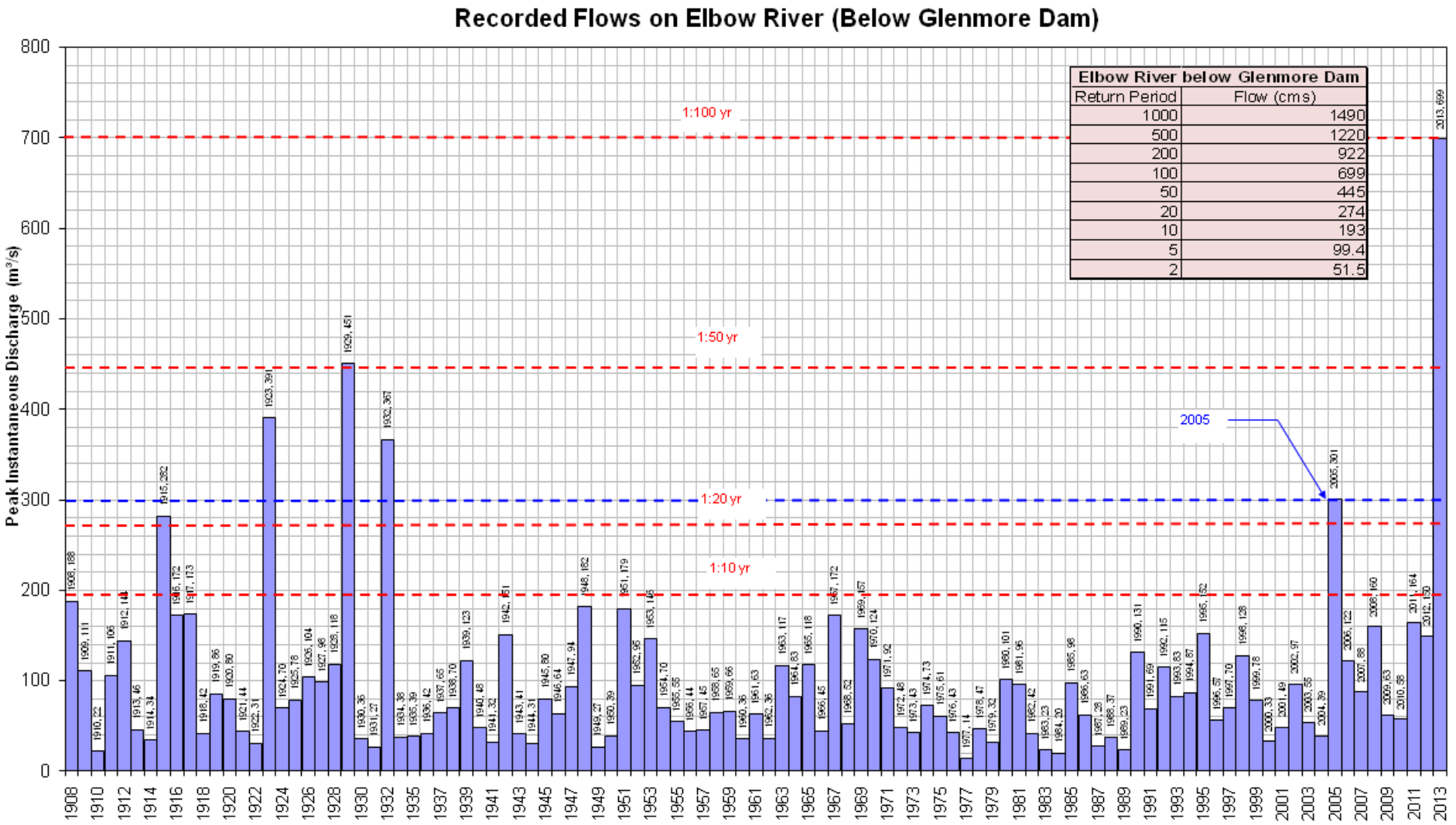
Flooding in Calgary

Flood Mitigation Measures Assessment: Community Advisory Group Meeting 2

By the end of this session, we will all be able to talk about:

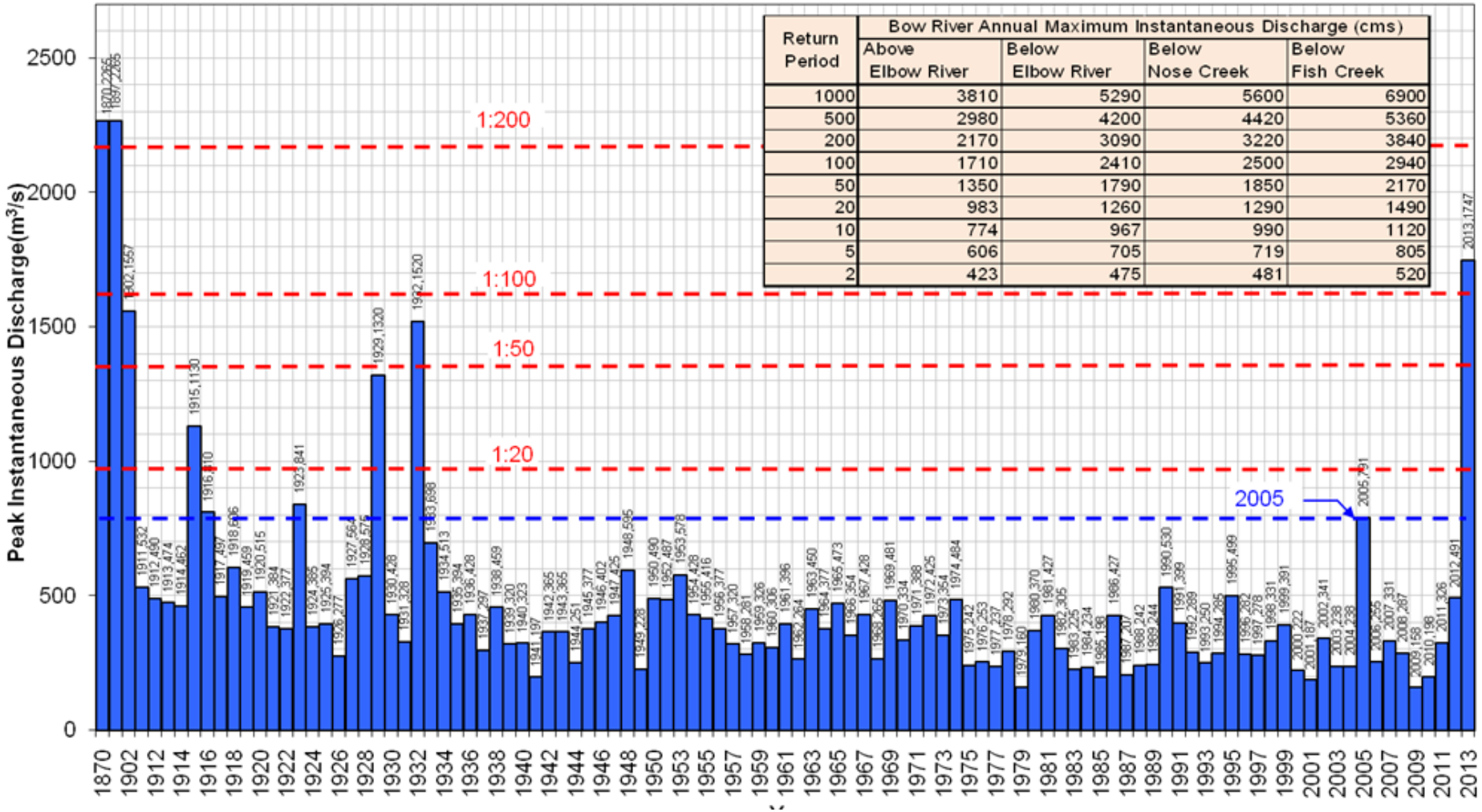
- History of flooding in Calgary
- Flood Mapping
- Flood Risk Management
- Damage Model
- How damage model results will be used to make decisions about mitigation

Past Flood Events - Elbow



Note: Return periods shown are based on 2012 hydrology

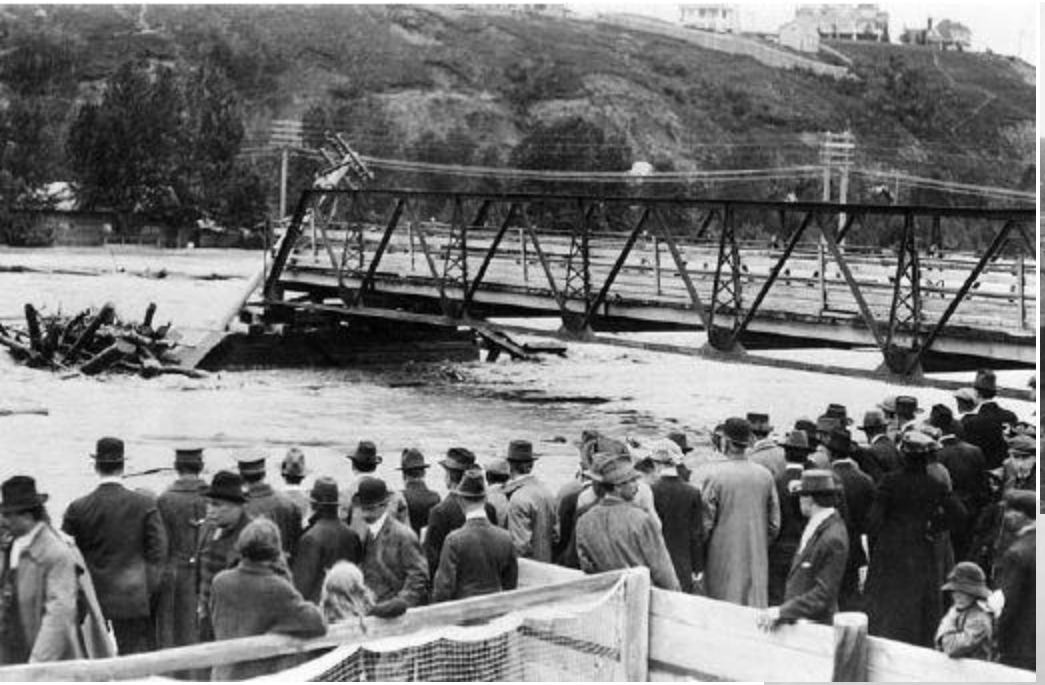
Past Flood Events – Bow Above the Elbow Confluence

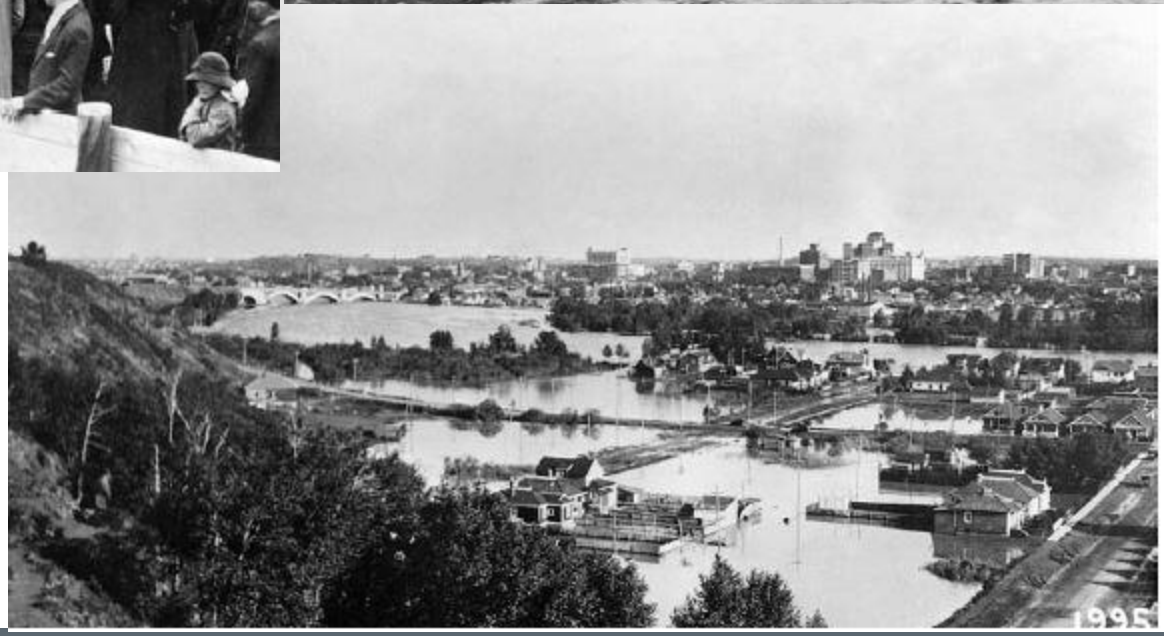


Return Period	Bow River Annual Maximum Instantaneous Discharge (cms)			
	Above Elbow River	Below Elbow River	Below Nose Creek	Below Fish Creek
1000	3810	5290	5600	6900
500	2980	4200	4420	5360
200	2170	3090	3220	3840
100	1710	2410	2500	2940
50	1350	1790	1850	2170
20	983	1260	1290	1490
10	774	967	990	1120
5	606	705	719	805
2	423	475	481	520

Note: Return periods shown are based on 2012 hydrology

Past Flood Events





What are we talking about?

- What is a “1 in 100 year flood”?

- A flood event that has a 1% chance of occurring in any given year

Flood Event	Chance of Occurrance
1:10 year	10%
1:20 year	5%
1:50 year	2%
1:100 year	1%
1:200 year	0.5%

Flood Mapping

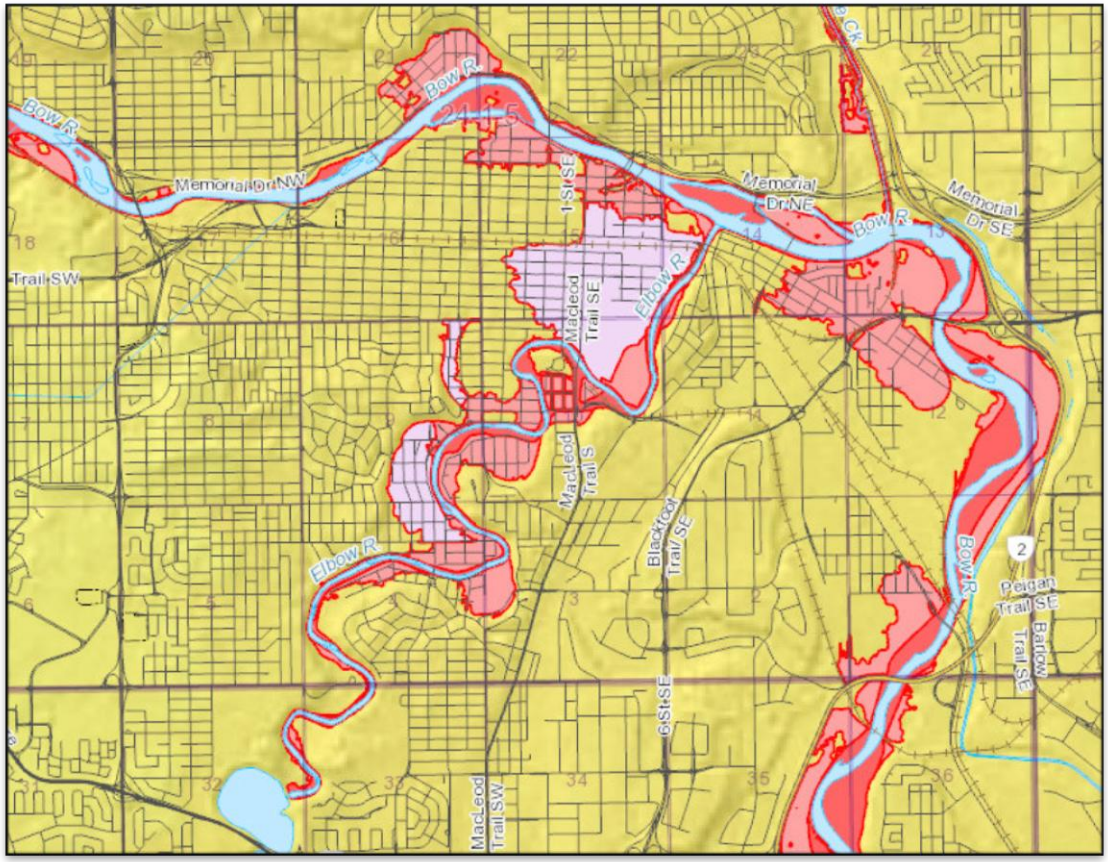
2 main types the City uses:

- Flood Hazard Maps
- Inundation Maps

Flood Hazard Mapping

- By Government of Alberta, 1983/1996
- For policy and planning
- Calgary land use bylaws based on these maps
- 1:100 year

- Floodway = fastest, deepest flow
- Flood fringe = slower flow, backwater inundation
- Different policy for floodway and flood fringe



http://maps.srd.alberta.ca/FloodHazard/

Inundation Mapping

- Mapped by City (2015)
- Used for citizen information, development advice and emergency response
- 2, 5, 10, 20 35, 50, 75, 100 200, 350, 500, 1000 year

1:100 year inundation map

http://www.calgary.ca/UEP/Water/Pages/Flood-Info/Calgary-flood-maps/Flood-inundation-maps.aspx

Flood Risk Management

Flood Risk Management

Intention:

Prevent incremental risk (safety, property, environmental) by:

- Preventing floodway obstruction
- Ensuring buildings flood-proofed
- Ensuring egress
- Preventing debris and contamination
- Requiring building setbacks (especially floodway)

Flood Risk

What is our risk?

- This is what the City works to understand

- What is the risk of a “1 in 100 year flood”?

  Risk = probability x impact.
  Probability = 1%
  Impact = ?

- Can use a “Damage Model” to try to estimate the impact

- Conversations around risk and costs drive decisions around how much to invest to mitigate

Flood Damage Model

Flood Damage

Direct Damages

Structures & contents affected by floodwaters

Indirect Damages

Displacement
Business interruption
Traffic disruption
Stress
Loss of life
Health effects
Loss of recreation
Loss of community services
Environmental damage

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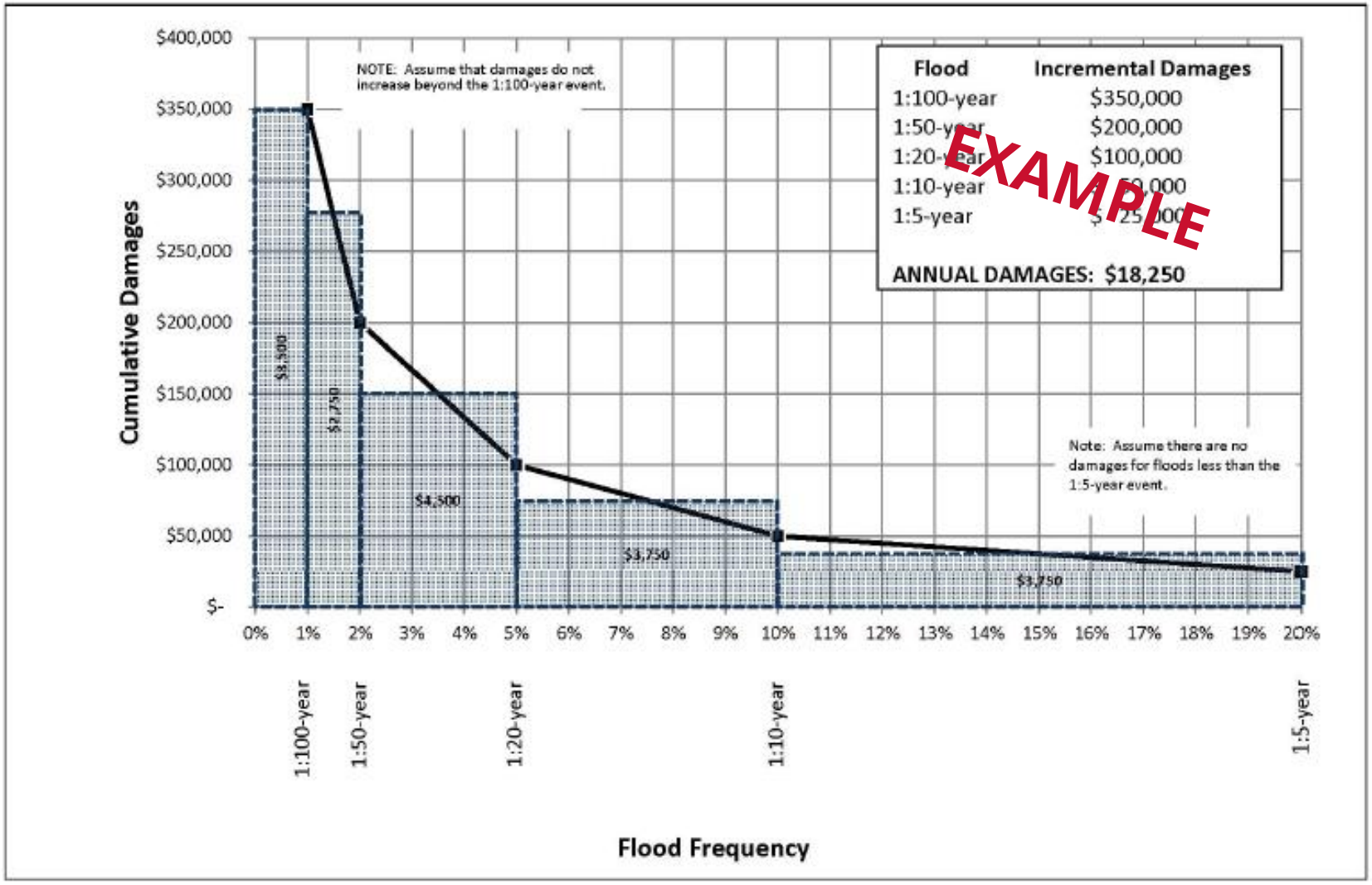
Flood Damage Model

Typical approach:

- Estimate damages for events of various sizes/probabilities
- Sketch a curve of damage vs probability
- The sum-product or area under the curve represents the equivalent annual damage cost

Flood Damage Model
EXAMPLE CURVE



Flood Damage Model

So there's a lot of potential damage - what now?

- Weigh the damages and benefits provided by mitigation measures against the cost of mitigation measures

- Triple Bottom Line (TBL) approach includes:
  - Economic costs and benefits
  - Social costs and benefits
  - Environmental costs and benefits

INTEGRATED WATERSHED MANAGEMENT

Everyone participates in protecting our precious resource of water –
The City, the community and the region

How do the pieces fit together?

Timeframe	City of Calgary	Provincial Government
Short Term (underway or <3 years)	-Emergency response -Education programs -Technical studies -Mapping, modeling -Existing land use policies -Local barriers	-Operations of reservoirs (e.g. Agreement with Transalta) -Flood Hazard Mapping
Medium Term (4-10 years)	-Glenmore Gates -Bonnybrook berm -Fish compensation -Local barriers -Land use policies	-Flood Insurance policy changes -Building Code amendments -National flood policy -Provincial flood policy
Long Term 10+ years	-Land use policies and planning -Local Barriers -Future measures	-Springbank Off-Stream Reservoir -Upstream storage on the Bow

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BRWG

Flood Mitigation Measures

Mitigation Planning and Implementation:

Taking the time to make sure we do the right things, do things right, and end up with holistic and sustainable solutions

Completing projects that will have benefit no matter what else gets done, as we get funding