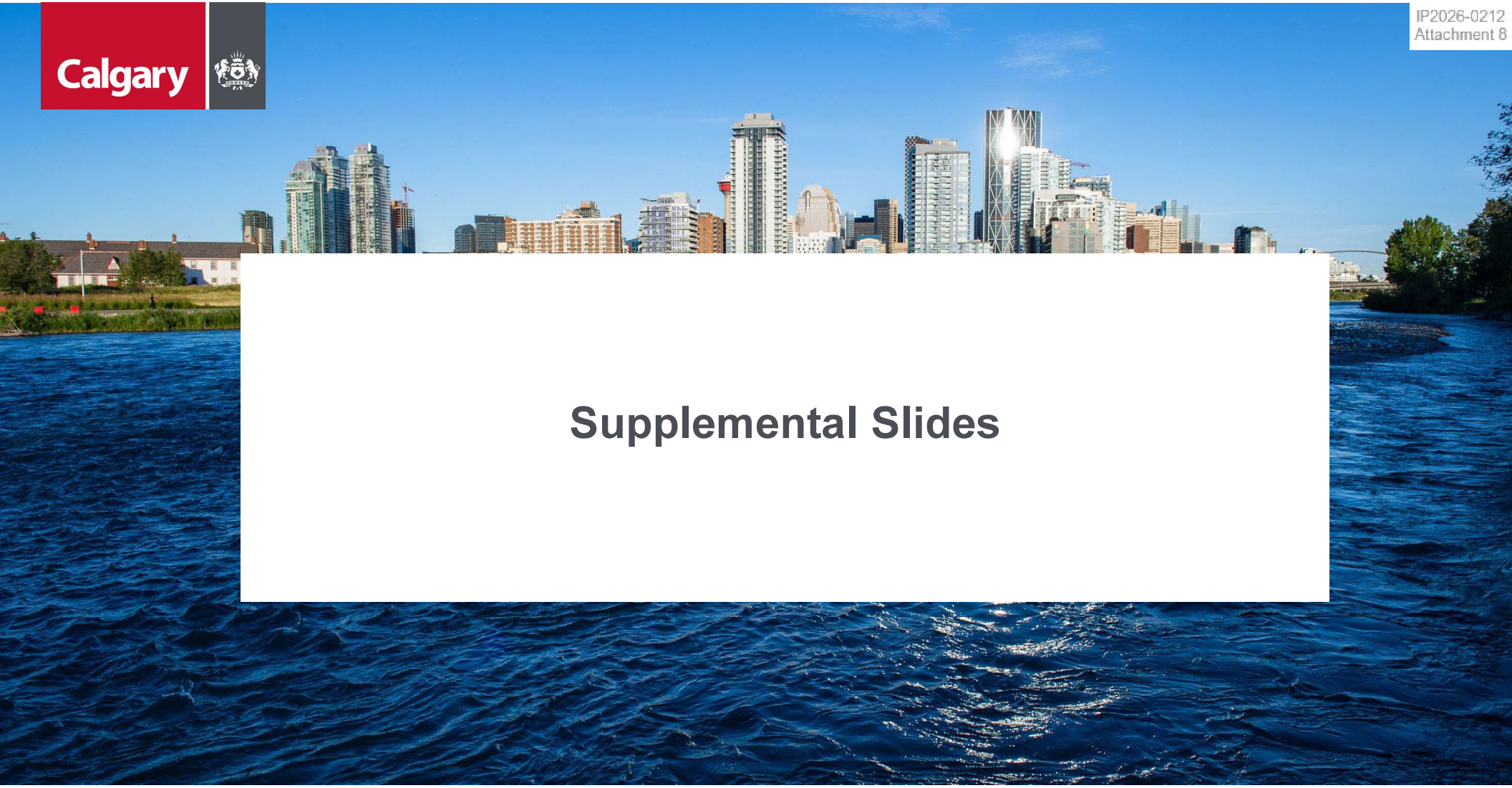


Supplemental Slides

Calgary – Flood Resilience Timeline

1983
First Flood Hazard Maps
First Land Use Bylaw Regulations

1996
Minor FHA Map Updates

2005 + 2013
Flood Events

2014
Land Use Bylaw Update

2015
New Innundation Maps

2016
Expert Management Panel Report

2017
Flood Resilience Plan Approved by Council

FLOOD RESILIENCE PLAN IMPLEMENTATION

- Ghost Agreement
- Springbank Reservoir
- Glenmore Dam Upgrades
- Restoration & Bioengineering
- Annual Flood Preparedness
- Sunnyside Flood Barrier
- Montgomery Flood Barrier
- Downtown Flood Barrier
- Heritage Flood Barrier
- West Eau Claire Flood Barrier
- Zoo Flood Barrier

2020
Updated Innundation Maps

2025
Updated Provincial Flood Hazard Maps
New City Groundwater Map

2026
Flood Resilience Land Use Bylaw Update

RIVER VALLEY & FLOOD POLICY

Broad direction for the conservation, use and development in Calgary's rivers and creeks including areas impacted by flooding.
Underway: Calgary Plan

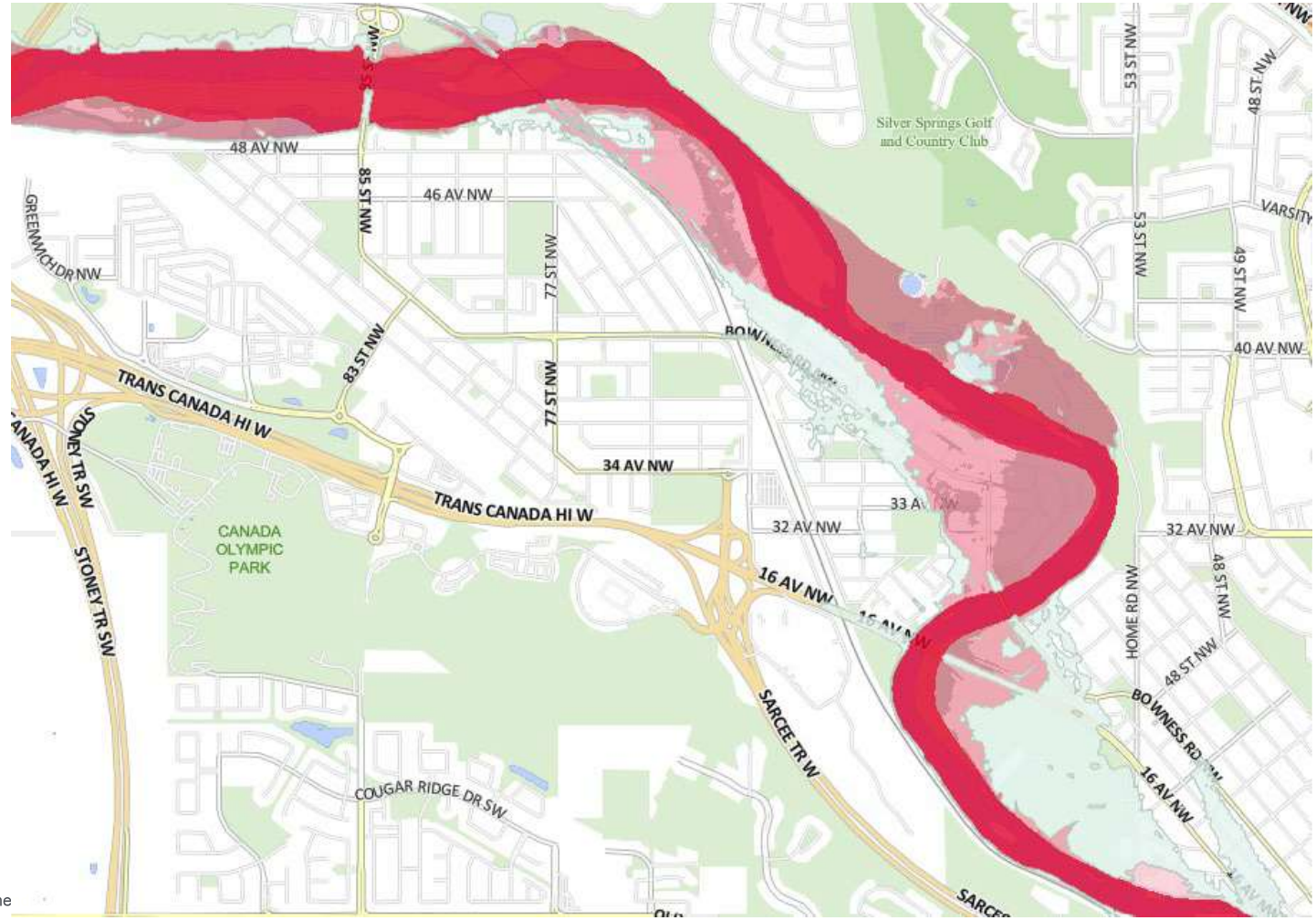
FLOOD RESILIENCE REGULATION

Implement direction for areas impacted by flooding through amendments to the Land Use Bylaw.
Complete: Land Use Bylaw Amendments
Underway: Zoning Bylaw

ECOLOGICAL AND CONSERVATION OUTCOMES

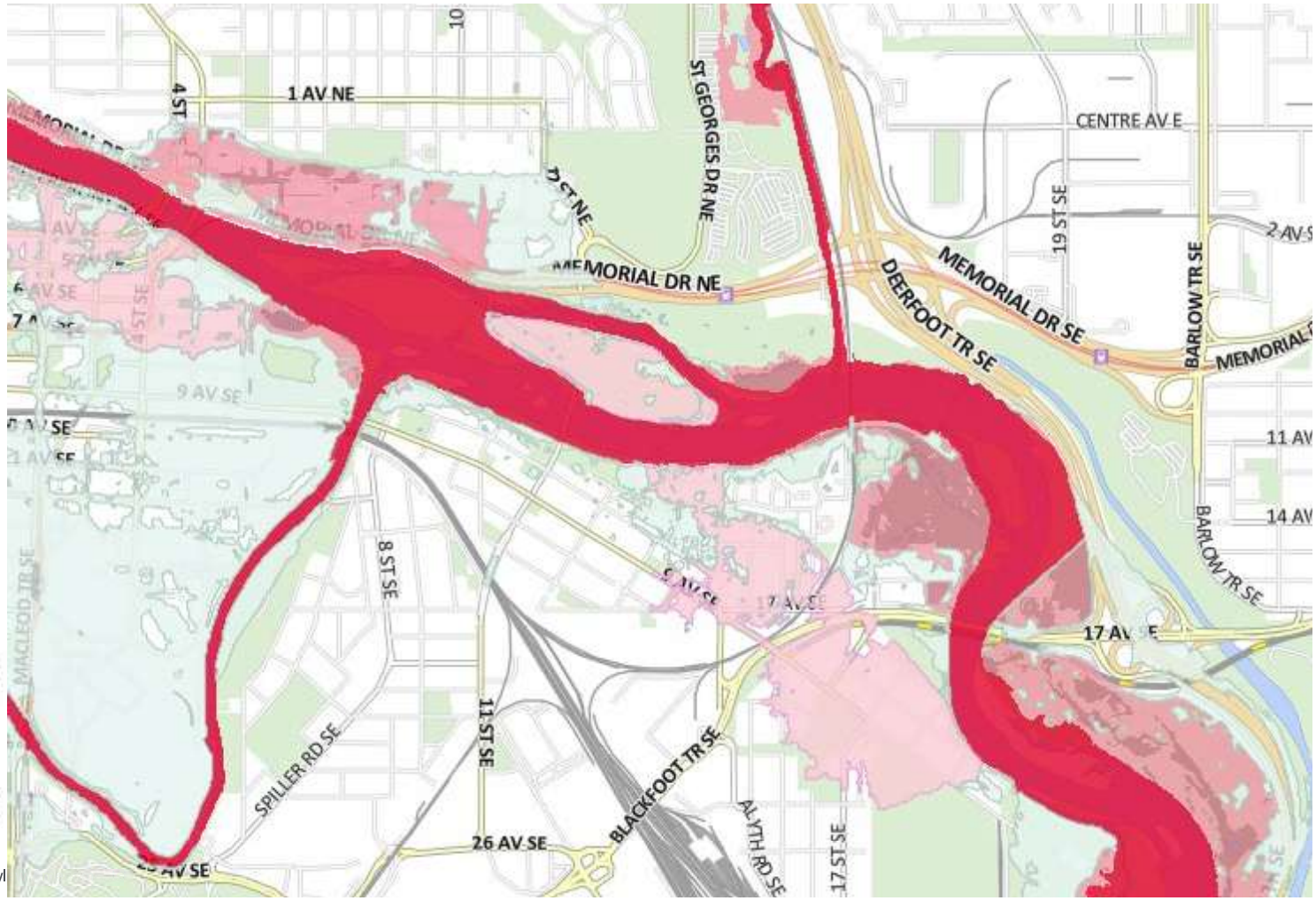
Implement direction for conservation and protection of river valleys and creeks.
To come: Environmental Reserve Guideline Updates

Proposed River Flood Map –Upper Bow

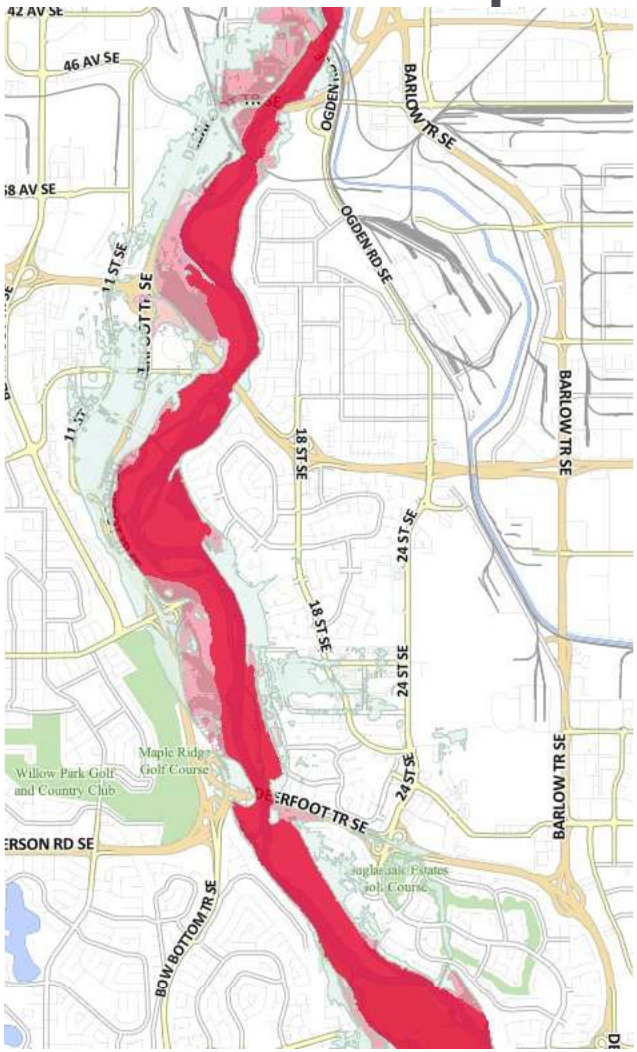


Proposed River Flood Map – Central Bow

Proposed River Flood Map – Central Bow

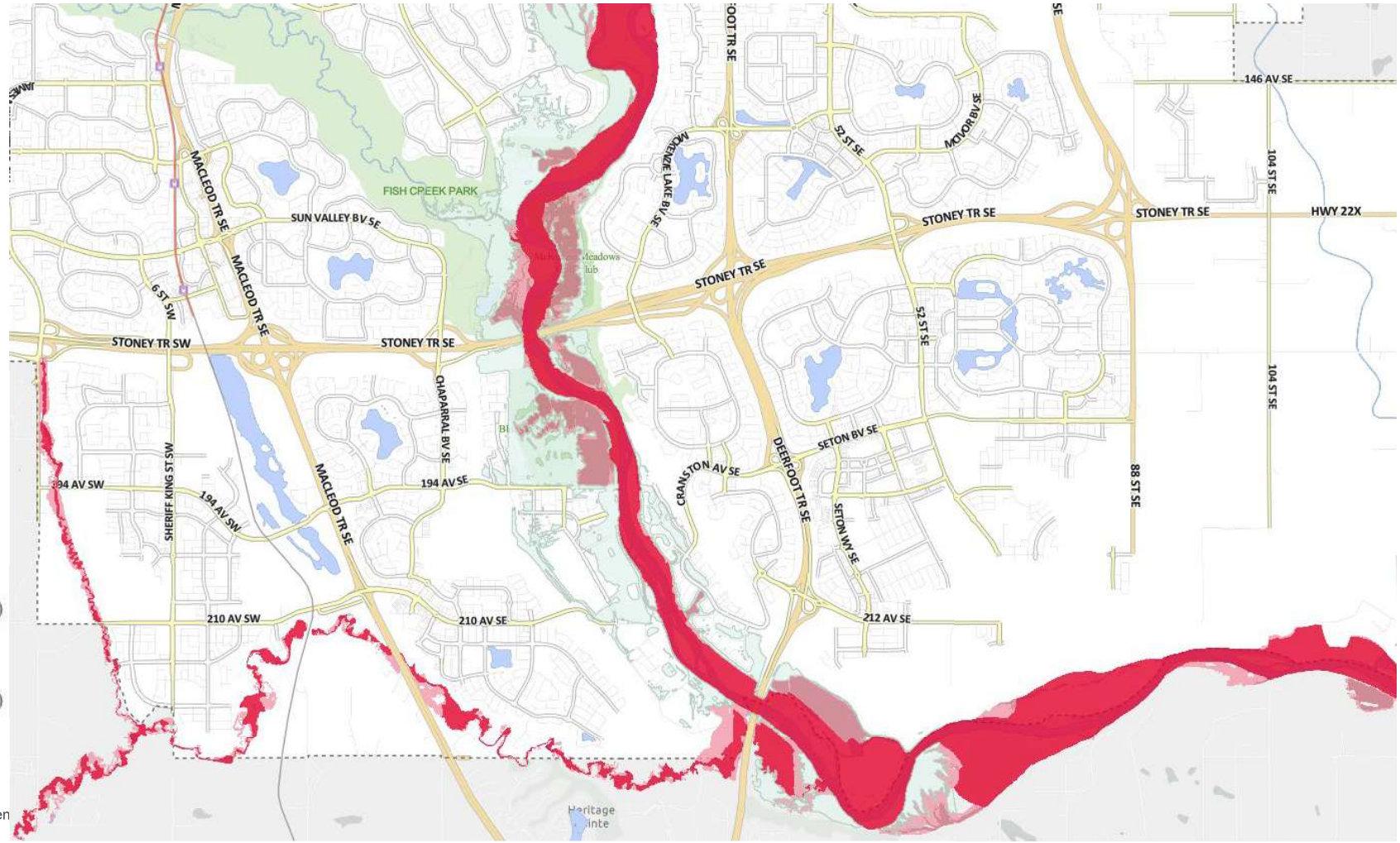


Proposed River Flood Map – Lower Bow



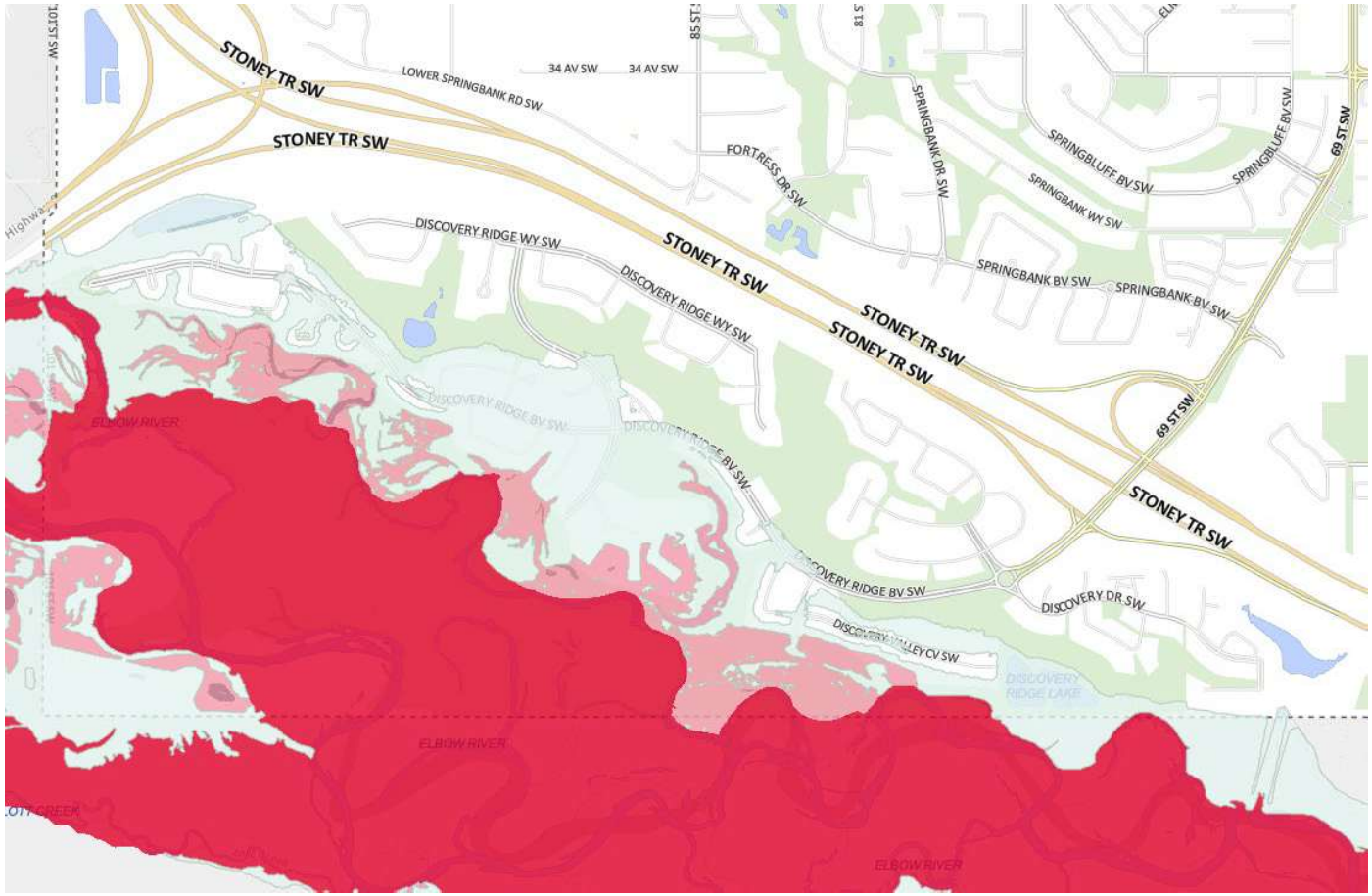
- Floodway
- High Hazard Flood Fringe (New)
- Flood Fringe
- Protected Flood Fringe (New)
- Groundwater Flood Fringe (New)

Proposed River Flood Map – Lower Bow



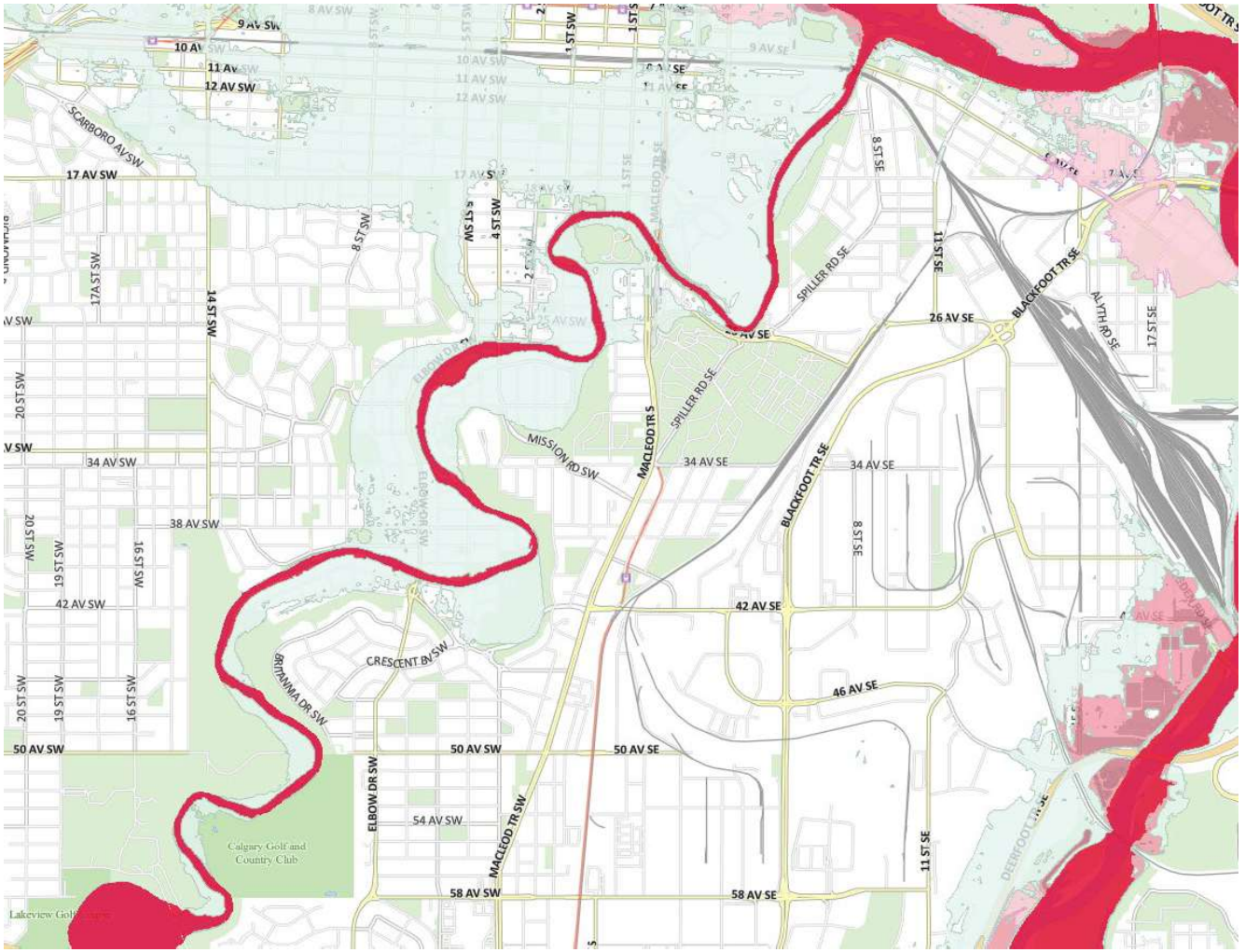
- Floodway
- High Hazard Flood Fringe (New)
- Flood Fringe
- Protected Flood Fringe (New)
- Groundwater Flood Fringe (New)

Proposed River Flood Map – Elbow River

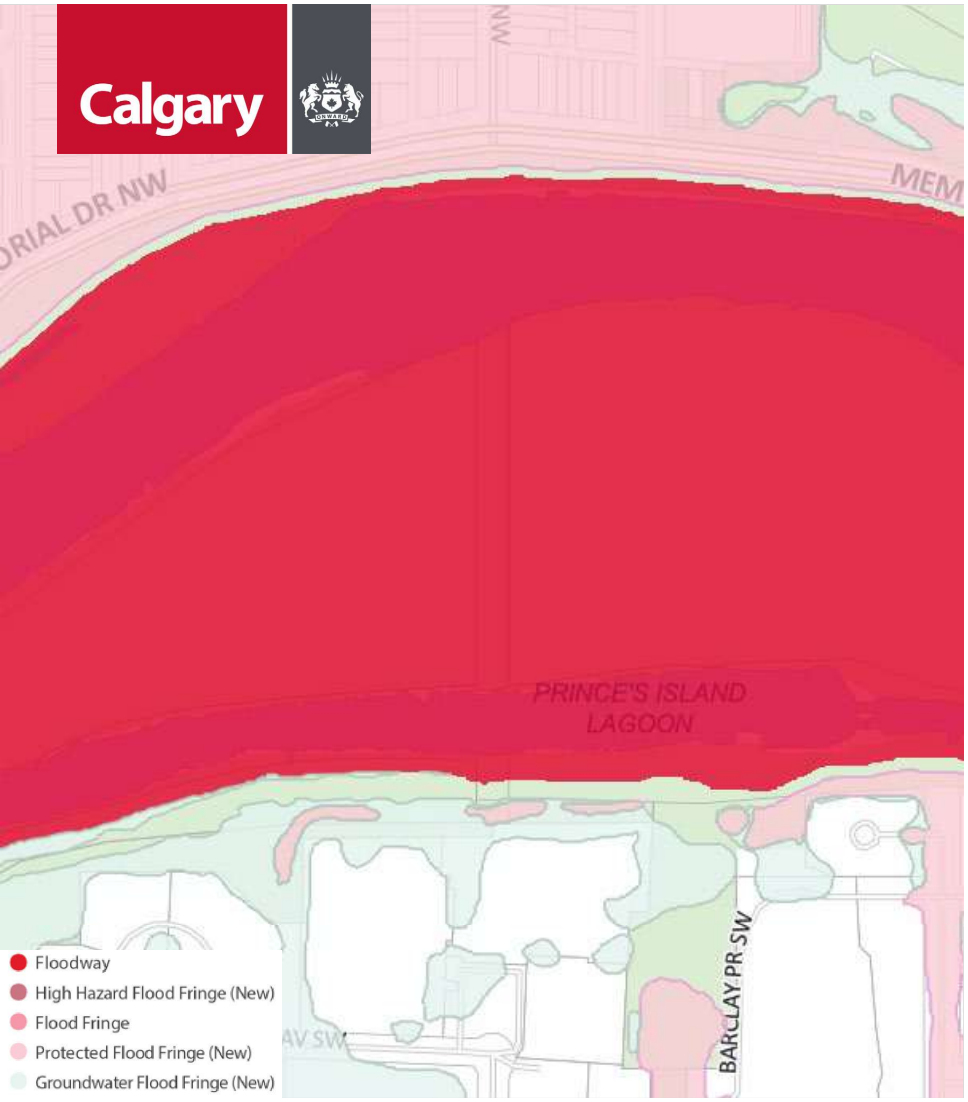


- Floodway
- High Hazard Flood Fringe (New)
- Flood Fringe
- Protected Flood Fringe (New)
- Groundwater Flood Fringe (New)

Proposed River Flood Map – Elbow River



- Floodway
- High Hazard Flood Fringe (New)
- Flood Fringe
- Protected Flood Fringe (New)
- Groundwater Flood Fringe (New)



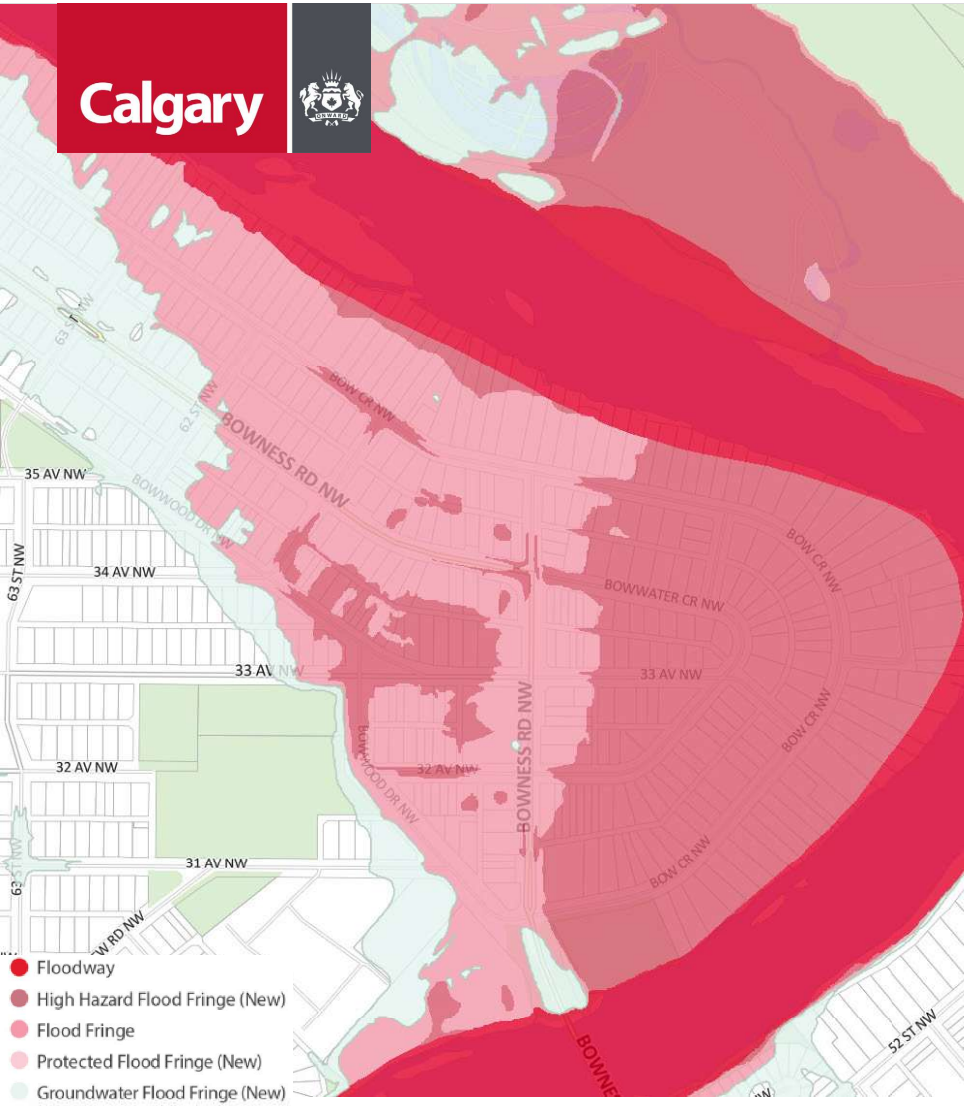
Floodway

FEATURES

- Highest risk area, conveys the deepest and fastest floodwaters
- No new development

PROPOSED AMENDMENTS

- Remains generally unsuitable for development
- Elbow River Floodway smaller / narrower due to upstream reservoir flood control



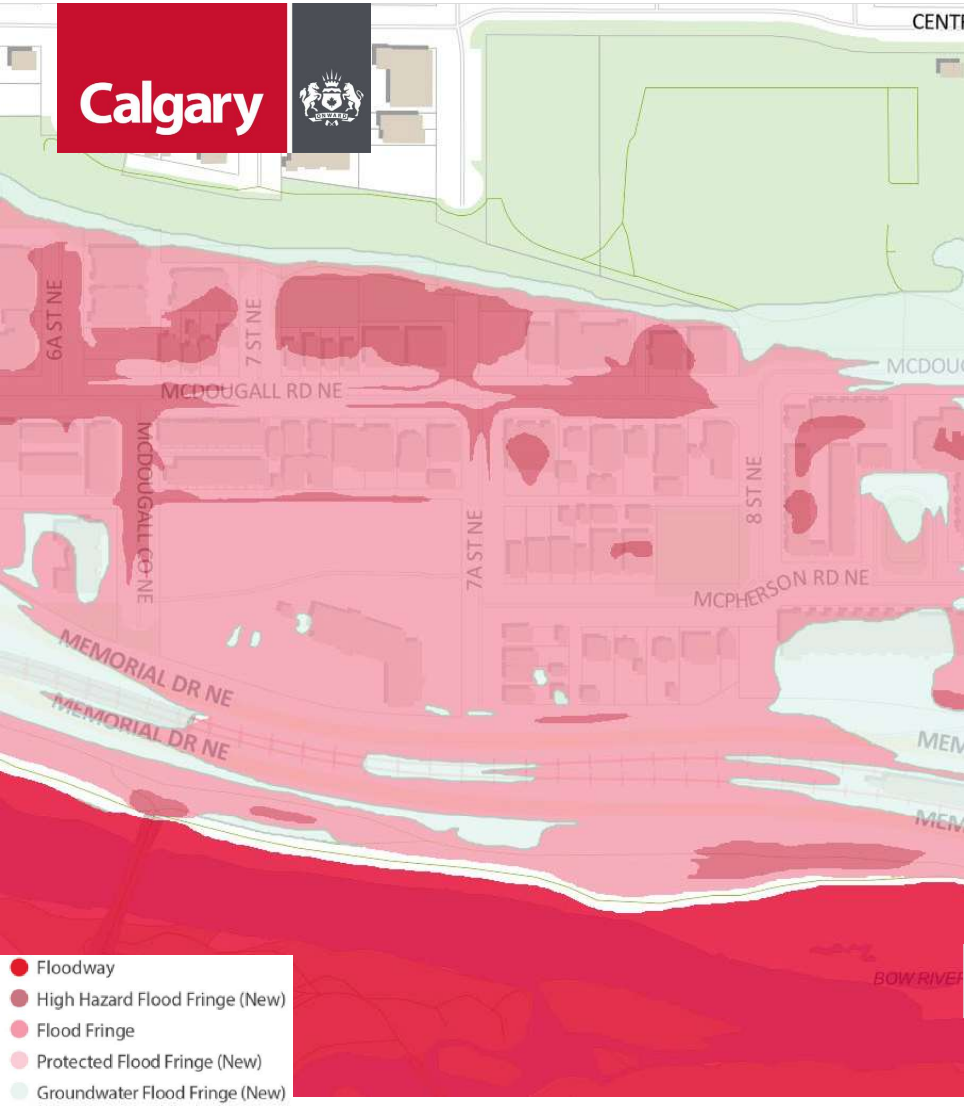
High Hazard Flood Fringe *new*

FEATURES

- Conveys deep and fast flowing water similar to Floodway.
- New area previously identified as Flood Fringe.

PROPOSED AMENDMENTS

- Existing residential buildings may be replaced or added to if on the same building footprint.
- No new living spaces below the flood elevation.
- No additional dwelling units or suites may be added.



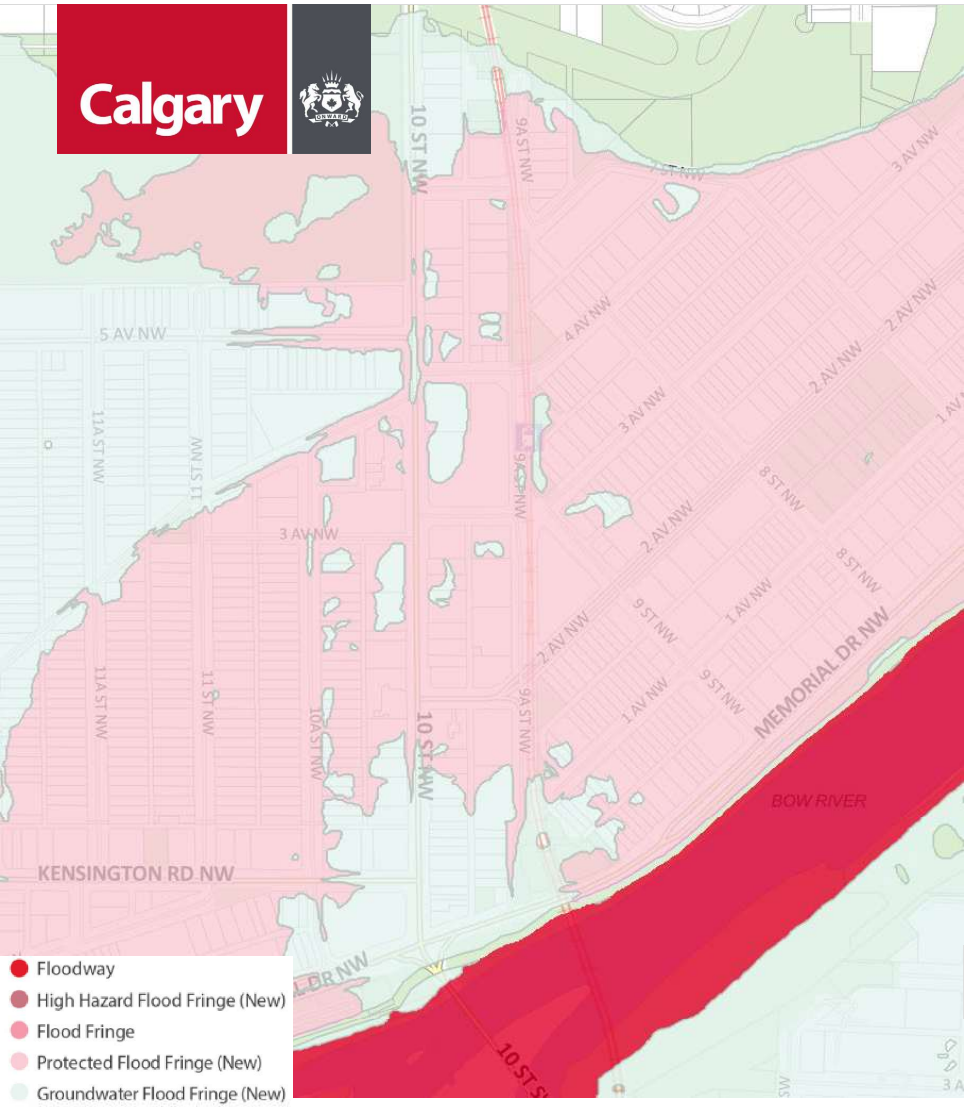
Flood Fringe

FEATURES

- Shallower and slower-moving floodwaters than Floodway
- boundary is smaller due to flood infrastructure and Protected Flood Fringe.

PROPOSED AMENDMENTS

- No new living spaces or suites below the flood elevation.



Protected Flood Fringe *new*

FEATURES

- Areas with dedicated flood mitigation infrastructure designed to at least the 1:100.
- Buildings previously in the Flood Fringe or Overland Flow.

PROPOSED AMENDMENTS

- Designated Flood Elevation (DFE) is based on groundwater elevation.
- Building floodproofing regulations apply

Groundwater Flood Fringe *new*

FEATURES

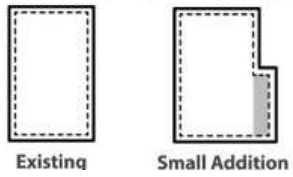
- City-defined area
- River flood related groundwater impact zone
- Covers previous Flood Fringe and Overland Flow Zone, and some additional new area.

PROPOSED AMENDMENTS

- Regulations focus on minimizing property damage from groundwater flooding.
- Designated Flood Elevation (DFE) is based on groundwater elevation.
- Building floodproofing regulations apply

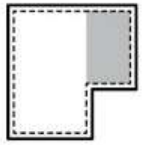
Building floodproofing regulations are scaled to acknowledge existing buildings

Small or no footprint change



No requirements

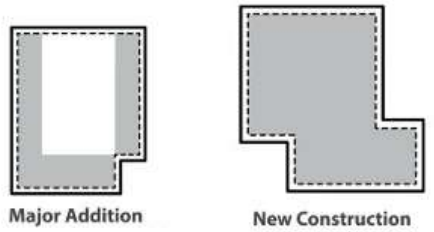
Moderate addition



Modified regulations

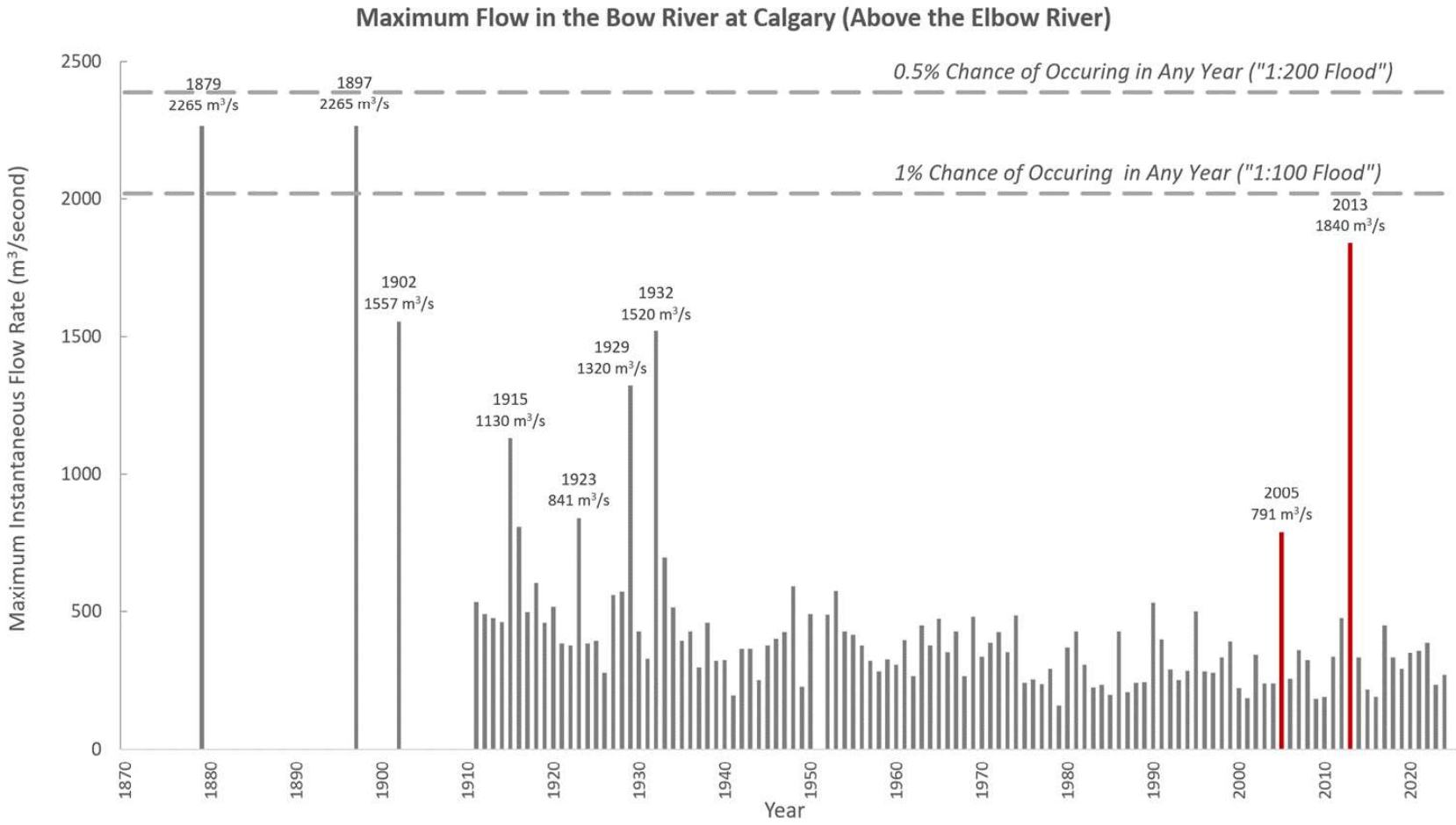
- sewer backflow valve
- Main electrical service disconnect above designated flood elevation

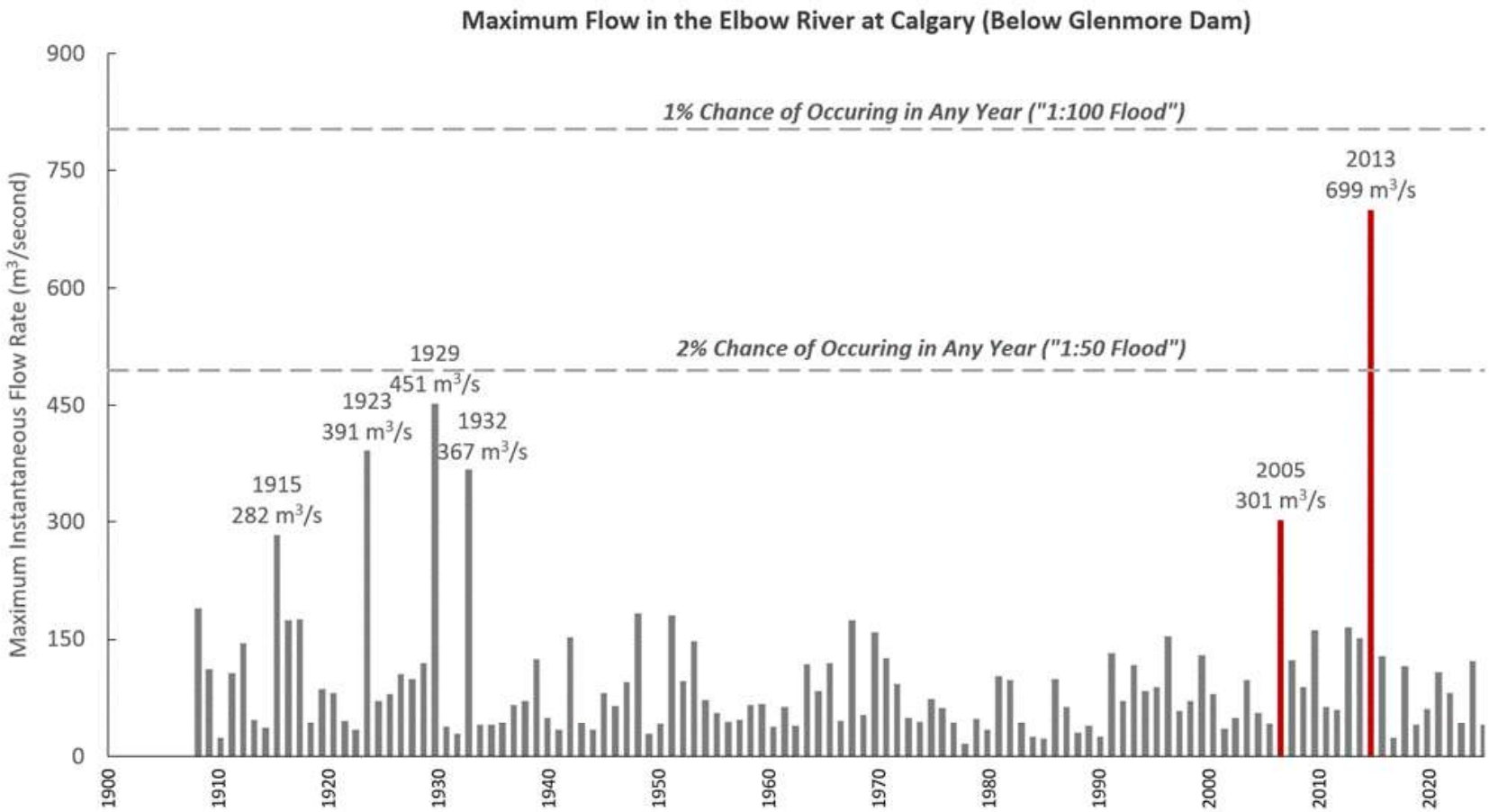
Major addition or new construction



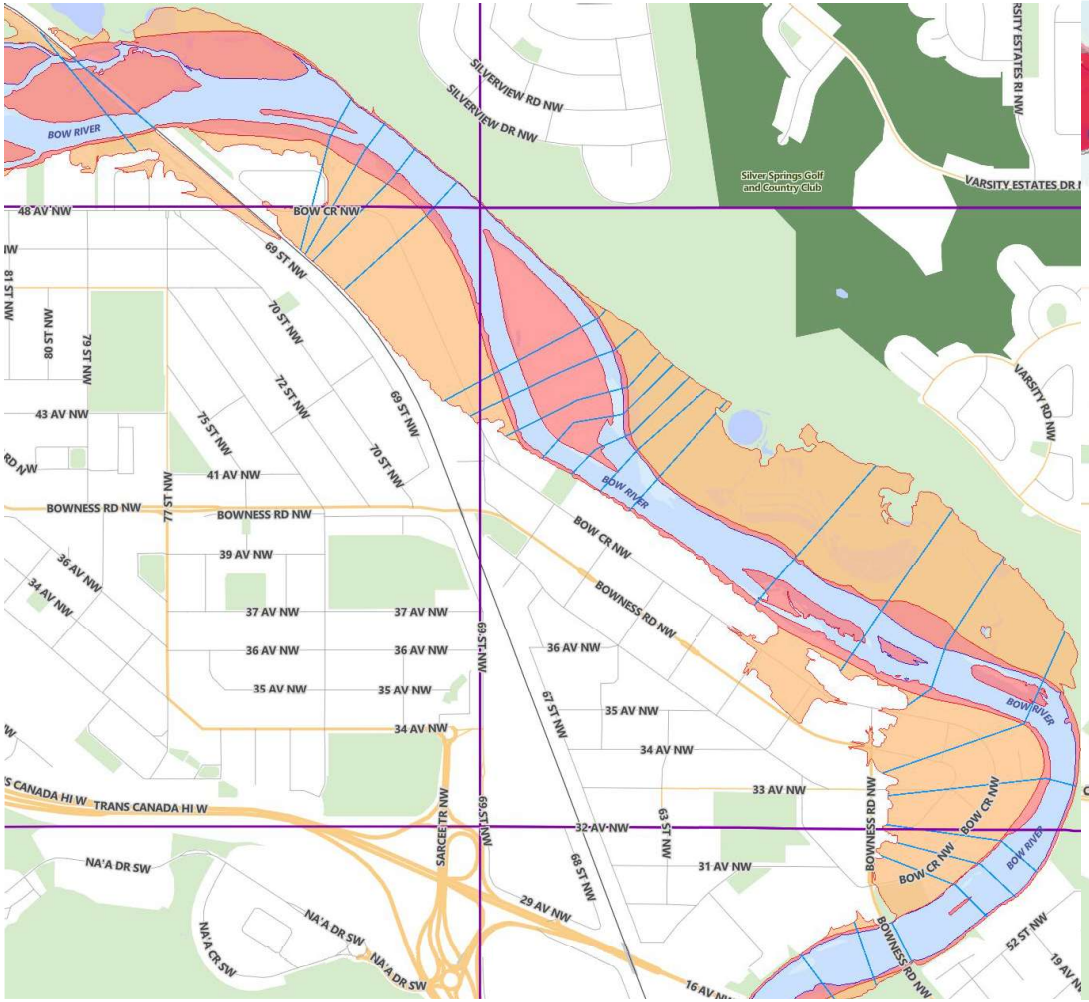
Full floodproofing regulations

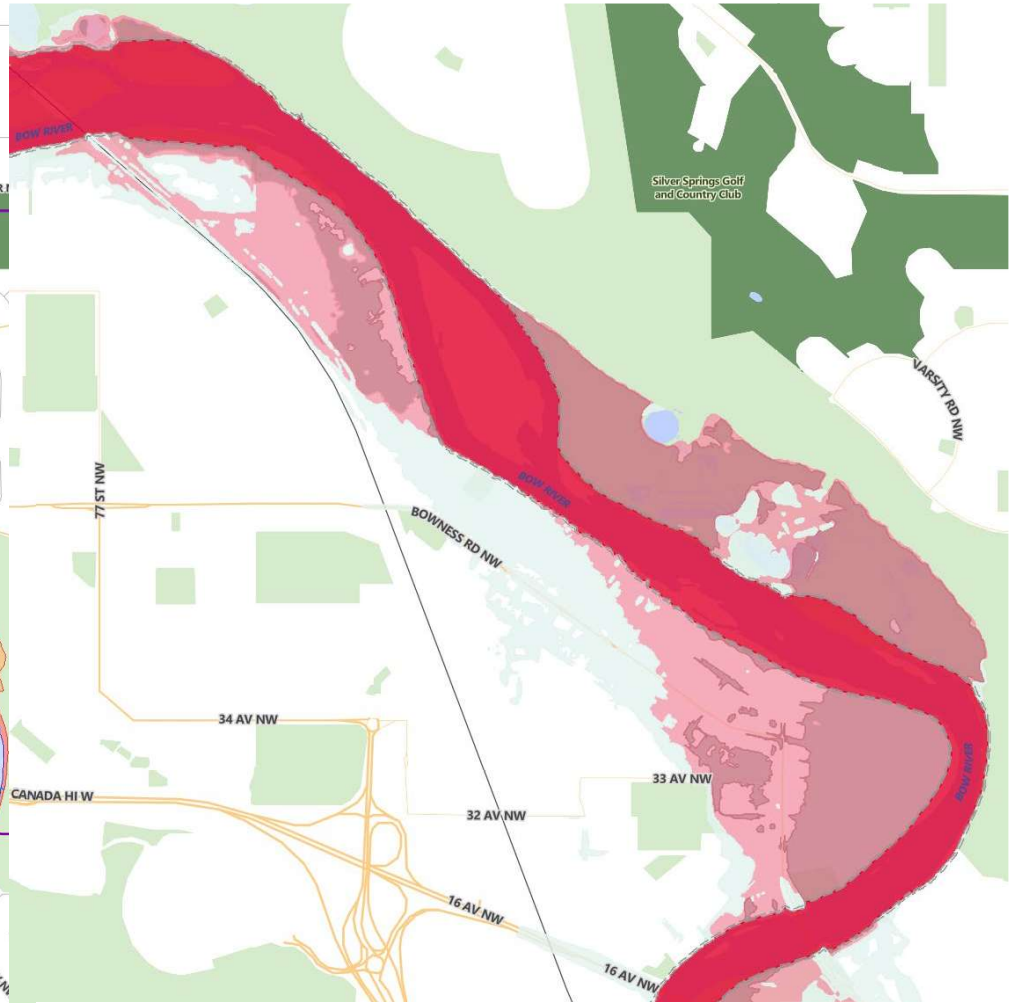
- Construct first floor above flood elevation
- Windows, doors and building penetrations at flood-safe levels
- Sewer backflow valve, sump pumps and water alarms
- Main electrical service disconnect above designated flood elevation.
- Design building area below flood elevation to prevent structural damage from floodwaters


Maximum Flow in the Bow River at Calgary (Above the Elbow River)
0.5% Chance of Occuring in Any Year ("1:200 Flood")
1% Chance of Occuring in Any Year ("1:100 Flood")
1879
2265 m³/s
1897
2265 m³/s
1902
1557 m³/s
1915
1130 m³/s
1923
841 m³/s
1929
1320 m³/s
1932
1520 m³/s
2005
791 m³/s
2013
1840 m³/s
Maximum Instantaneous Flow Rate (m³/second)
2500
2000
1500
1000
500
0
1870
1880
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
2020
Year

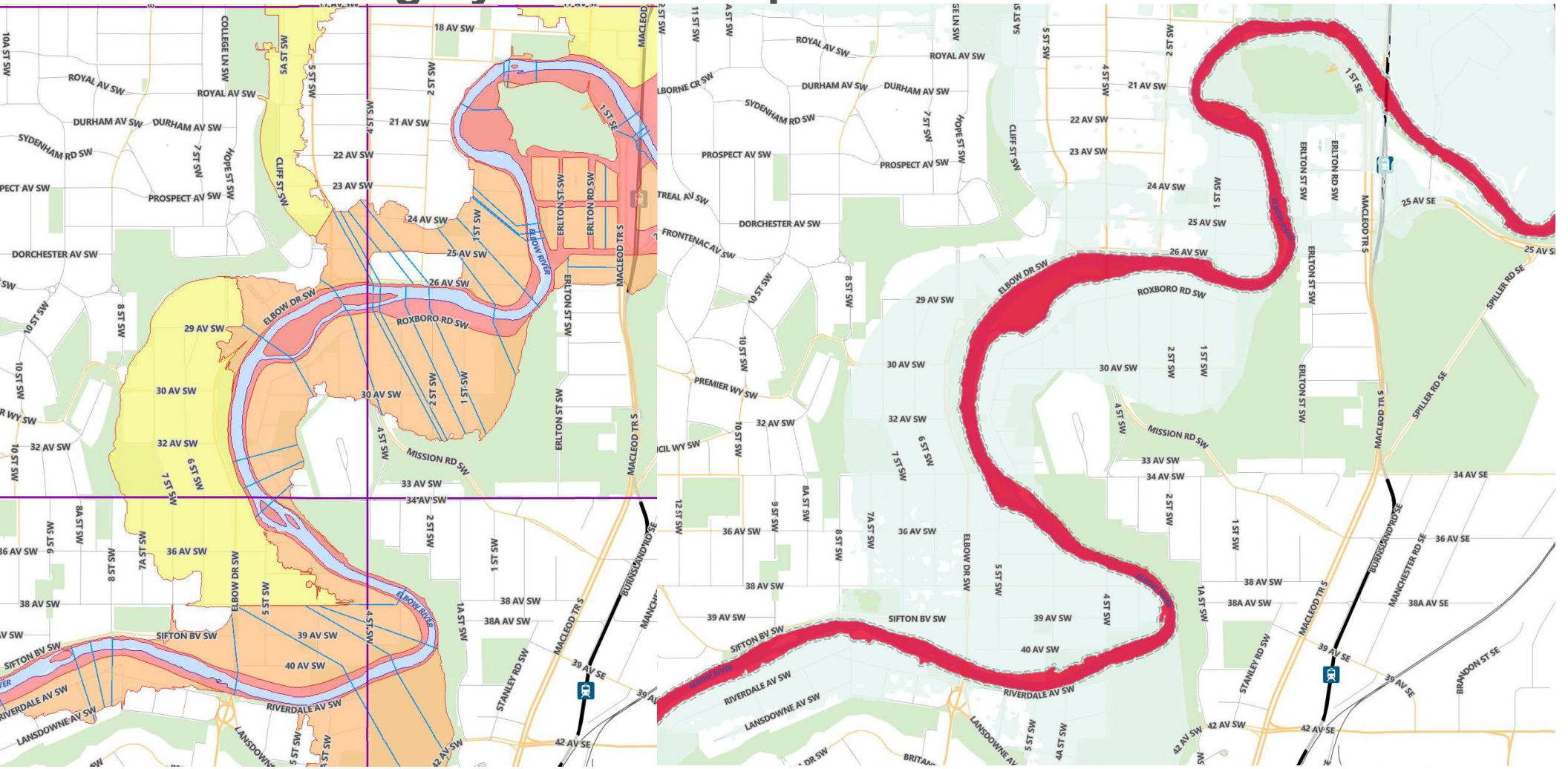

Maximum Flow in the Elbow River at Calgary (Below Glenmore Dam)
Maximum Instantaneous Flow Rate (m³/second)
900
750
600
450
300
150
0
1% Chance of Occuring in Any Year ("1:100 Flood")
2% Chance of Occuring in Any Year ("1:50 Flood")
2013
699 m³/s
1929
451 m³/s
1923
391 m³/s
1932
367 m³/s
1915
282 m³/s
2005
301 m³/s
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
2020

Calgary – Flood Maps

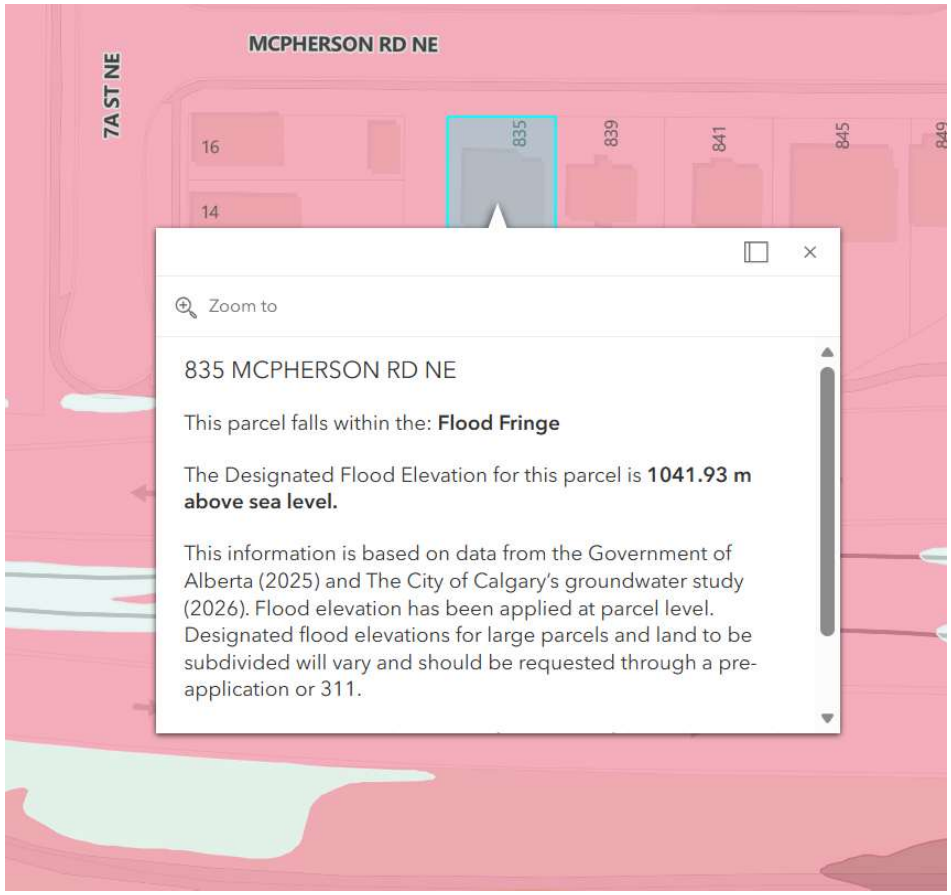




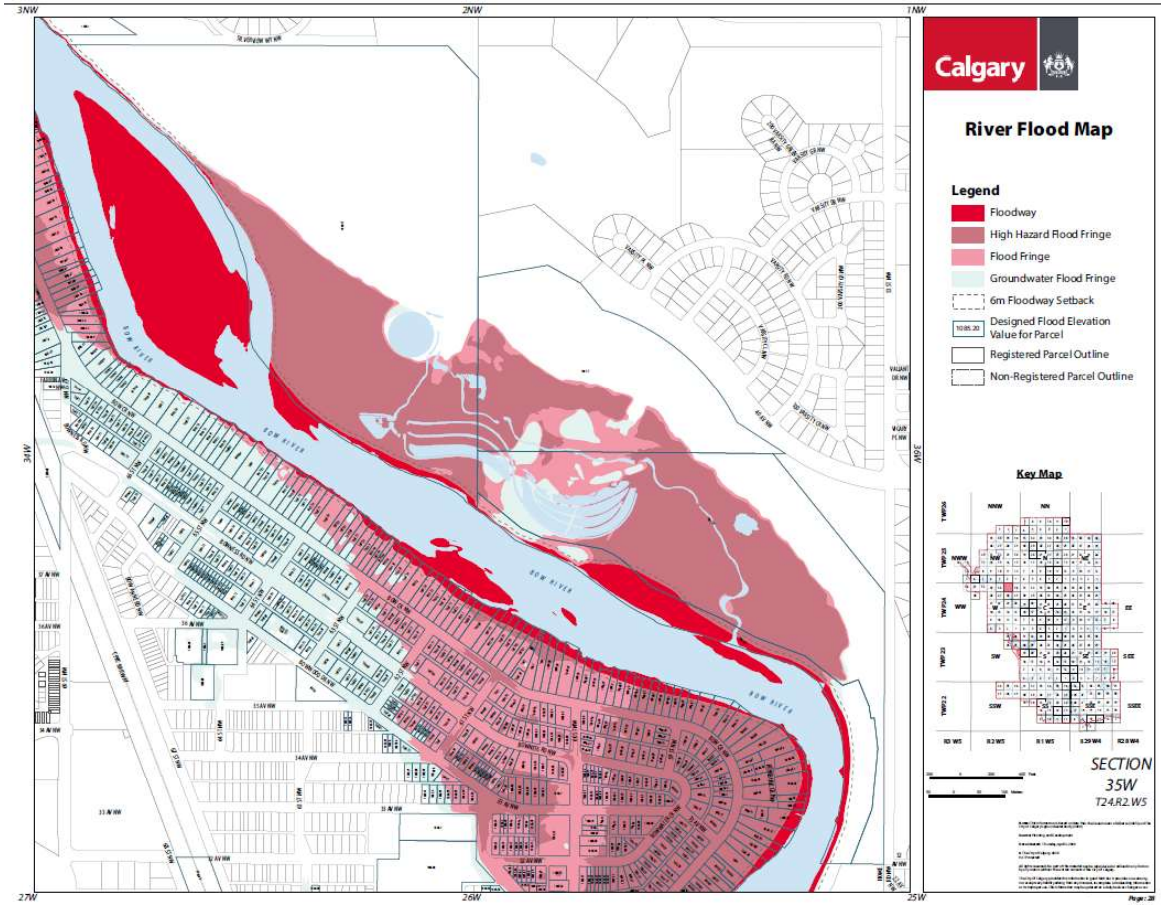
Calgary – Flood Maps

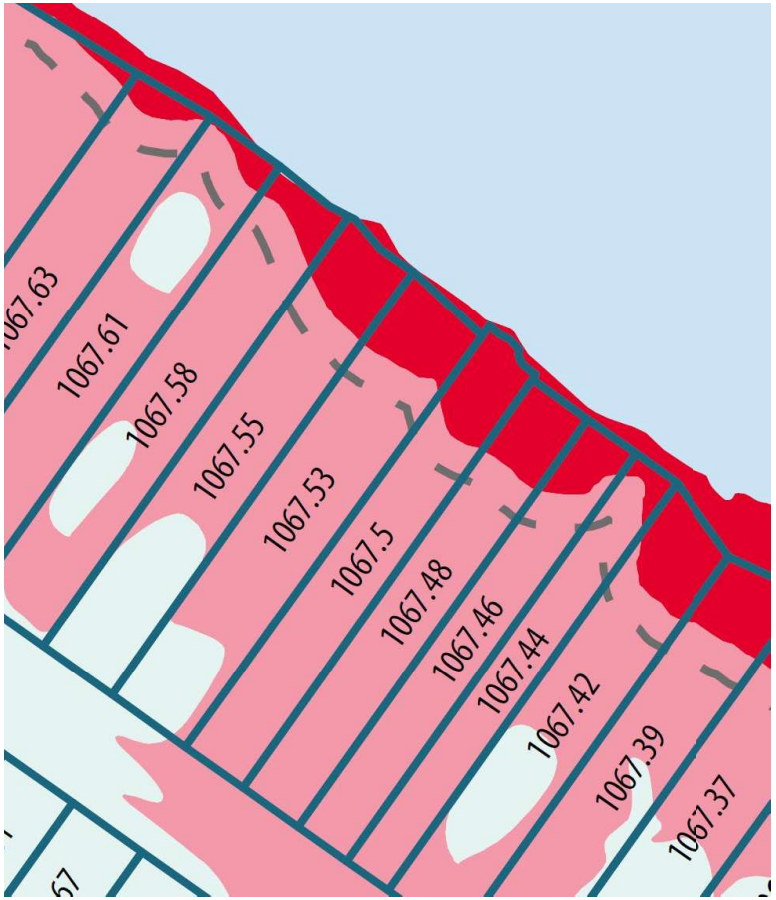


Calgary – Interactive Online Flood Map

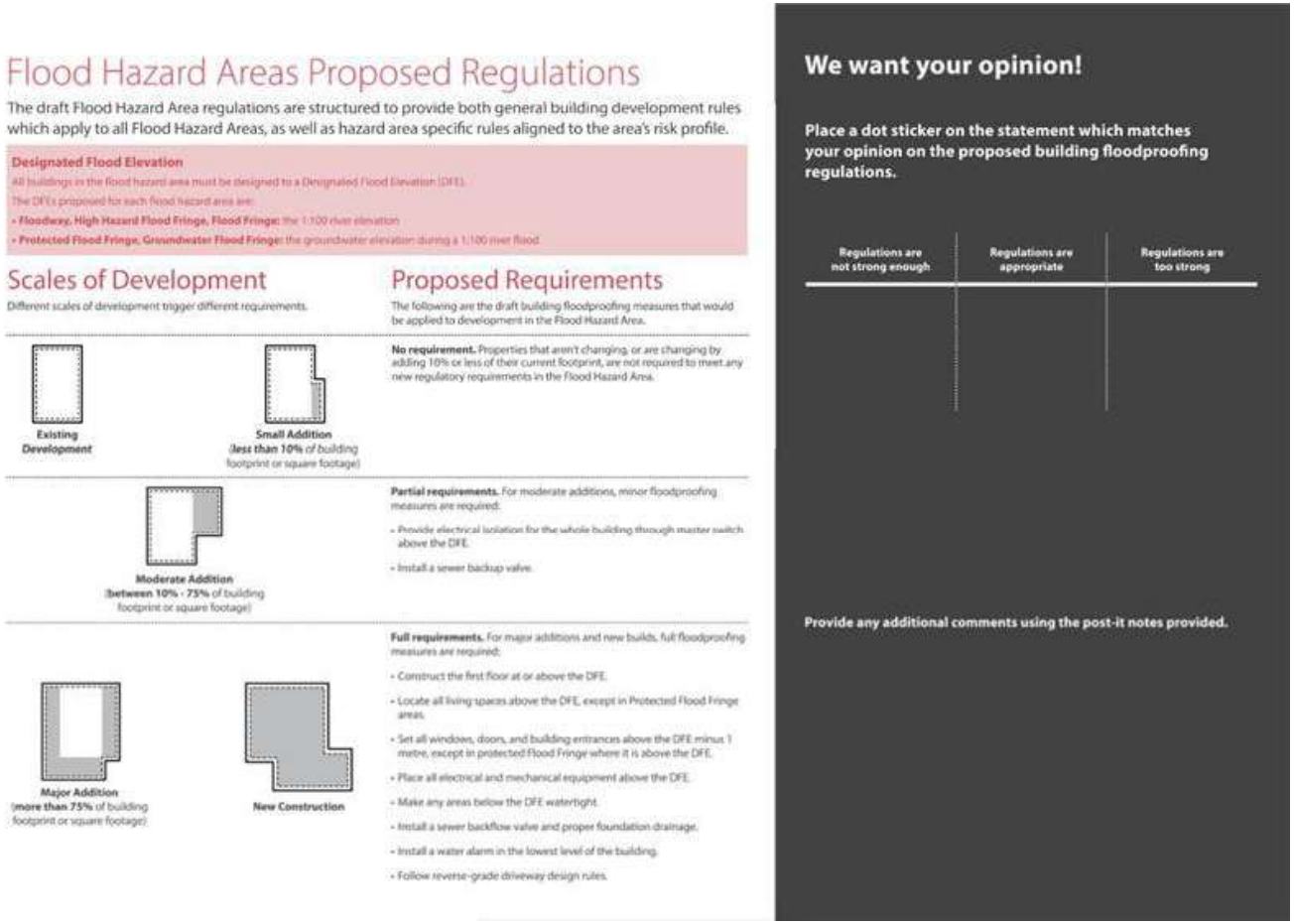


Land Use Bylaw Calgary Flood Map





Stage 3 Engagement Proposed Regulations



Flood Hazard Areas Proposed Regulations

The draft Flood Hazard Area regulations are structured to provide both general building development rules which apply to all Flood Hazard Areas, as well as hazard area specific rules aligned to the area's risk profile.

Designated Flood Elevation

All buildings in the flood hazard area must be designed to a Designated Flood Elevation (DFE).

The DFEs proposed for each flood hazard area are:

- **Floodway, High Hazard Flood Fringe, Flood Fringe:** the 1:100 river elevation
- **Protected Flood Fringe, Groundwater Flood Fringe:** the groundwater elevation during a 1:100 river flood

Scales of Development

Different scales of development trigger different requirements.

Existing Development

Small Addition (**less than 10%** of building footprint or square footage)

Moderate Addition (**between 10% - 75%** of building footprint or square footage)

Major Addition (**more than 75%** of building footprint or square footage)

New Construction

Proposed Requirements

The following are the draft building floodproofing measures that would be applied to development in the Flood Hazard Area.

No requirement. Properties that aren't changing, or are changing by adding 10% or less of their current footprint, are not required to meet any new regulatory requirements in the Flood Hazard Area.

Partial requirements. For moderate additions, minor floodproofing measures are required:

- Provide electrical isolation for the whole building through master switch above the DFE.
- Install a sewer backup valve.

Full requirements. For major additions and new builds, full floodproofing measures are required:

- Construct the first floor at or above the DFE.
- Locate all living spaces above the DFE, except in Protected Flood Fringe areas.
- Set all windows, doors, and building entrances above the DFE minus 1 metre, except in protected Flood Fringe where it is above the DFE.
- Place all electrical and mechanical equipment above the DFE.
- Make any areas below the DFE watertight.
- Install a sewer backflow valve and proper foundation drainage.
- Install a water alarm in the lowest level of the building.
- Follow reverse-grade driveway design rules.

We want your opinion!

Place a dot sticker on the statement which matches your opinion on the proposed building floodproofing regulations.

Regulations are not strong enough	Regulations are appropriate	Regulations are too strong

Provide any additional comments using the post-it notes provided.

Stage 3 Engagement Proposed Regulations

Flood Hazard Area Proposed Regulations

Hazard Area Specific Regulations

In addition to the general building development rules, other rules may apply based on the specific hazard area you are in. These rules are provided below by hazard area. If your property is partially located in the Floodway, High Hazard Flood Fringe, Flood Fringe, Protected Flood Fringe or Groundwater Flood Fringe, or is located in multiple regulatory flood areas, the regulations for the most restrictive area in which the building is located will apply.

Floodway Overview

What is the Floodway?

The Floodway is the river channel and some of the land next to the river.

- Floodways carry the bulk of the floodwater, at higher speeds and greater depth than anywhere else in the floodplain.
- This is the highest risk flood hazard zone and is generally unsuitable for buildings and development.

Where is the Floodway?

The Floodway boundary in Calgary is not changing substantially in the draft updated Provincial flood map.

- The Floodway includes some properties with buildings built before our first floodplain map, and parks and open spaces.

Proposed Regulations

New buildings or structures cannot be built in the Floodway.

Additions are permitted only if it does not increase the building footprint and does not increase the obstruction to the floodwaters.

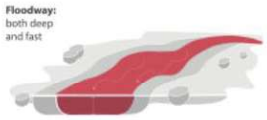
A Floodway must not be altered, and no buildings or structures are allowed to be constructed on, in or under a Floodway.

No new living spaces are allowed below the DFE.

Nothing must be stored outside of a building.

New development is not permitted within 6 metres of the Floodway.

The proposed Floodway DFE is the 1:100 river elevation.



We want your opinion!

Place a dot sticker in the category that matches your opinion on the proposed floodway regulations, or leave a sticky note below with your feedback.

Regulations are too strong	Regulations are appropriate	Regulations are not strong enough

High Hazard Flood Fringe Overview

What is the High Hazard Flood Fringe?

There are two types of High Hazard Flood Fringe areas: Deep floodwaters (typically small 'pockets' within the Flood Fringe) OR Both fast and deep floodwaters (mostly continuous bands of High Hazard Areas along the Floodway).

When the High Hazard Flood Fringe is both fast and deep, it is the second highest flood risk category after Floodway. In some cases, High Hazard Flood Fringe areas show up as pockets surrounded entirely by Flood Fringe. These pockets typically indicate water depth, rather than water speed. Depending on the case, The City may consider regulating these pockets as Flood Fringe.

Where is the High Hazard Flood Fringe?

- Some High Hazard Flood Fringe areas will shift to lower risk categories over the next few years as flood mitigation measures are completed (i.e., the Sunnyside Flood Barrier)
- High Hazard Flood Fringe will remain in: **Bowness | Areas along the Bow River downstream of the Elbow River confluence**

Proposed Regulations

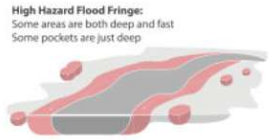
New buildings or structures cannot be built in the High Hazard Flood Fringe, except:

- When replacing an existing accessory building, backyard suite, duplex dwelling, secondary suite, semi-detached dwelling or single detached dwelling
- Is a legally existing structure used for an acceptable non-residential use, such as outdoor recreation or park space; AND
- If it does not increase the building footprint and does not increase the obstruction to the floodwaters.

The maximum number of units or suites allowed on a parcel is equal to the number of units or suites legally existing or approved prior to the adoption of the Bylaw.

No new living spaces are allowed below the DFE.

The proposed High Hazard Flood Fringe DFE is the 1:100 river elevation.



We want your opinion!

Place a dot sticker in the category that matches your opinion on the proposed high hazard flood fringe regulations, or leave a sticky note below with your feedback.

Regulations are too strong	Regulations are appropriate	Regulations are not strong enough