

# PHASE ONE MAPS-ELBOW RIVER

## RIPARIAN AREAS MAPPING PROJECT FOR THE CITY OF CALGARY

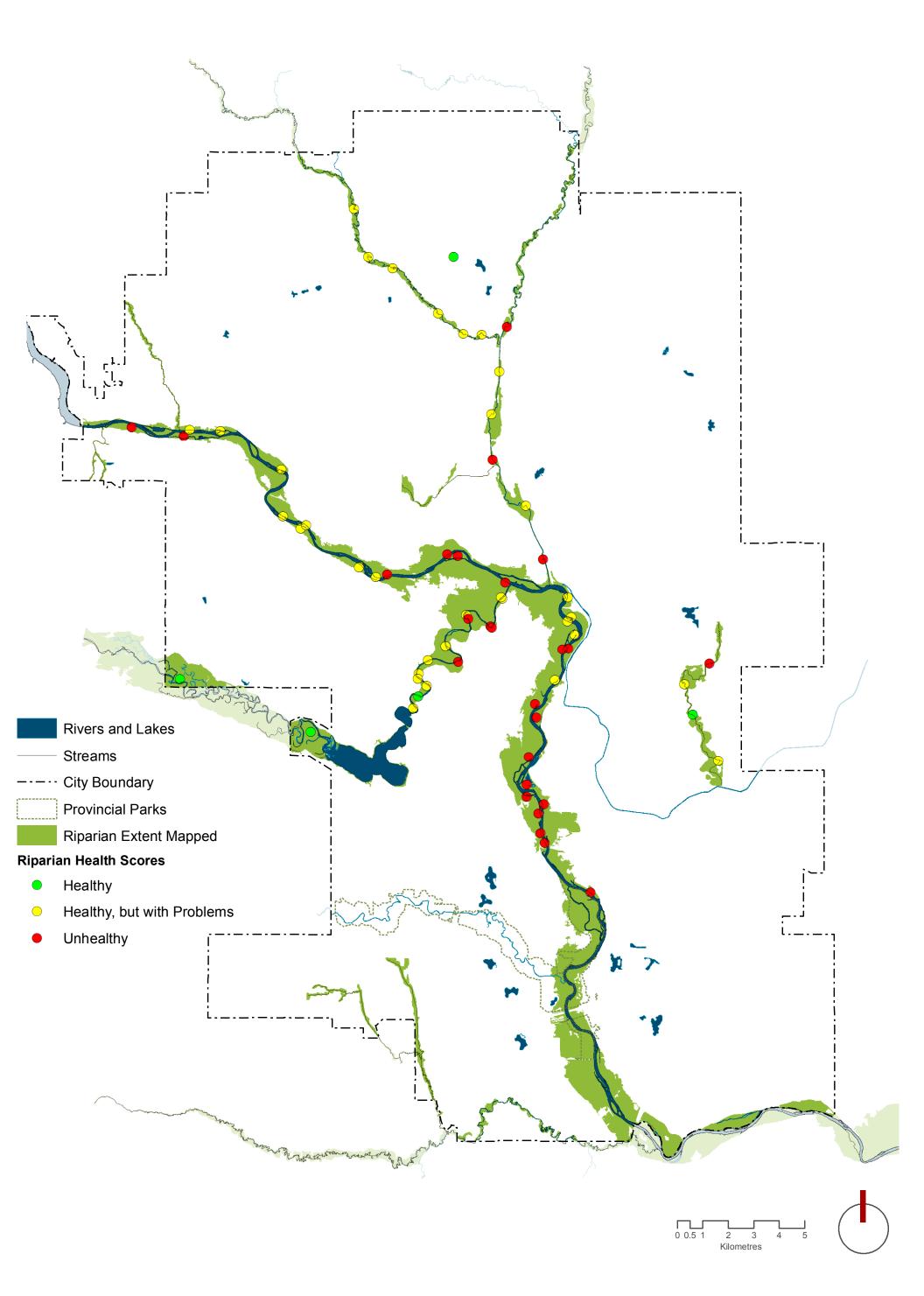
Prepared by: O2 Planning + Design Inc. with The Alberta Riparian Habitat Management Society (Cows and Fish)

Submitted to: The City of Calgary Water Resources

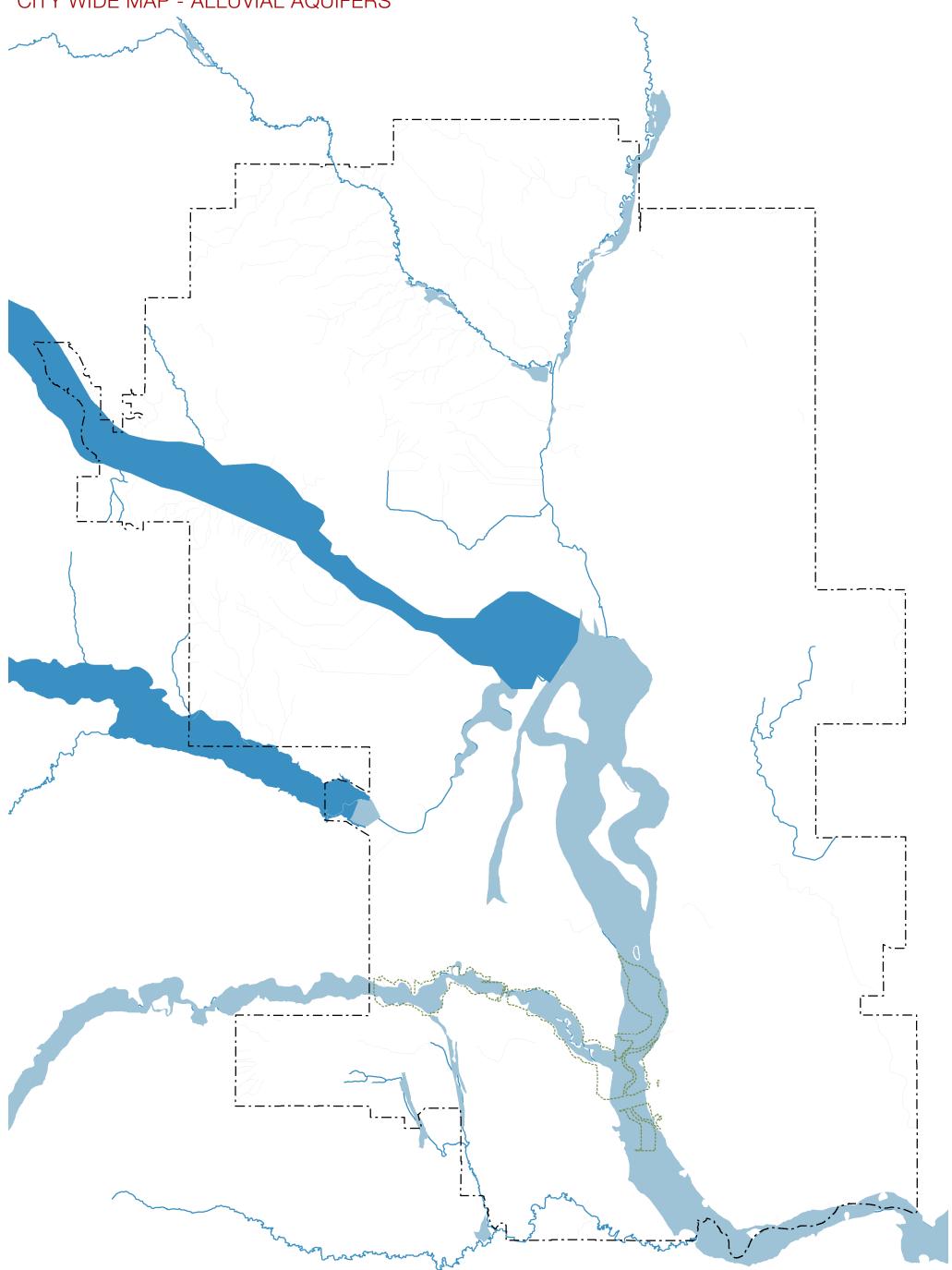
October 19 | 2012



## CITY WIDE MAP - RIPARIAN LOCATION AND FUNCTION



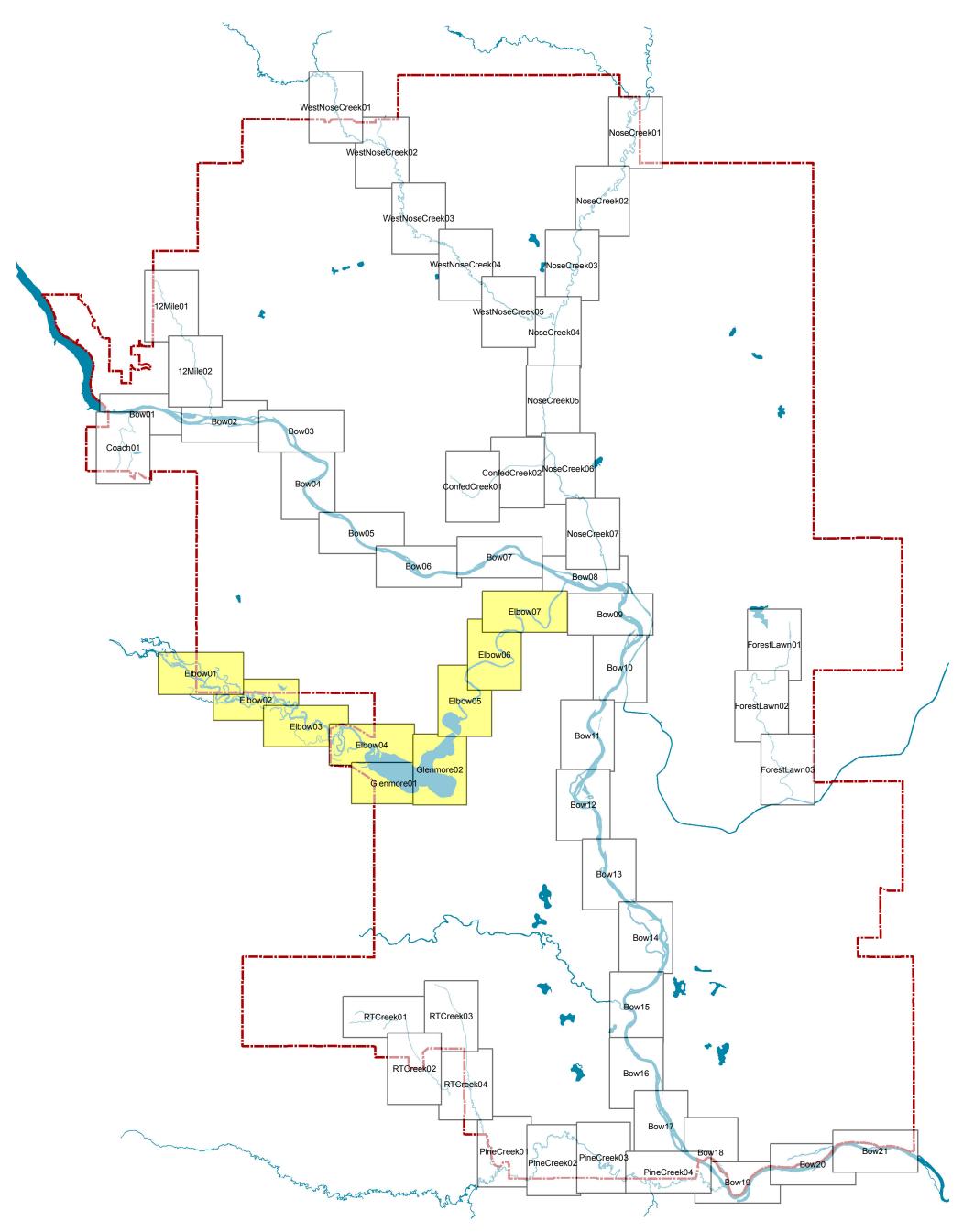
## CITY WIDE MAP - ALLUVIAL AQUIFERS



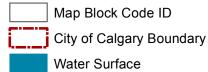
- \_ City Boundary
- Fish Creek Provincial Park
- Mapped Alluvial Aquifer (ARC 2009)
- Potential Large Alluvial Aquifers in Coarse Sediments (Moran 1986)
- \_\_\_\_Streams / Rivers
- Lower Order Streams

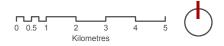


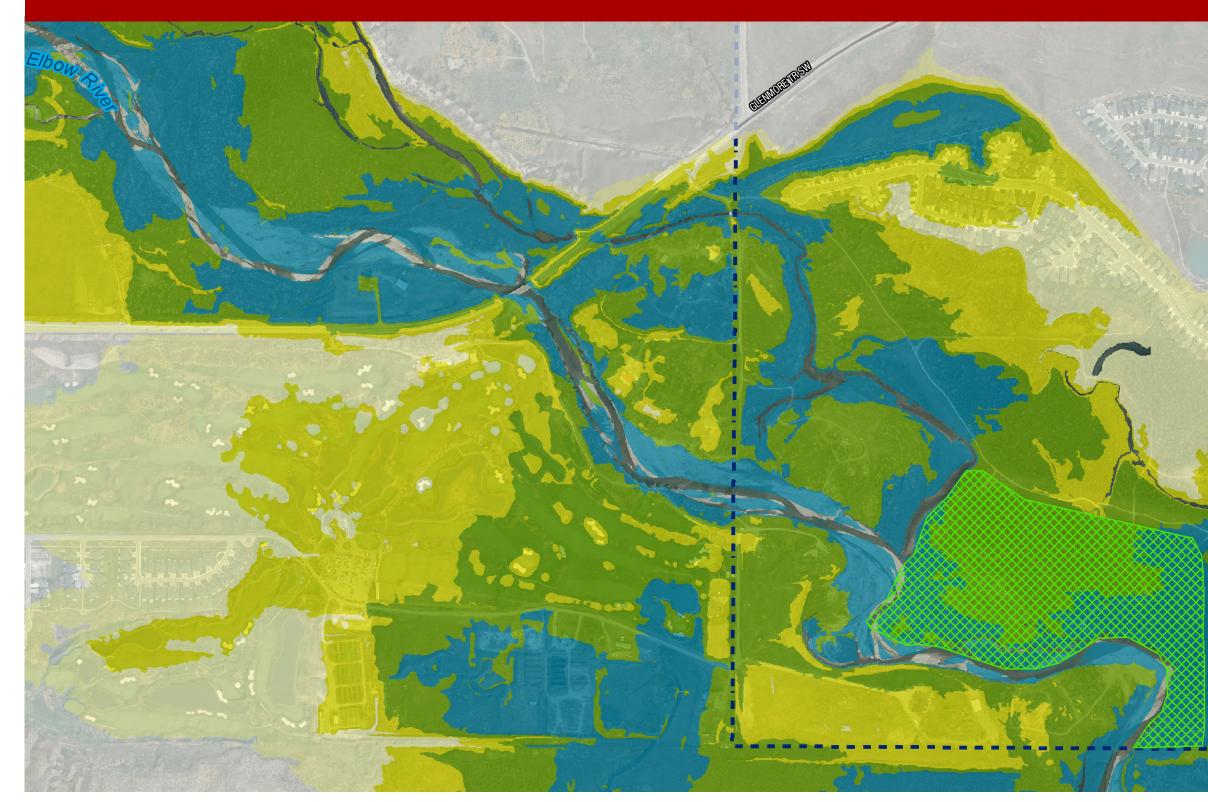
## CITY WIDE MAP - MAP BLOCK CODE



### Legend







#### **Riparian Zone\***



Healthy Healthy, but with Problems

### Good

Unhealthy

Bank Health\*\*\*

Moderate

### Poor

\*\*\*Based on field studies of major rivers / creeks, excluding private residential riverfront lots or steep valley slopes with limited riparian habitat

 City Boundary — Major Roads

⊢++++ Rail

Streams







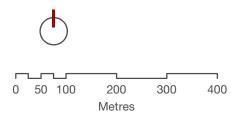
\*Variable Width Riparian Model Outputs

\*\*Based on field studies of sampled riparian polygons only

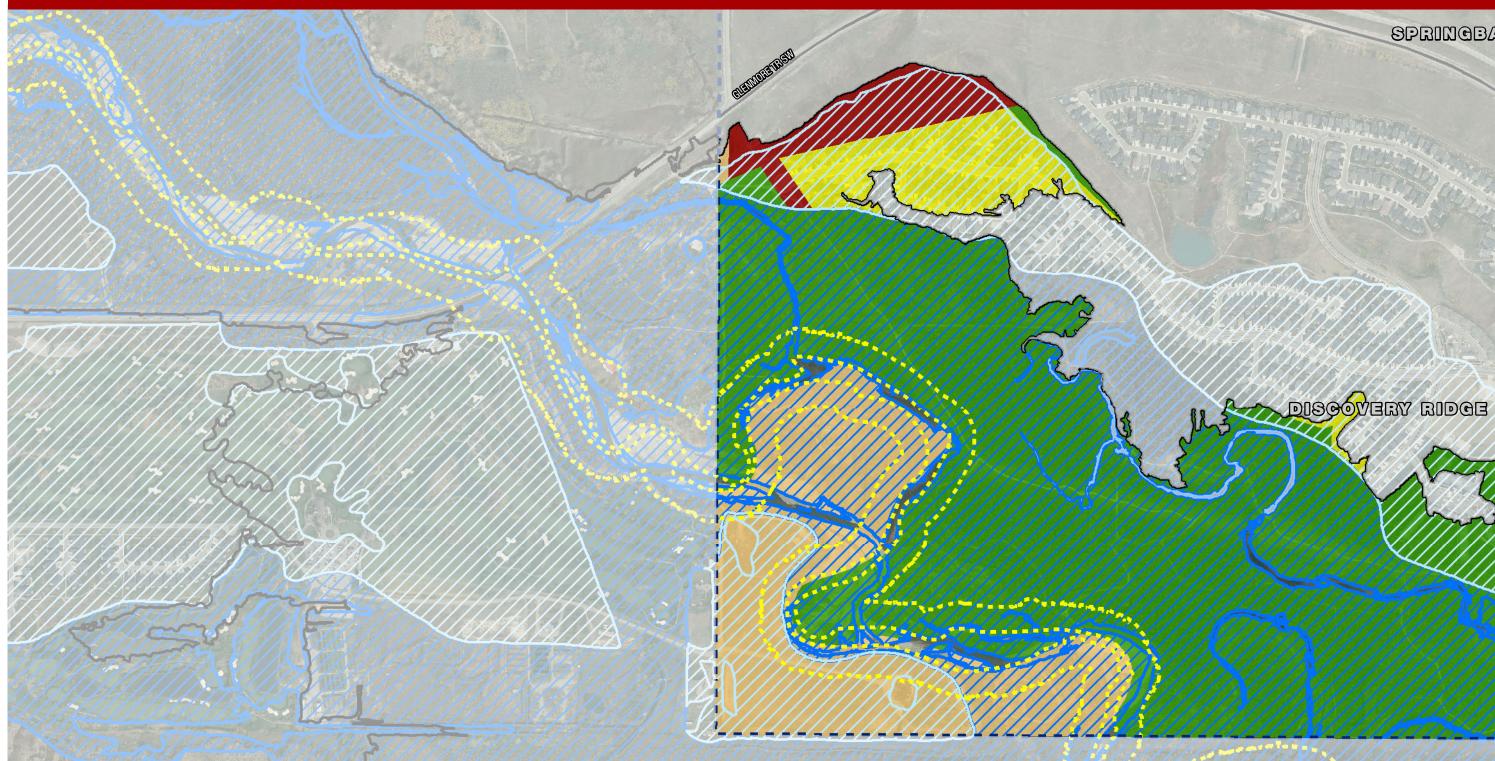
## **RIPARIAN AREA - LOCATION AND FUNCTION** ELBOW RIVER 01

CLEMMORETRON SPRINGBANK HILL

### DISCOVERY RIDCE









Major Infrastructure
Mixed Use
Residential
Parks, Recreation and Public Education
Golf Course

City of Calgary ER Setback Policy*
Nose Creek Water Management Plan

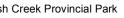


Flood Fringe Flood Extent - 100 Year (Nose Creek/West Nose Creek) Fish Creek Provincial Park

Outer Riparian Zone Boundary

Streams Major Roads <del>⊢++++</del> Rail

City Boundary







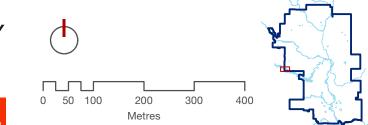
\*Note that ER setbacks for lower order streams are not mapped as they were out of the project scope

\*\*Recommended setback boundary of Nose Creek Watershed Partnership including floodplain, meander belt width and adjacent escarpments >15%

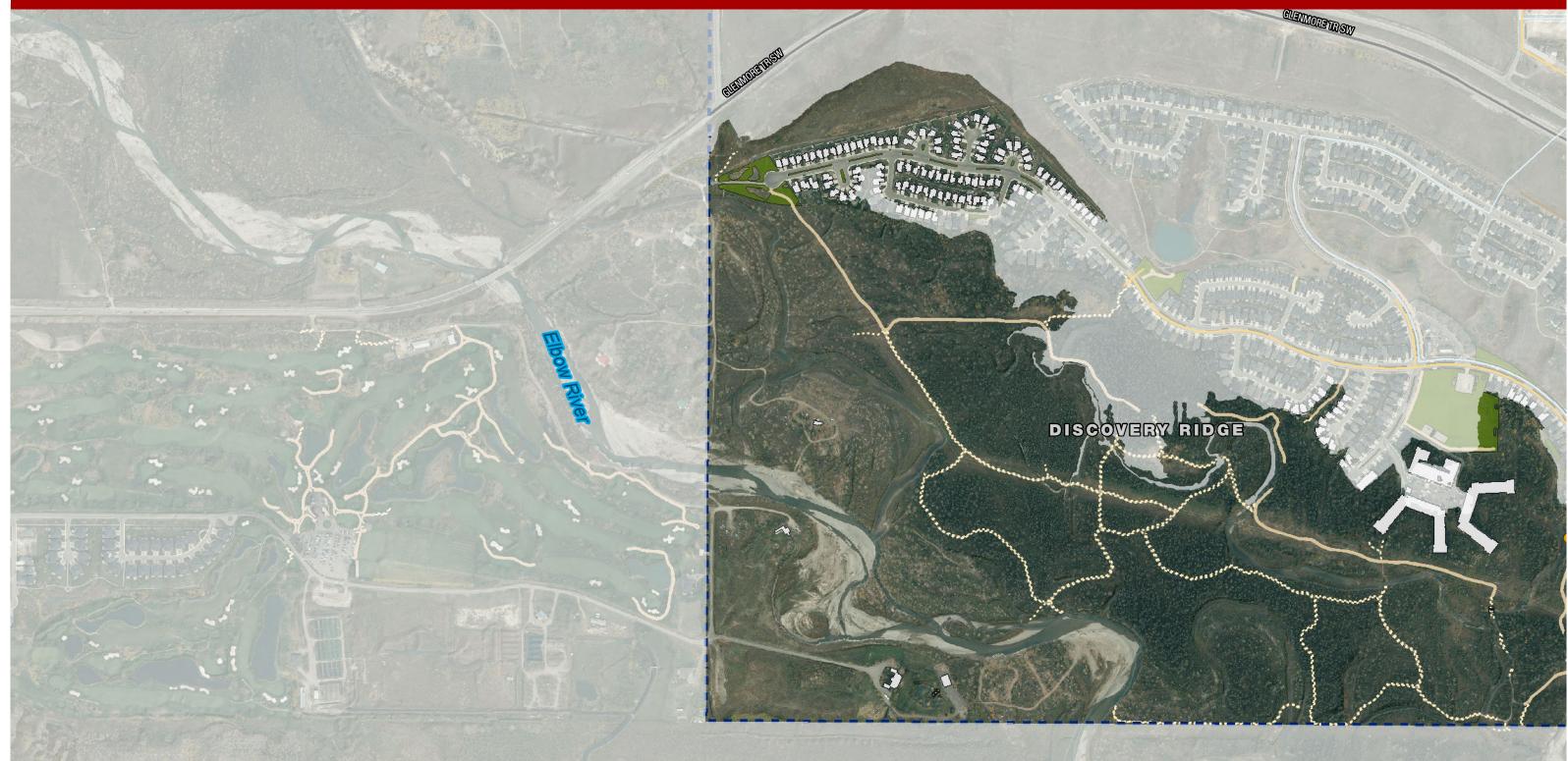
Setback \*\*

# LAND AND REGULATORY ISSUES ELBOW RIVER 01

Springbank Hill



## EXISTING INFRASTRUCTURE AND POSSIBLE IMPROVEMENTS



- Storm Outflow Location
   Stormwater Lift Station
   Storm Main (> 900mm diameter)
   Sanitary Main (>600mm diameter)
   Water Main (>400mm diameter)
- - · Siphon
- Pipeline River Crossing Locations
  Water / Waste Water Treatment Plants
  Existing Storm Retrofit Pond
- Possible Location of Storm Retrofit Pond

- Existing Storm Pond
- Existing Bank Infrastructure (e.g., Rip Rap, Retaining Walls, Weirs)
- Bank Erosion Hotspot
- Candidate Flood / Erosion Control Projects
- Paved Trails
- ----- Gravel Trails
- Buildings
- Parks (Maintained Turf Areas)

- City BoundaryMajor Roads
- HI Rail
- Fish Creek Provincial Park

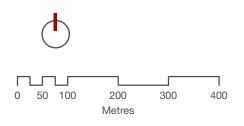
The non-masked area is based on the greater of:

(i) outer riparian zone of the variable width model,
(ii) City ER setback policy boundary,
(iii) Nose Creek Watershed Partnership recommended setback policy
(See Theme 2-Land and Regulatory Issues)

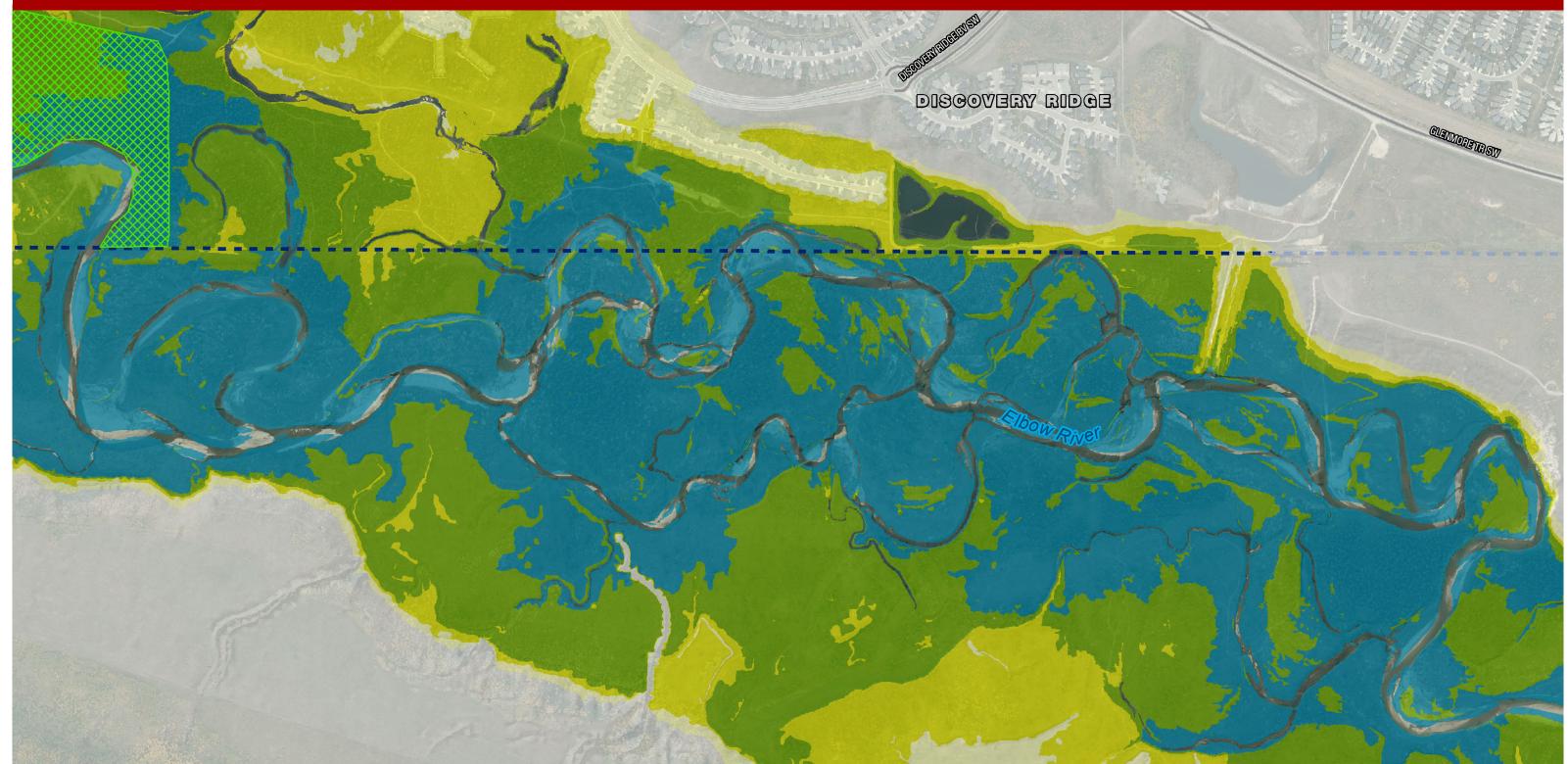




## POSSIBLE IMPROVEMENTS ELBOW RIVER 01







#### **Riparian Zone\***



### Riparian Health\*\*

\*\*Based on field studies of sampled riparian polygons only

Healthy Healthy, but with Problems Unhealthy

Bank Health\*\*\* Good

Moderate

#### Poor

\*\*\*Based on field studies of major rivers / creeks, excluding private residential riverfront lots or steep valley slopes with limited riparian habitat

— Major Roads +++++ Rail

City Boundary

Streams

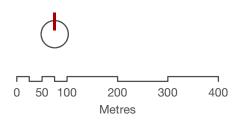
Fish Creek Provincial Park





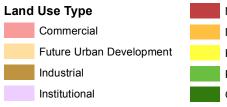
\*Variable Width Riparian Model Outputs

## **RIPARIAN AREA - LOCATION AND FUNCTION** ELBOW RIVER 02











City of Calgary ER Setback Policy\* Nose Creek Water Management Plan Setback \*\* ----Floodway



Flood Extent - 100 Year (Nose Creek/West Nose Creek)

Outer Riparian Zone Boundary

Streams Major Roads

⊢++++ Rail

City Boundary

Fish Creek Provincial Park



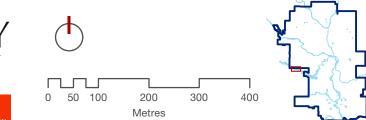


\*Note that ER setbacks for lower order streams are not mapped as they were out of the project scope

\*\*Recommended setback boundary of Nose Creek Watershed Partnership including floodplain, meander belt width and adjacent escarpments >15%

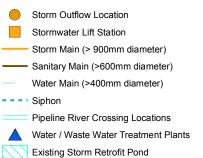
## LAND AND REGULATORY ISSUES ELBOW RIVER 02

SIGNAL MILL



# EXISTING INFRASTRUCTURE AND POSSIBLE IMPROVEMENTS ELBOW RIVER 02

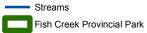




Possible Location of Storm Retrofit Pond

- Existing Storm Pond Existing Bank Infrastructure (e.g., Rip Rap, Retaining Walls, Weirs)
- Bank Erosion Hotspot
- Candidate Flood / Erosion Control Projects
- Paved Trails
- Bridge Buildings
- Parks (Maintained Turf Areas)

- City Boundary
- → Major Roads



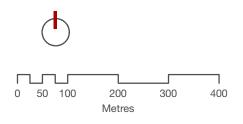
The non-masked area is based on the greater of: (i) outer riparian zone of the variable width model.

(ii) City ER setback policy boundary, (iii) Nose Creek Watershed Partnership recommended setback policy (See Theme 2-Land and Regulatory Issues)

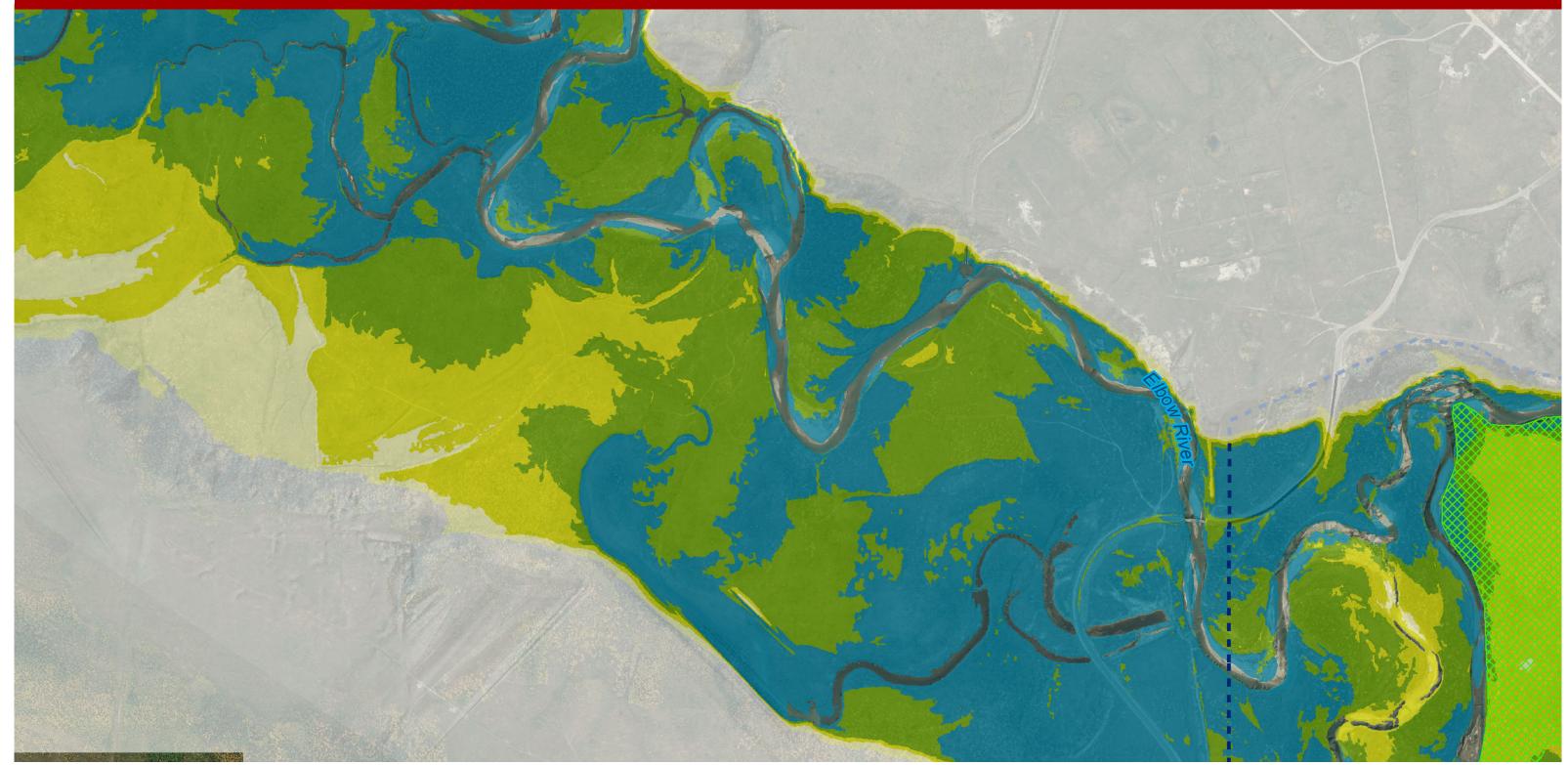












#### **Riparian Zone\***



Riparian	Health**
----------	----------

\*\*Based on field studies of sampled riparian polygons only

Healthy Healthy, but with Problems

### Good

Unhealthy

### Moderate

Poor \*\*\*Based on field studies of major rivers / creeks, excluding private residential riverfront lots or steep valley slopes with limited riparian habitat

Bank Health\*\*\*

 City Boundary — Major Roads

+++++ Rail

Streams

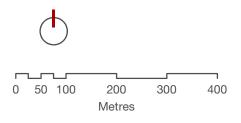
Fish Creek Provincial Park





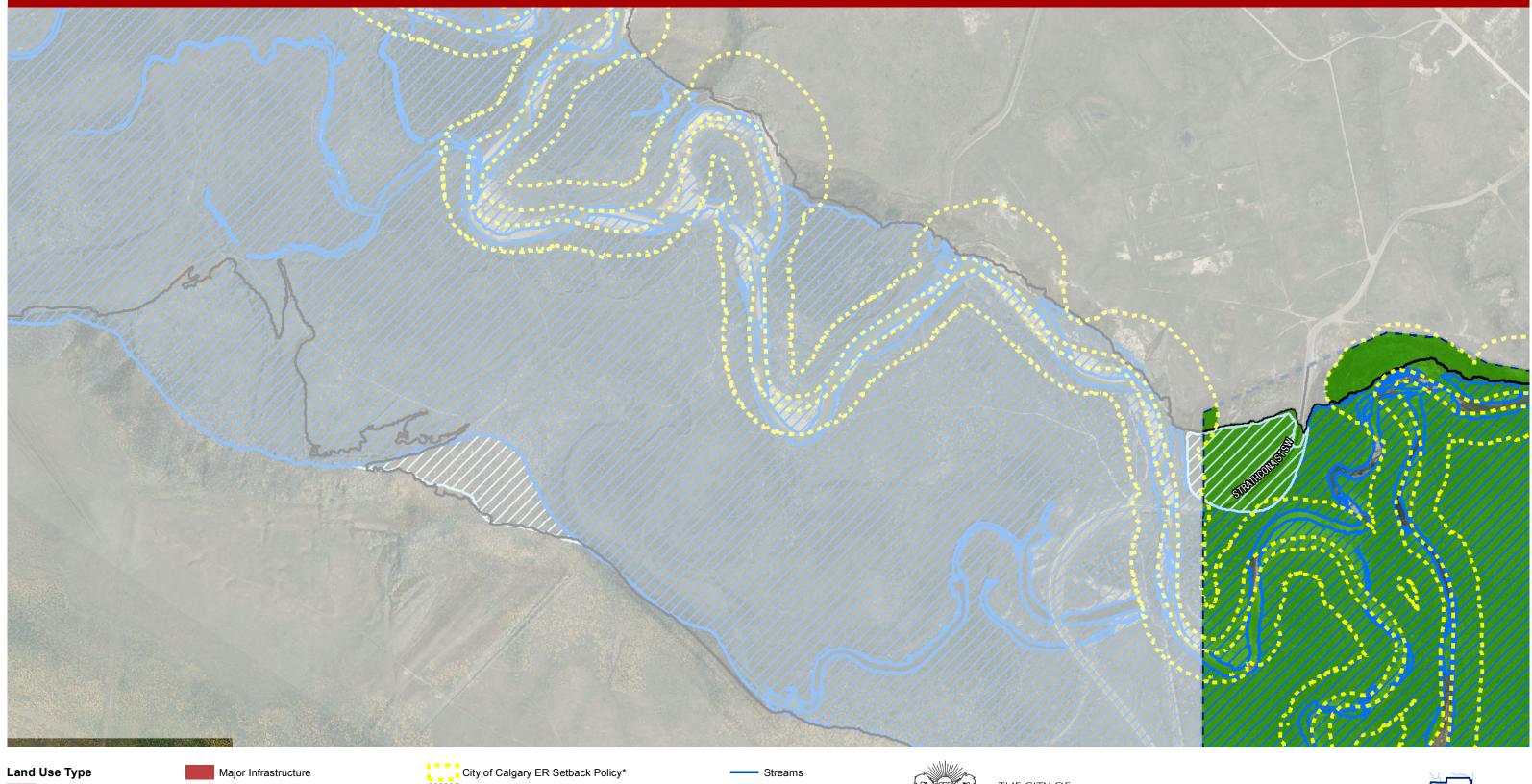
\*Variable Width Riparian Model Outputs

## **RIPARIAN AREA - LOCATION AND FUNCTION** ELBOW RIVER 03









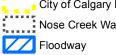


Industrial

Institutional

	Major Infrastructure	
	Mixed Use	
ment	Residential	
	Parks, Recreation and Public Education	

Golf Course



Nose Creek Water Management Plan Setback \*\*



Flood Fringe

Flood Extent - 100 Year (Nose Creek/West Nose Creek) \_\_\_\_\_ Fish Creek Provincial Park

Outer Riparian Zone Boundary

- Major Roads
- ⊷++++ Rail City Boundary

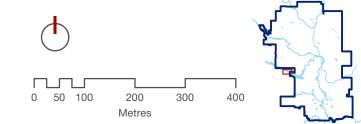




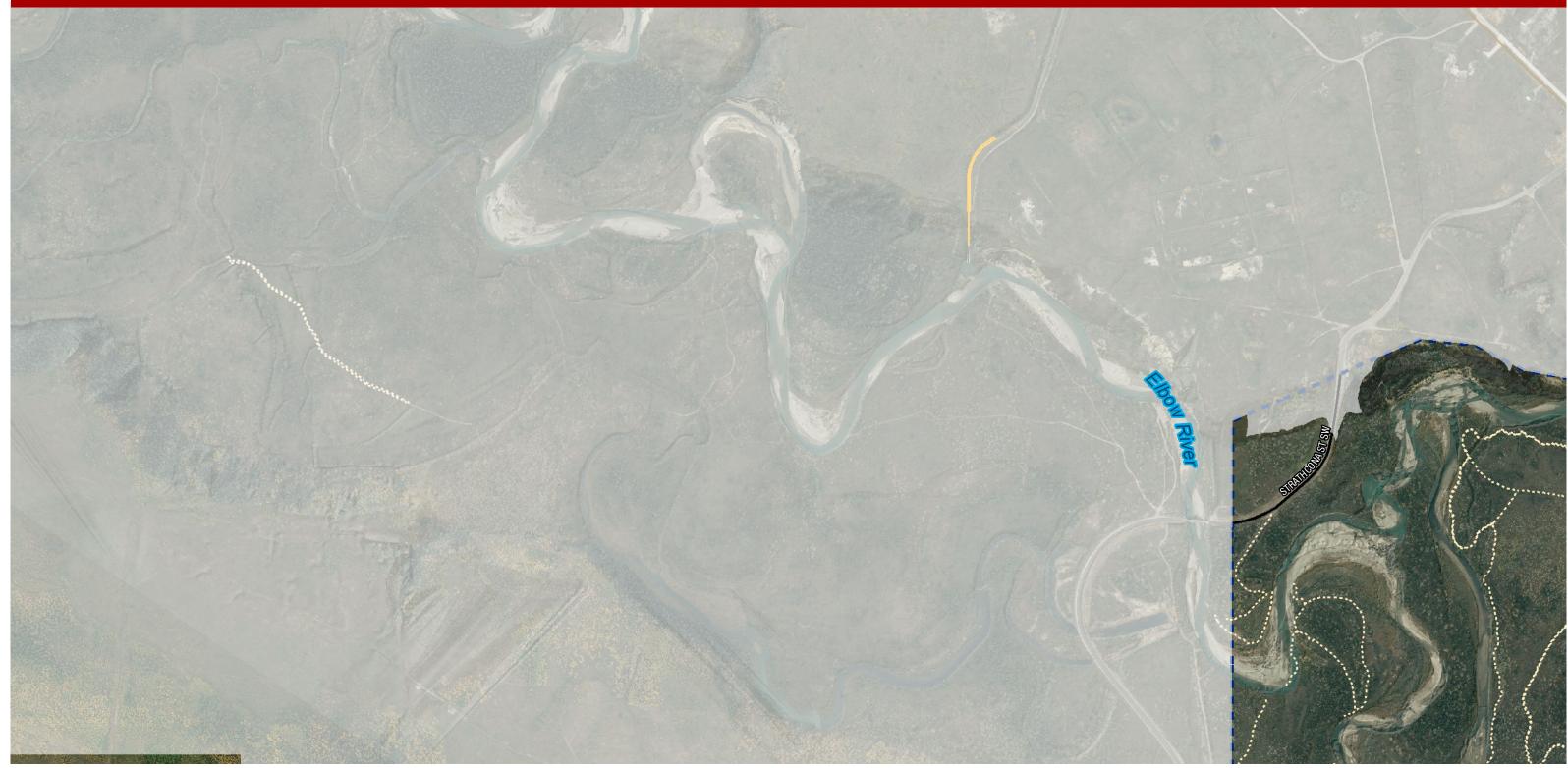
\*Note that ER setbacks for lower order streams are not mapped as they were out of the project scope

\*\*Recommended setback boundary of Nose Creek Watershed Partnership including floodplain, meander belt width and adjacent escarpments >15%

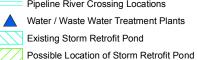
# LAND AND REGULATORY ISSUES ELBOW RIVER 03



# EXISTING INFRASTRUCTURE AND POSSIBLE IMPROVEMENTS ELBOW RIVER 03



Storm Outflow Location
Stormwater Lift Station
 Storm Main (> 900mm diameter)
 Sanitary Main (>600mm diameter)
 Water Main (>400mm diameter)
 Siphon
 Pipeline River Crossing Locations



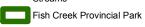






- Candidate Flood / Erosion Control Projects
- Paved Trails
   Gravel Trails
- Bridge
- Buildings
- Parks (Maintained Turf Areas)

- City Boundary
- ──── Major Roads
  ⊢+++ Rail
  ─── Streams

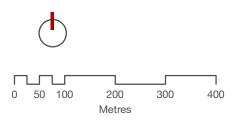


The non-masked area is based on the greater of:

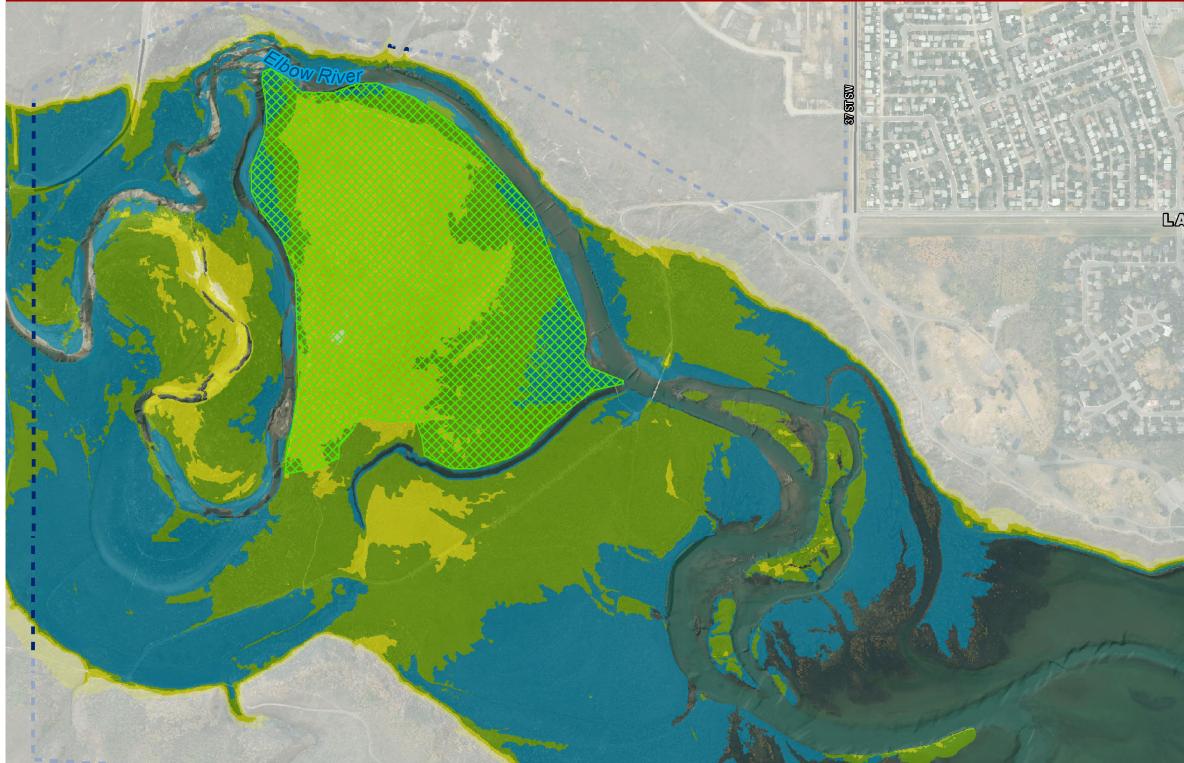
(i) outer riparian zone of the variable width model,
(ii) City ER setback policy boundary,
(iii) Nose Creek Watershed Partnership recommended setback policy
(See Theme 2-Land and Regulatory Issues)



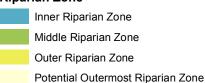






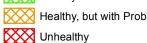


#### **Riparian Zone\***



### **Riparian Health\*\***

Healthy Healthy, but with Problems



Bank Health\*\*\*

Good Moderate

Poor

 City Boundary — Major Roads

⊢++++ Rail

Streams

Fish Creek Provincial Park





\*Variable Width Riparian Model Outputs

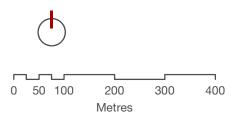
\*\*Based on field studies of sampled riparian polygons only \*\*\*Based on field studies of major rivers / creeks, excluding private residential riverfront lots or steep valley slopes with limited riparian habitat

## **RIPARIAN AREA - LOCATION AND FUNCTION** ELBOW RIVER 04

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LAKEVIEW

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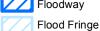








City of Calgary ER Setback Policy\* Nose Creek Water Management Plan Setback \*\* ----Floodway



Flood Extent - 100 Year (Nose Creek/West Nose Creek) Fish Creek Provincial Park

Outer Riparian Zone Boundary

Streams Major Roads <del>⊢++++</del> Rail City Boundary



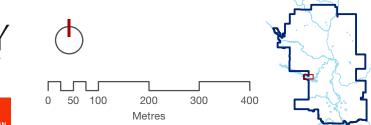


\*Note that ER setbacks for lower order streams are not mapped as they were out of the project scope

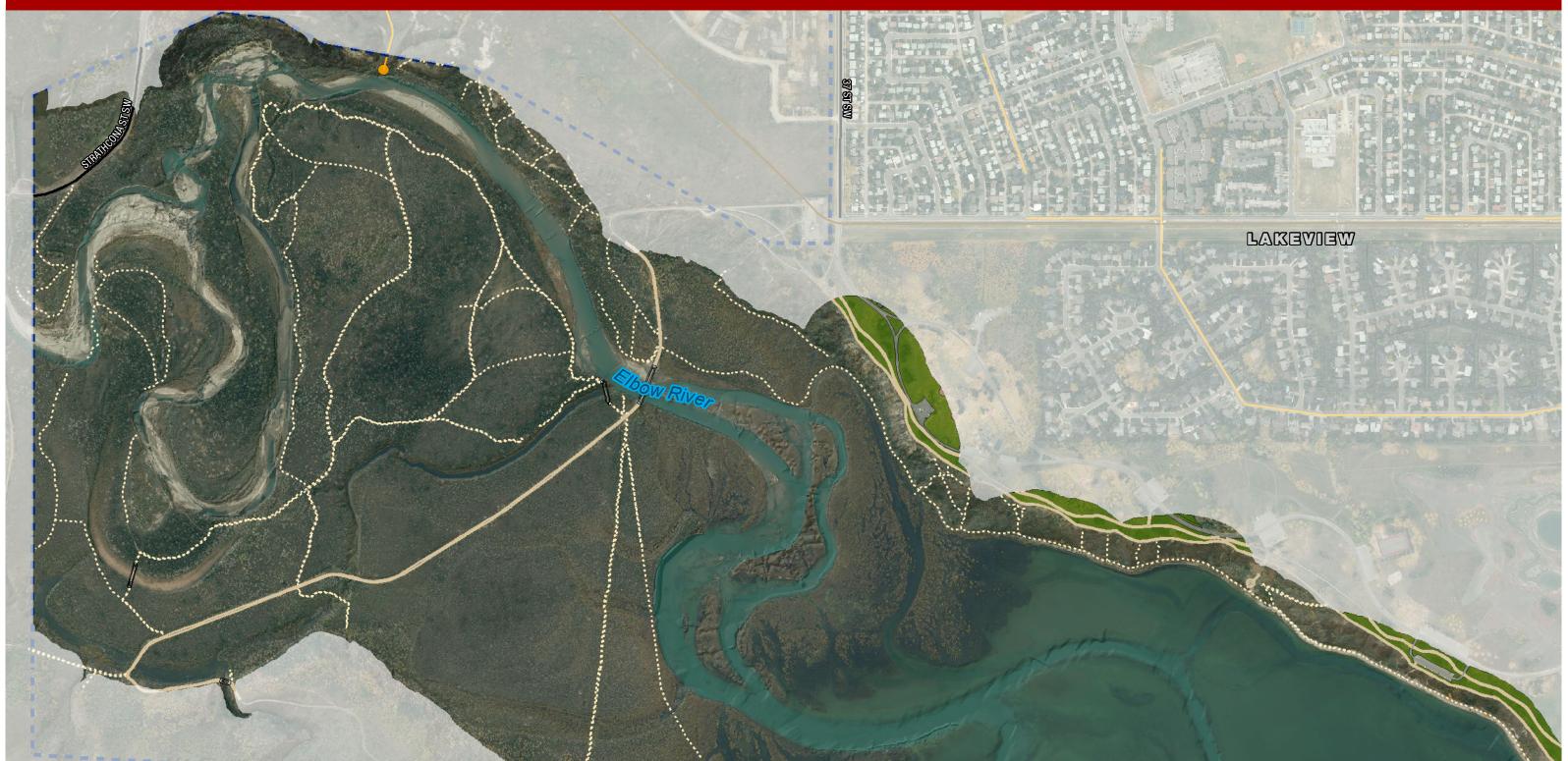
\*\*Recommended setback boundary of Nose Creek Watershed Partnership including floodplain, meander belt width and adjacent escarpments >15%

## LAND AND REGULATORY ISSUES ELBOW RIVER 04

LAKEVIEW



## EXISTING INFRASTRUCTURE AND POSSIBLE IMPROVEMENTS ELBOW RIVER 04



- Storm Outflow Location
   Stormwater Lift Station
   Storm Main (> 900mm diameter)
   Sanitary Main (>600mm diameter)
   Water Main (>400mm diameter)
   Siphon
   Pipeline River Crossing Locations
- Water / Waste Water Treatment Plants
   Existing Storm Retrofit Pond
   Possible Location of Storm Retrofit Pond
- Bank Erosion Hotspot
   Candidate Flood / Erosion Control Projects
- Paved Trails
   Gravel Trails

Bridge

Buildings

Existing Storm Pond

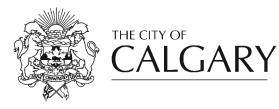
Parks (Maintained Turf Areas)

Existing Bank Infrastructure (e.g., Rip Rap, Retaining Walls, Weirs)

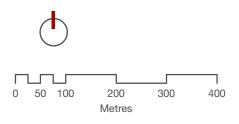
- City Boundary
- ──── Major Roads ⊢++++ Rail
- Streams

The non-masked area is based on the greater of:

(i) outer riparian zone of the variable width model,
(ii) City ER setback policy boundary,
(iii) Nose Creek Watershed Partnership recommended setback policy
(See Theme 2-Land and Regulatory Issues)











City Boundary

— Major Roads

Streams

Fish Creek Provincial Park

⊢++++ Rail

#### **Riparian Zone\***



### Riparian Health\*\*

Healthy Healthy, but with Problems Unhealthy

### Bank Health\*\*\*

Good Moderate

### Poor

or steep valley slopes with limited riparian habitat

\*\*\*Based on field studies of major rivers / creeks, excluding private residential riverfront lots

THE CITY OF CALGARY



\*Variable Width Riparian Model Outputs

\*\*Based on field studies of sampled riparian polygons only

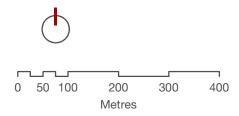
# **RIPARIAN AREA - LOCATION AND FUNCTION GLENMORE RESERVOIR 01**

## BAYVIEW

Salara a Real

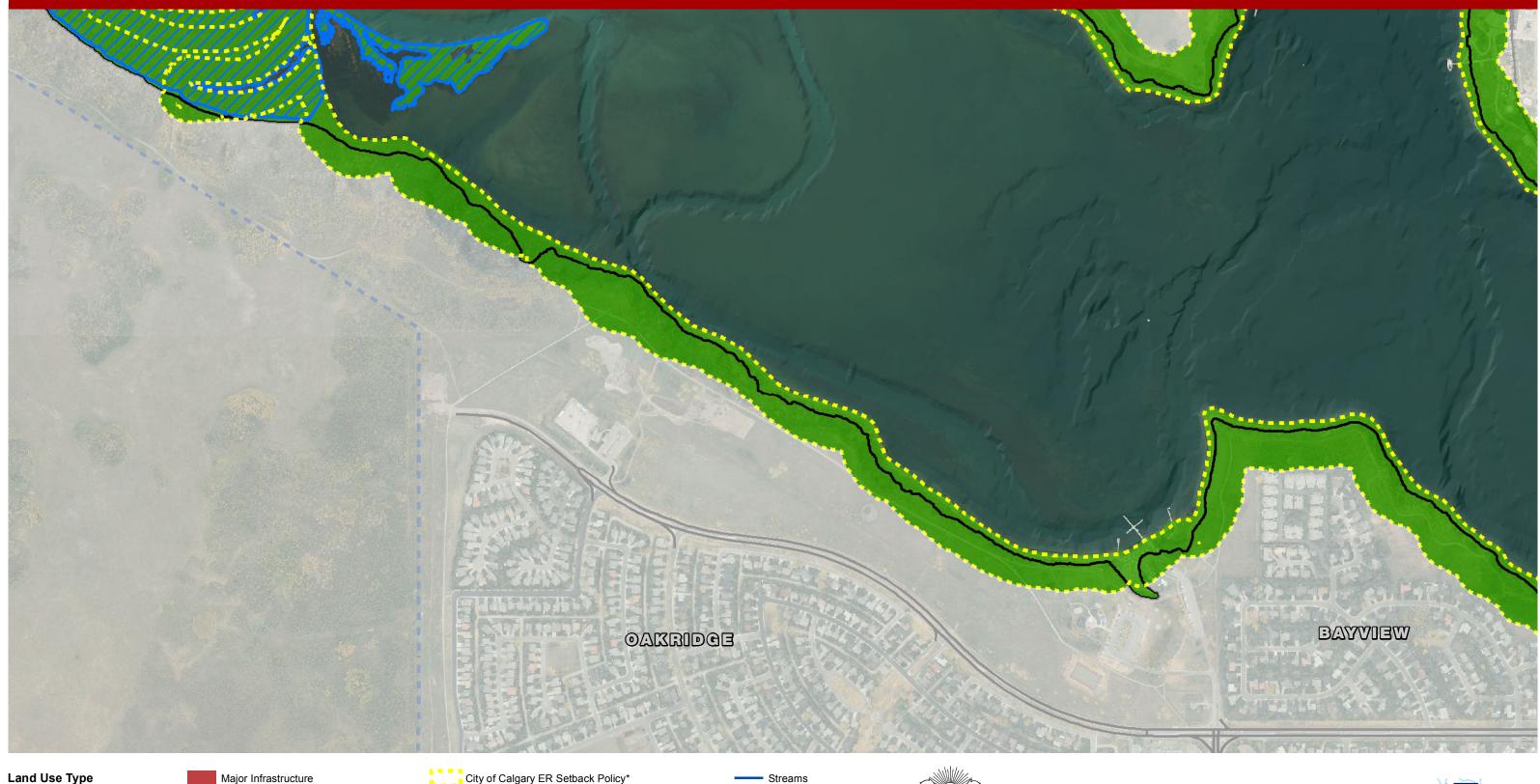
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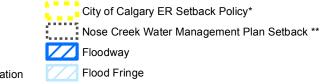












Flood Extent - 100 Year (Nose Creek/West Nose Creek)

Outer Riparian Zone Boundary

Streams Major Roads ⊢++++ Rail City Boundary

Fish Creek Provincial Park

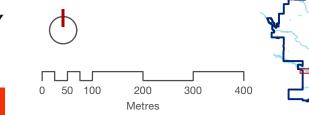




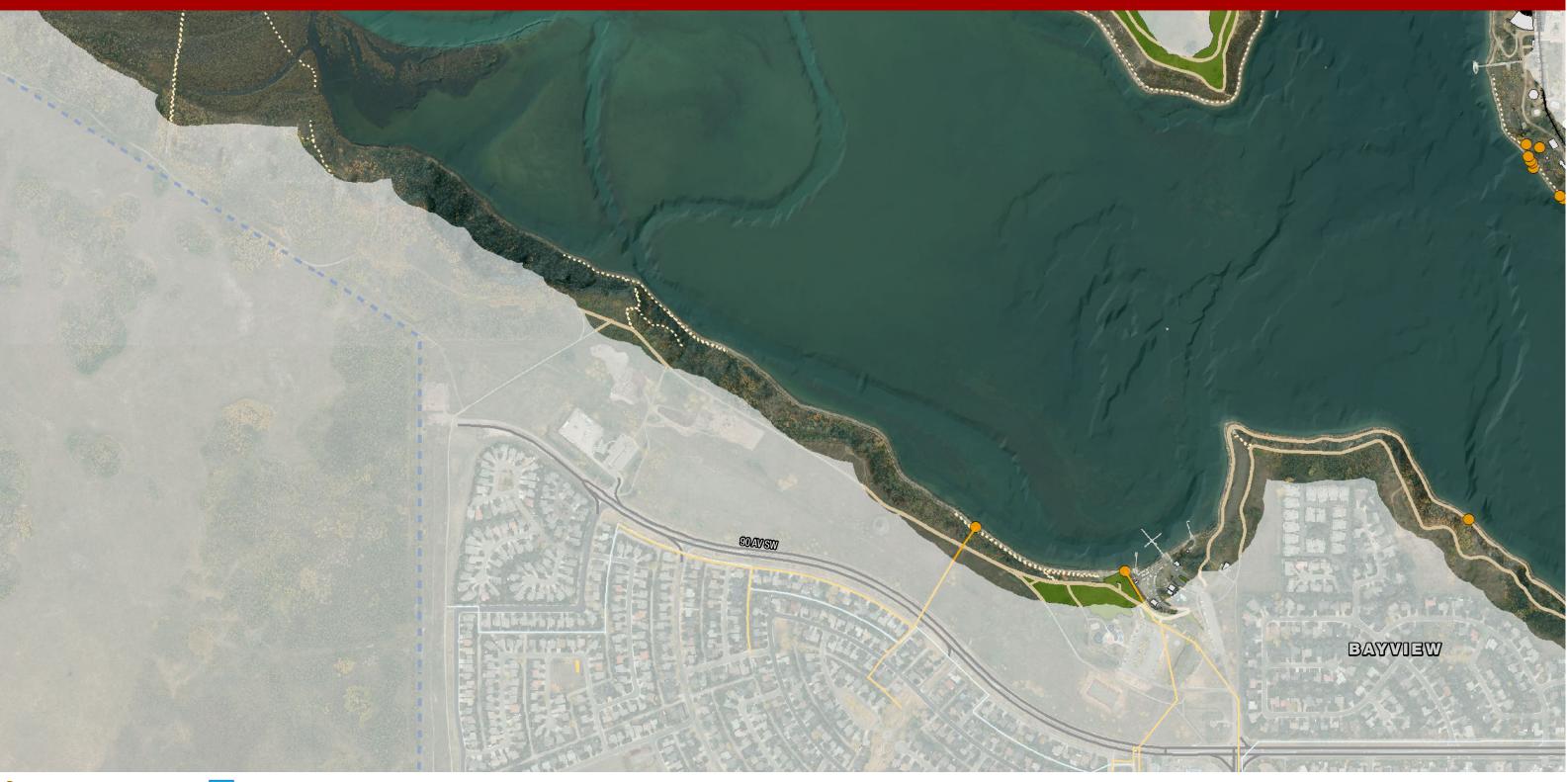
\*Note that ER setbacks for lower order streams are not mapped as they were out of the project scope

\*\*Recommended setback boundary of Nose Creek Watershed Partnership including floodplain, meander belt width and adjacent escarpments >15%

# LAND AND REGULATORY ISSUES **GLENMORE RESERVOIR 01**

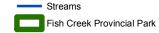


# EXISTING INFRASTRUCTURE AND POSSIBLE IMPROVEMENTS GLENMORE RESERVOIR 01



- Storm Outflow Location
   Stormwater Lift Station
   Storm Main (> 900mm diameter)
   Sanitary Main (>600mm diameter)
   Water Main (>400mm diameter)
   Siphon
- Pipeline River Crossing Locations
  Water / Waste Water Treatment Plants
  Existing Storm Retrofit Pond
  Possible Location of Storm Retrofit Pond
- Existing Storm Pond
- Existing Bank Infrastructure (e.g., Rip Rap, Retaining Walls, Weirs)
- Bank Erosion Hotspot
- Candidate Flood / Erosion Control Projects
- Paved Trails
- === Bridge
- Buildings
- Parks (Maintained Turf Areas)

- City Boundary
- ─── Major Roads
  ⊢+++ Rail

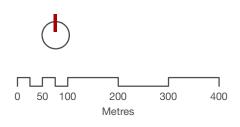


The non-masked area is based on the greater of:

(i) outer riparian zone of the variable width model,
(ii) City ER setback policy boundary,
(iii) Nose Creek Watershed Partnership recommended setback policy
(See Theme 2-Land and Regulatory Issues)









### **RIPARIAN AREA - LOCATION AND FUNCTION** GLENMORE RESERVOIR 02



#### **Riparian Zone\***

- Inner Riparian Zone Middle Riparian Zone
  - Outer Riparian Zone
  - Potential Outermost Riparian Zone

\*Variable Width Riparian Model Outputs

**Riparian Health\*\*** Healthy

\*\*Based on field studies of

sampled riparian polygons only

Healthy, but with Problems

Unhealthy

Bank Health\*\*\* Good

Moderate Poor

\*\*\*Based on field studies of major rivers / creeks, excluding private residential riverfront lots or steep valley slopes with limited riparian habitat





ms	$\frown$
Creek Provincial Park	C

0 50 100



н

300



T

400

### LAND AND REGULATORY ISSUES GLENMORE RESERVOIR 02



#### Land Use Type

- Commercial Future Urban Development Industrial
  - Institutional
- Major Infrastructure
- Mixed Use

Golf Course

- Residential
- Parks, Recreation and Public Education
- City of Calgary ER Setback Policy\* ..... Nose Creek Watershed Partnership Setback\*\*

  - Flood Fringe
  - Flood Extent 100 Year (Nose Creek/West Nose Creek)
  - Outer Riparian Zone Boundary
    - Streams
  - Major Roads
  - HHH Rail

\*Note that ER setbacks for lower order streams are not mapped as they were out of the project scope

City Boundary

Fish Creek Provincial Park

\*\*Recommended setback boundary of Nose Creek Watershed Partnership including floodplain, meander belt width and adjacent escarpments >15%









### EXISTING INFRASTRUCTURE AND POSSIBLE IMPROVEMENTS GLENMORE RESERVOIR 02



- Storm Outflow Location
- Stormwater Lift Station
- Storm Main (>900mm diameter)
- Sanitary Main (>600mm diameter)
- Water Main (>400mm diameter)
- Siphon
- Pipeline River Crossing Locations
- Water / Waste Water Treament Plants
- Existing Storm Retrofit Pond
- Possible Location of Storm Retrofit Pond
- Existing Storm Pond
- Existing Bank Infrastructure (e.g., Rip Rap, Retaining Walls, Weirs)
- Bank Erosion Hotspot

- Candidate Flood / Erosion Control Projects
- Paved Trails
- Gravel Trails
- = Bridge
- Buildings
- Parks (Maintained Turf Areas)
- City Boundary
   Major Roads
- HH Rail
- Streams
- Fish Creek Provincial Park

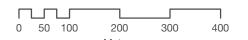
The non-masked area is based on the greater of:

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 (iii) Nose Creek Watershed Partnership recommended setback policy

(See Theme 2-Land and Regulatory Issues)









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### RIPARIAN AREA - LOCATION AND FUNCTION ELBOW RIVER 05





#### **Riparian Zone\***

- Inner Riparian Zone Middle Riparian Zone Outer Riparian Zone
  - Potential Outermost Riparian Zone

\*Variable Width Riparian Model Outputs

 Riparian Health\*\*

 Healthy

 Healthy, but with Problems

 Unhealthy

\*\*Based on field studies of

sampled riparian polygons only

Bank Health\*\*\* Good Moderate

Poor

\*\*\*Based on field studies of major rivers / creeks, excluding private residential riverfront lots or steep valley slopes with limited riparian habitat





300



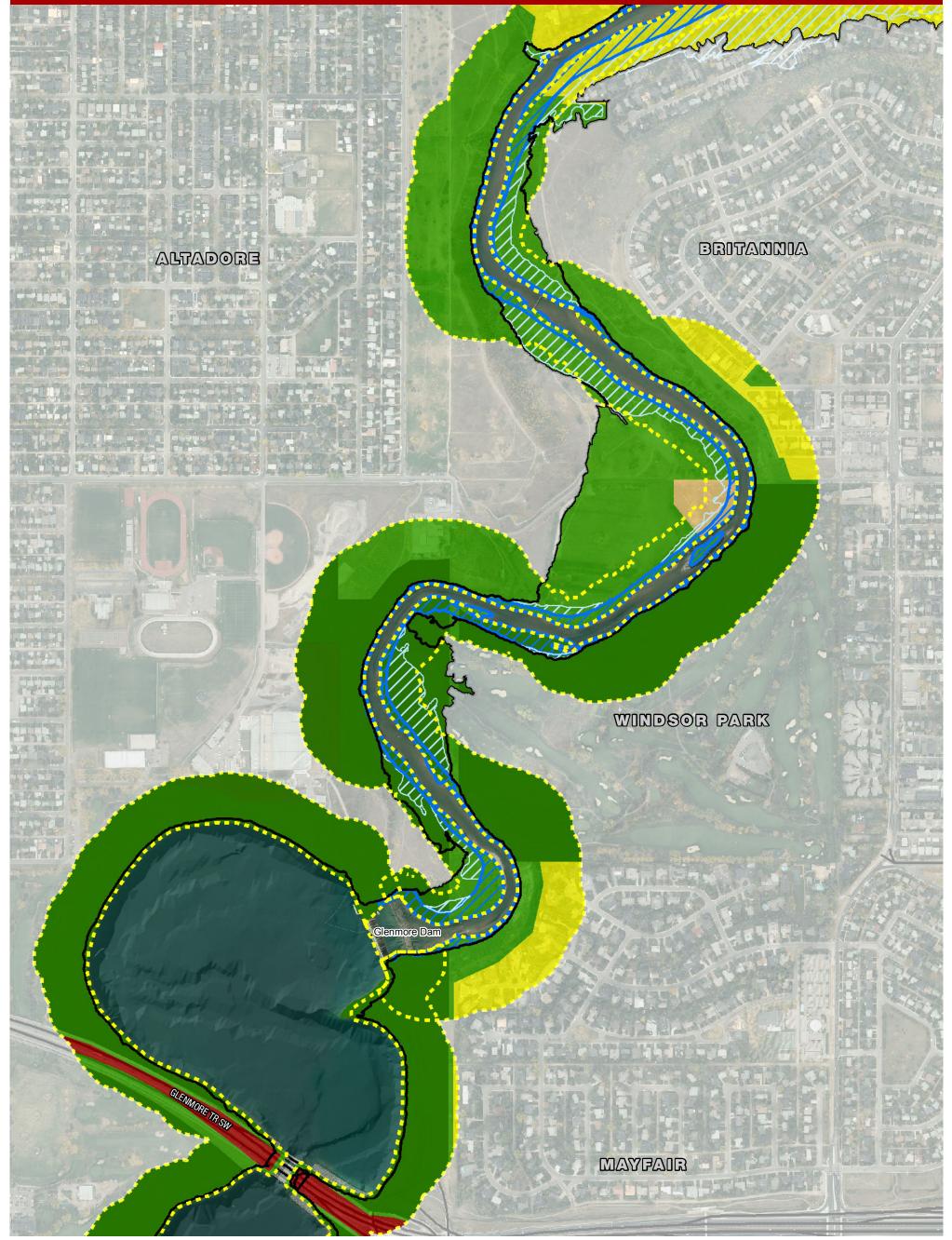
T

400

200 Metres

0 50 100

### LAND AND REGULATORY ISSUES ELBOW RIVER 05



#### Land Use Type

- Commercial Future Urban Development Industrial Institutional
- Major Infrastructure
- Mixed Use
- Residential
- Parks, Recreation and Public Education
- Golf Course
- City of Calgary ER Setback Policy\* Nose Creek Watershed Partnership Setback\*\*
  - Flood Fringe
- Flood Extent 100 Year (Nose Creek/West Nose Creek)
- Outer Riparian Zone Boundary
  - Streams
- Major Roads
- HHH Rail

- City Boundary
- Fish Creek Provincial Park

- \*Note that ER setbacks for lower order streams are not mapped as they were out of the project scope
- \*\*Recommended setback boundary of Nose Creek Watershed Partnership including floodplain, meander belt width and adjacent escarpments >15%
- THE CITY OF Ş 0 50 100 200 300 400

Metres

### EXISTING INFRASTRUCTURE AND POSSIBLE IMPROVEMENTS ELBOW RIVER 05



- Storm Outflow Location
- Stormwater Lift Station
- Storm Main (>900mm diameter)
- Sanitary Main (>600mm diameter)
- Water Main (>400mm diameter)
- Siphon
- Pipeline River Crossing Locations
- Water / Waste Water Treament Plants
- Existing Storm Retrofit Pond
- Possible Location of Storm Retrofit Pond
- Existing Storm Pond
- Existing Bank Infrastructure (e.g., Rip Rap, Retaining Walls, Weirs)
- Bank Erosion Hotspot

- Candidate Flood / Erosion Control Projects
- Paved Trails
- Gravel Trails
- = Bridge
- Buildings
- Parks (Maintained Turf Areas)
- City Boundary
   Major Roads
- ⊢++ Rail
- Streams
- Fish Creek Provincial Park

The non-masked area is based on the greater of:

(i) outer riparian zone of the variable width model, (ii) City ER setback policy boundary, (iii) Nose Creek Watershed Partnership recommended setback policy

(See Theme 2-Land and Regulatory Issues)



119

300

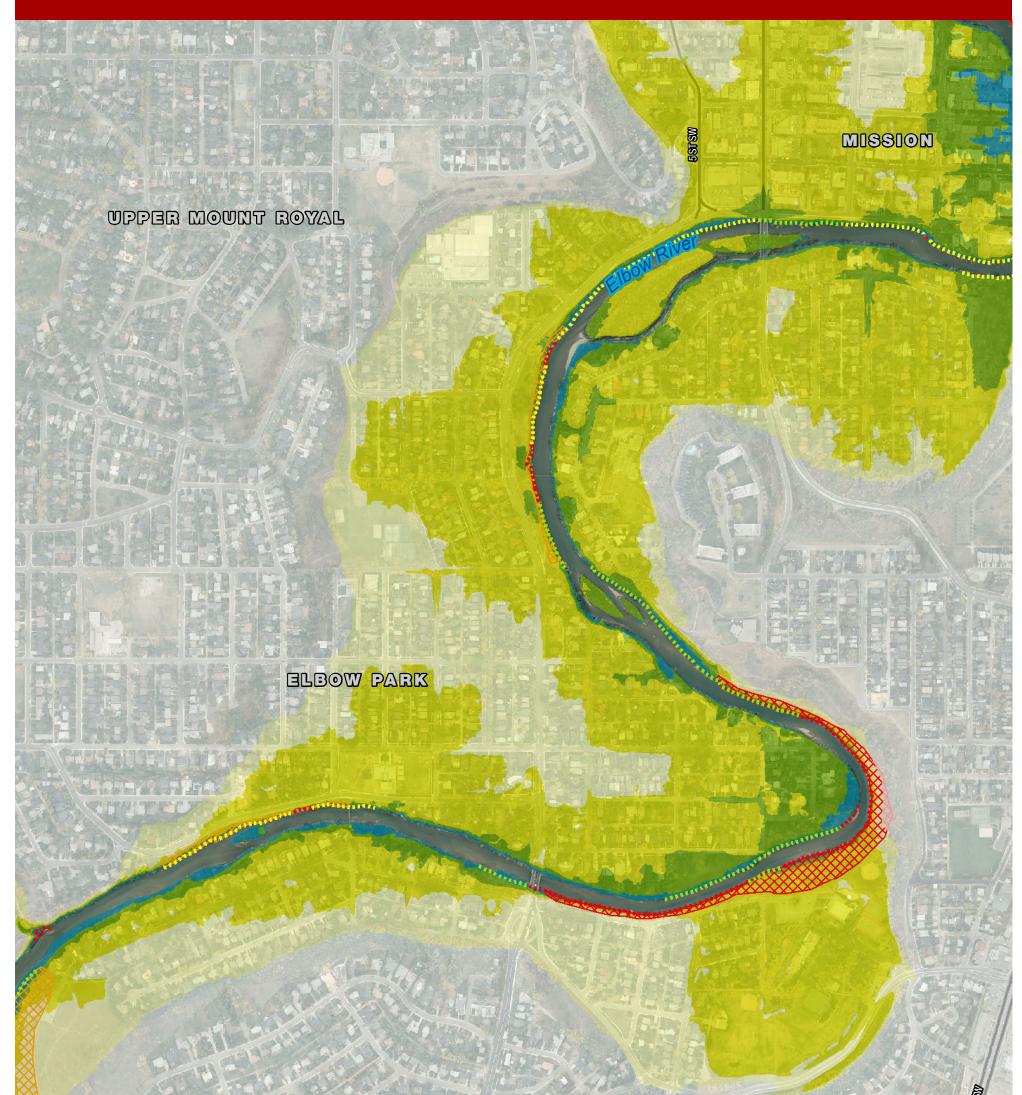
400



200 Metres

0 50 100

### RIPARIAN AREA - LOCATION AND FUNCTION ELBOW RIVER 06





#### **Riparian Zone\***

Inner Riparian Zone Middle Riparian Zone Outer Riparian Zone

Potential Outermost Riparian Zone

\*Variable Width Riparian Model Outputs

 Riparian Health\*\*

 Healthy

 Healthy, but with Problems

\*\*Based on field studies of

sampled riparian polygons only

Unhealthy

Bank Health\*\*\* Good Moderate

Poor

\*\*\*Based on field studies of major rivers / creeks, excluding private residential riverfront lots or steep valley slopes with limited riparian habitat





н

300



T

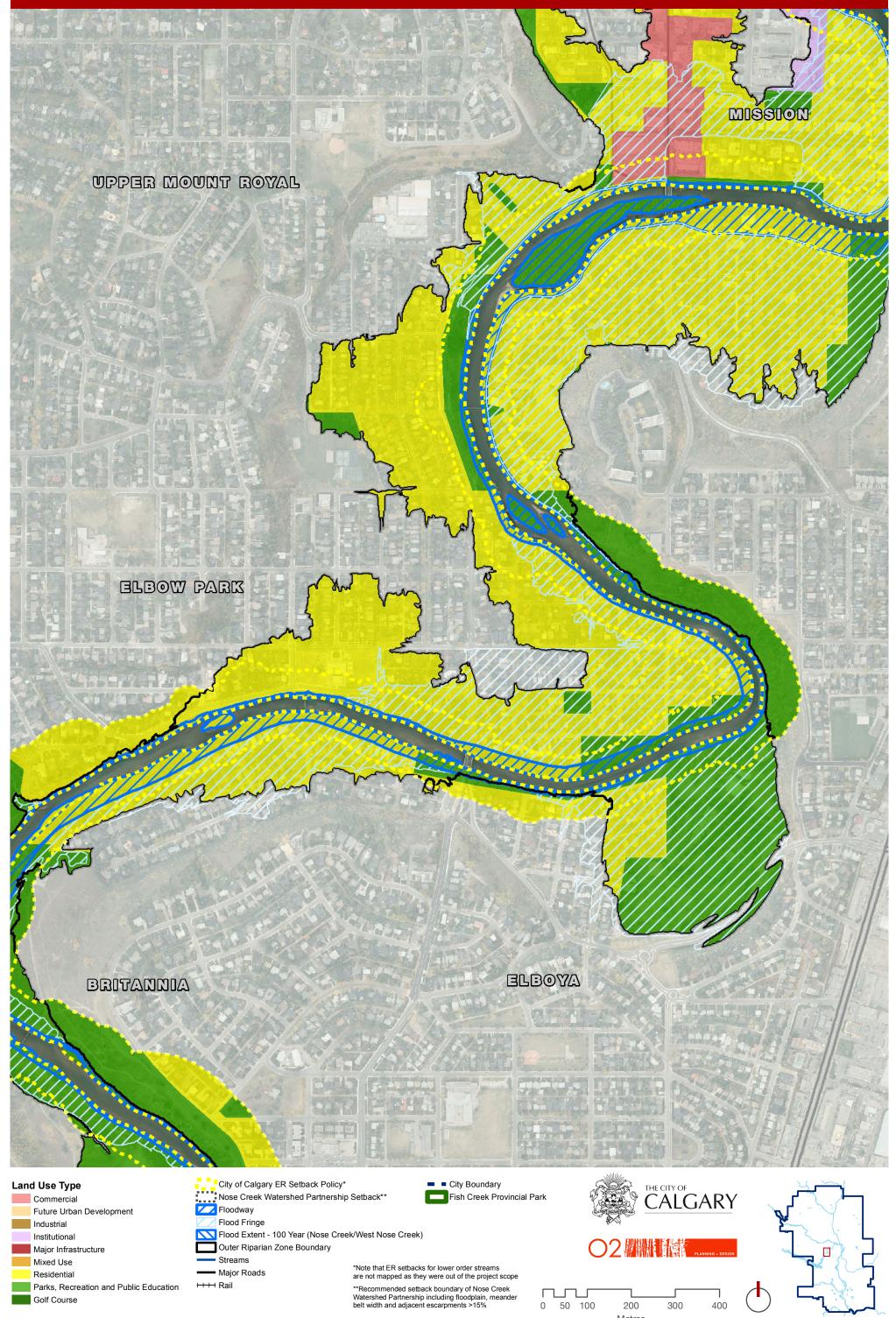
400

200 Metres

0 50 100

### LAND AND REGULATORY ISSUES ELBOW RIVER 06

### RIPARIAN AREAS MAP PROJECT



### EXISTING INFRASTRUCTURE AND POSSIBLE IMPROVEMENTS **ELBOW RIVER 06**

### RIPARIAN AREAS MAP PROJECT





- Storm Outflow Location
- Stormwater Lift Station
- Storm Main (>900mm diameter)
- Sanitary Main (>600mm diameter)
- Water Main (>400mm diameter)
- Siphon
- Pipeline River Crossing Locations
- Water / Waste Water Treament Plants
- Existing Storm Retrofit Pond
- Possible Location of Storm Retrofit Pond
- Existing Storm Pond
- Existing Bank Infrastructure (e.g., Rip Rap, Retaining Walls, Weirs)
- Bank Erosion Hotspot

- Candidate Flood / Erosion Control Projects
- Paved Trails
- Gravel Trails
- = Bridge
- Buildings
- Parks (Maintained Turf Areas)
- City Boundary
   Major Roads
- ⊢++ Rail
- Streams
- Fish Creek Provincial Park

The non-masked area is based on the greater of:

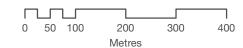
(i) outer riparian zone of the variable width model, (ii) City ER setback policy boundary,
 (iii) Nose Creek Watershed Partnership recommended setback policy

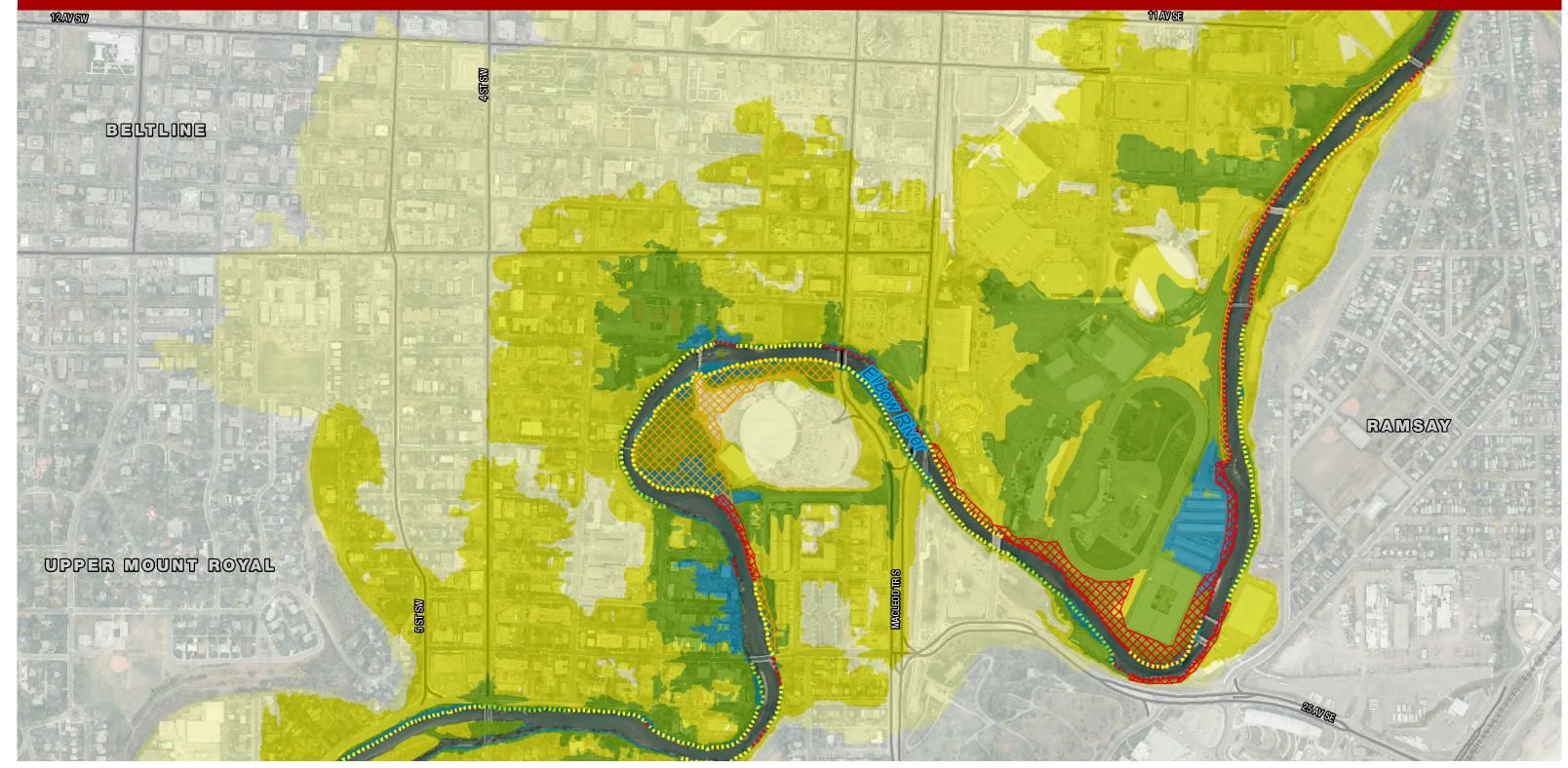
(See Theme 2-Land and Regulatory Issues)



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#### **Riparian Zone\***



Riparian	Health*

\*\*Based on field studies of

sampled riparian polygons only

Healthy Healthy, but with Problems Unhealthy

### Bank Health\*\*\*

Good

### Moderate

Poor

or steep valley slopes with limited riparian habitat

\*\*\*Based on field studies of major rivers / creeks, excluding private residential riverfront lots

 Streams Fish Creek Provincial Park

City Boundary

— Major Roads

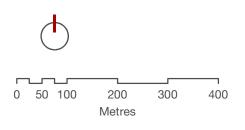
⊢++++ Rail



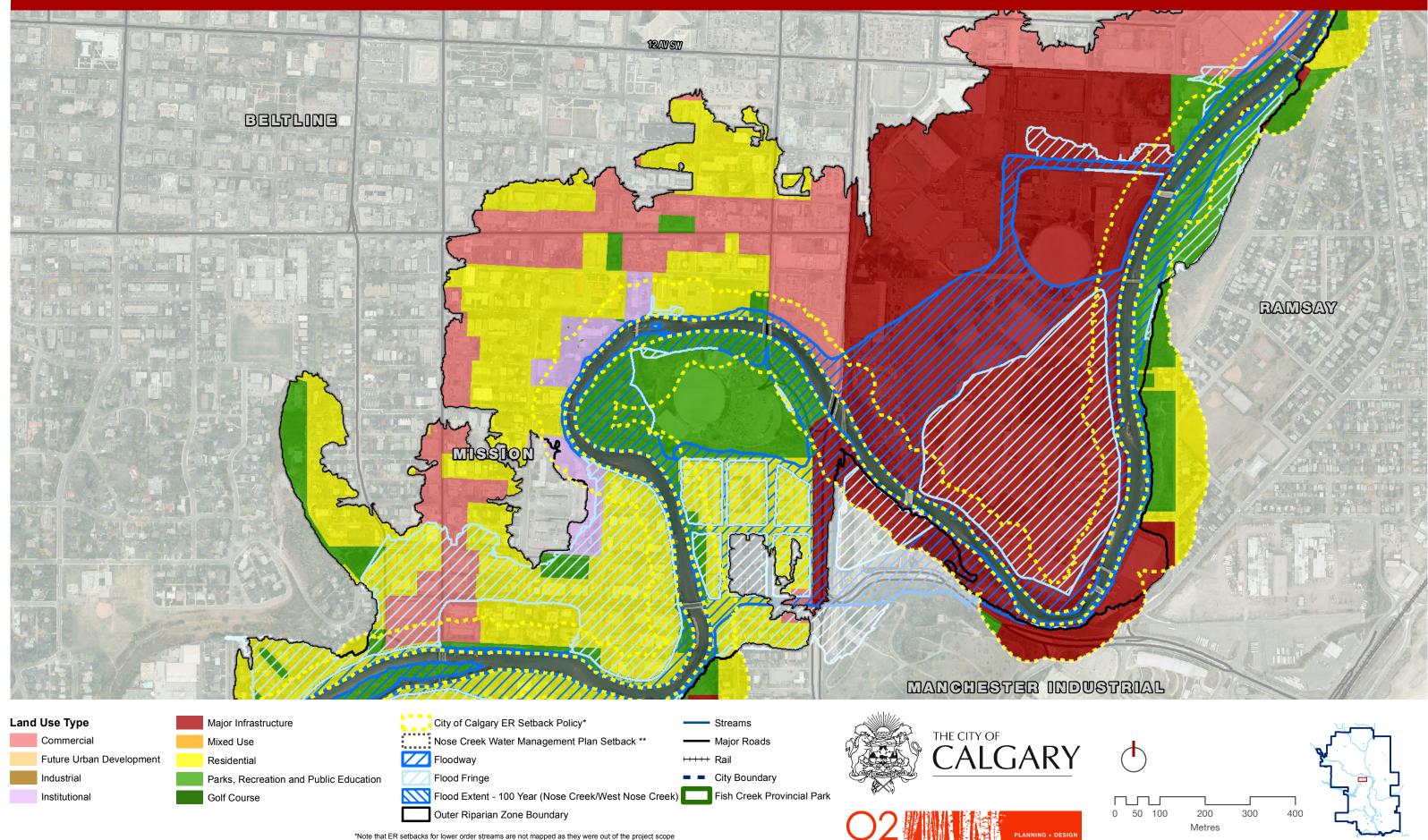


\*Variable Width Riparian Model Outputs

## **RIPARIAN AREA - LOCATION AND FUNCTION** ELBOW RIVER 07







\*Note that ER setbacks for lower order streams are not mapped as they were out of the project scope

\*\*Recommended setback boundary of Nose Creek Watershed Partnership including floodplain, meander belt width and adjacent escarpments >15%

## LAND AND REGULATORY ISSUES ELBOW RIVER 07

## EXISTING INFRASTRUCTURE AND POSSIBLE IMPROVEMENTS ELBOW RIVER 07



- Storm Outflow Location Stormwater Lift Station Storm Main (> 900mm diameter)
- Sanitary Main (>600mm diameter)
- Water Main (>400mm diameter)
- - · Siphon
- Pipeline River Crossing Locations Water / Waste Water Treatment Plants Existing Storm Retrofit Pond
- Possible Location of Storm Retrofit Pond

- Existing Storm Pond
- Existing Bank Infrastructure (e.g., Rip Rap, Retaining Walls, Weirs)
- Bank Erosion Hotspot
- Candidate Flood / Erosion Control Projects
- Paved Trails - Gravel Trails
- Bridge
- Buildings
- Parks (Maintained Turf Areas)

- Major Roads ⊢+++ Rail
- Streams Fish Creek Provincial Park

(ii) City ER setback policy boundary,(iii) Nose Creek Watershed Partnership

The non-masked area is based on the greater of: (i) outer riparian zone of the variable width model

recommended setback policy (See Theme 2-Land and Regulatory Issues)

