



Environmental Reserve Mapping

EDMONTON ANNEXATION PROJECT

Municipal Government Board Merit Hearing
June 12 2018

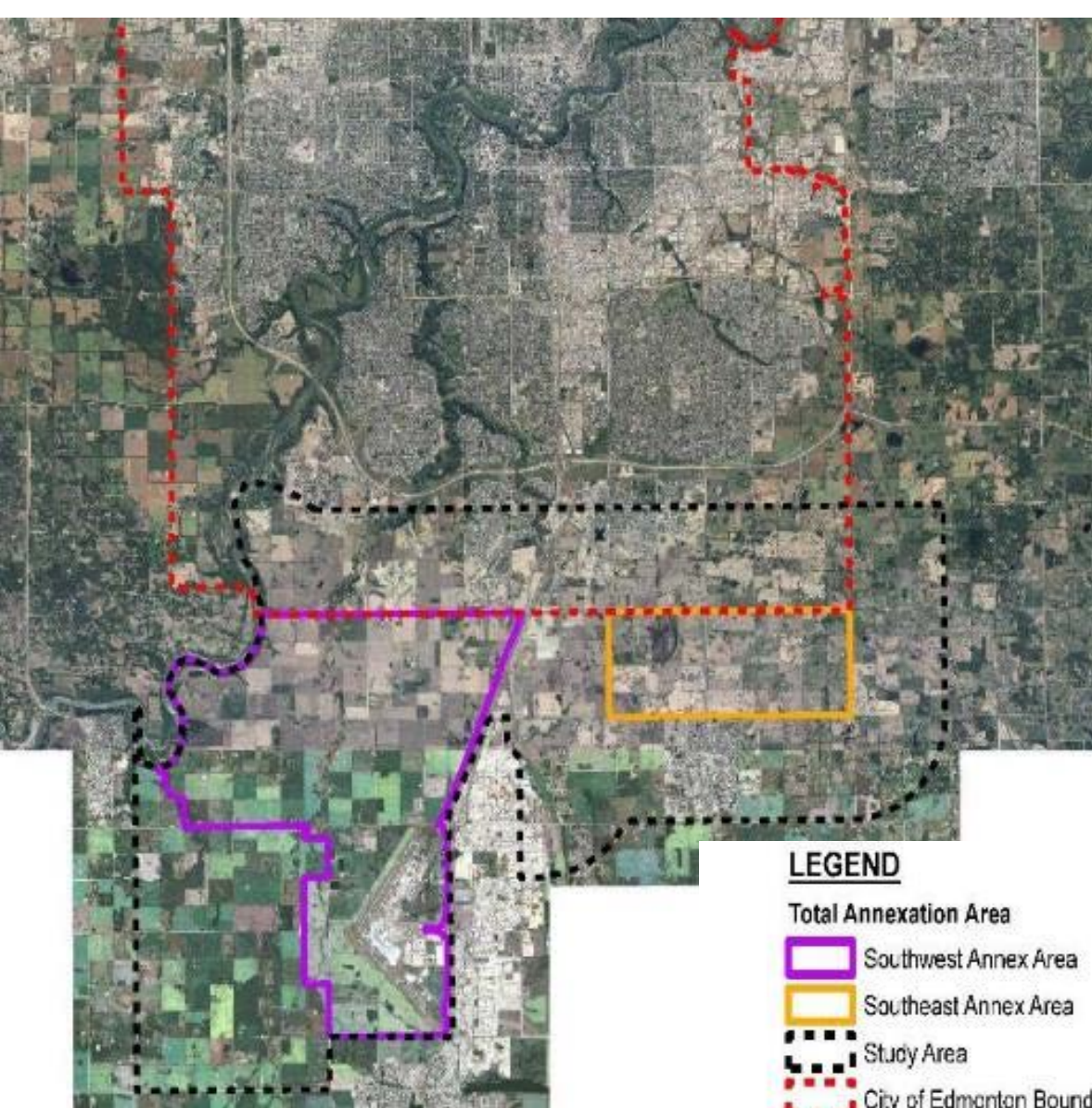


Overview

- Project objectives
- Study area
- Policy review – Environmental Reserve (ER) determination
- Methods review
- ER mapping results
- Recommendations

Project Objectives

- Collect GIS environmental information for *Growth Study Update*, to identify potential ER lands
- Demonstrate thorough understanding of current land inventory, including environmental sensitivities
- Incorporate that information into a plan to preserve important features and ecological systems, supported by policy and best practices



Annexation Areas and Environmental Sensitivities Study Area

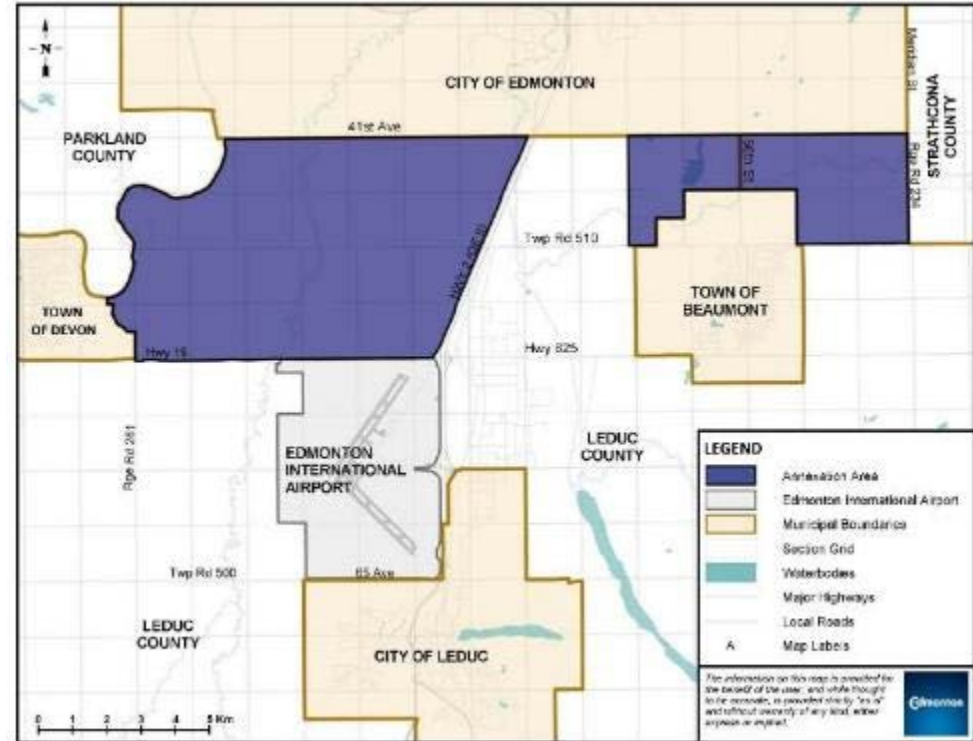
Study Area

Potential ER lands analysis:

- East area
- West area
- Airport lands

Environmental Sensitivities analysis:

- From south boundary of the City over all annexation lands



Original Study Area

Proposed Annexation Areas

Methods

ER dedication policies

ER identification standards for mapping

Past Assessments (comparative analysis):

- Regional assessments (1992 – 2008)
- Westworth & Associates (1990) Environmentally Significant Areas (ESA) study
- Fiera (2015) ESA study

ER Dedication Policies

PROVINCIAL

Municipal Government Act (& Subdivision Regulation), Part 17, Section 664:

- *A swamp, gully, ravine, coulee or natural drainage course*
- *Land subject to flooding, or unstable*
- *A buffer of **≤6 m** around bed and shore of lakes, rivers, streams, or other waterbodies*

Water Act (& Wetland Policy):

- Wetlands (typically **≥ Class III**)

Public Lands Act:

- Wetlands (≥ Class IV) and other waterbodies

MUNICIPAL

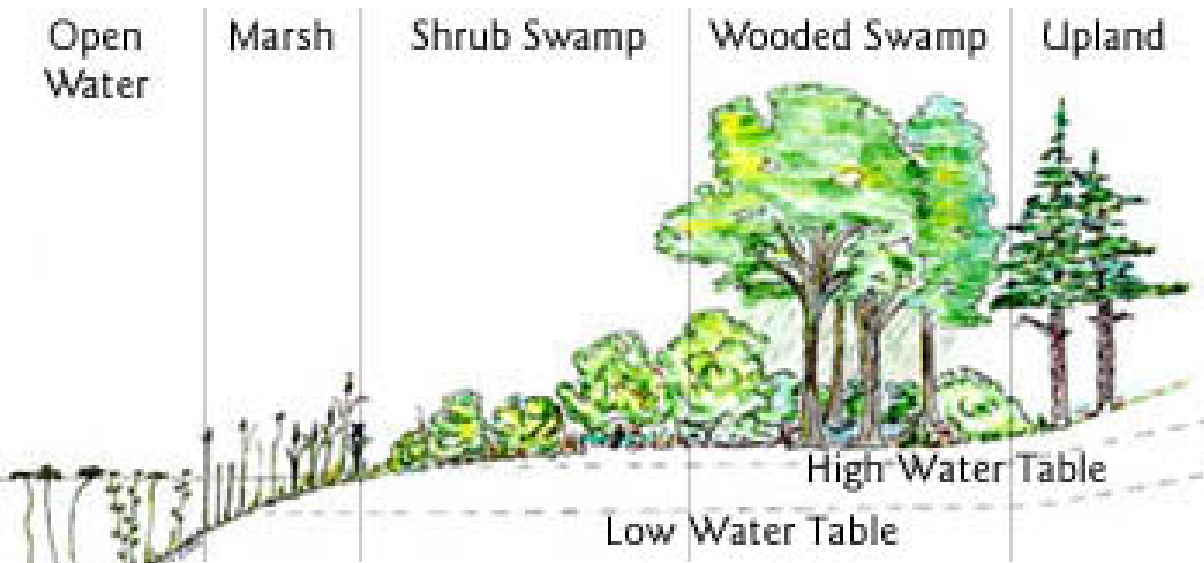
Natural Area Systems Policy (C531)

- **30 m** buffer around wetlands, streams and other waterbodies

Top of Bank Policy,

- minimum **10 m setback** (ravines, river valley)

Wetland Classification



Wetland Cross Section

Dem.ri.gov



**Class VI or V
(Open Water
Wetland)**

**Class II
(Temporary Marsh)**

Class III (Seasonal Marsh)



Potential ER Identification

CRITERIA

Provincial scenario:

- 6 m buffer to wetlands and streams
- no buffer on ravines

City scenario:

- 30 m buffer to waterbodies
- 10 m buffer along ravines

MAPPING METHODS

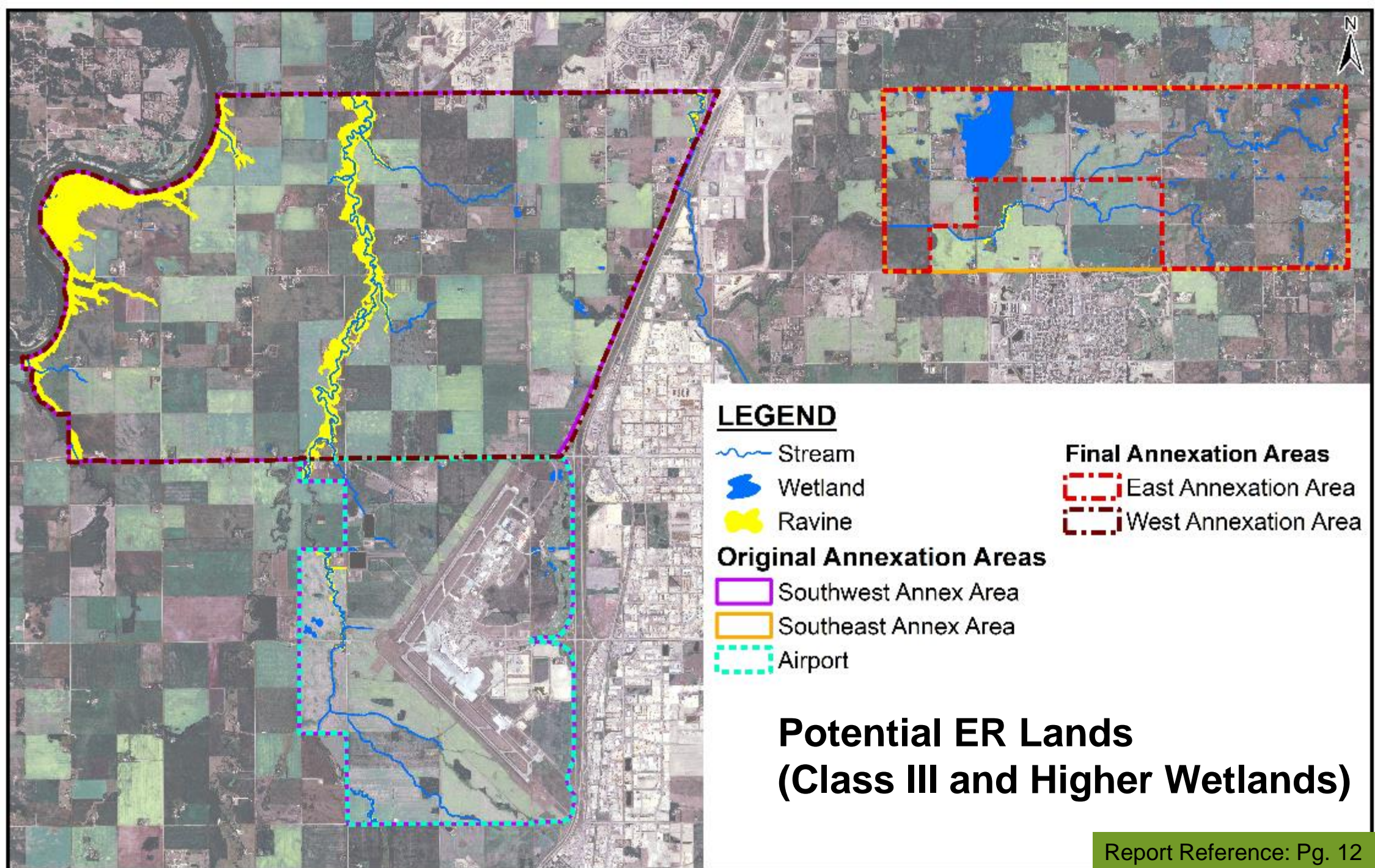
GIS remote sensing analysis of:

- Ravine and river valley slope (top of bank)
- Wetland mapping (0.5 ha, all classes)
- Stream mapping (1:5,000 scale)

Plus applicable buffers

Ravine / valley crest of slope:

- where slope $\geq 5^\circ$
- Shadow terrain map (manual fill of gaps)



ER Dedication Area, Conservative Estimate

| Annexation Area | ER Area (ha) | | | Total Possible ER (ha) | Total Annexation Area (ha) | % ER of Total Annexation Area |
|--|--------------|------------|-----------------------|------------------------|----------------------------|-------------------------------|
| | RAVINE | STREAM | WETLAND (≥ Class III) | | | |
| City Policy Scenario (30 m buffer on waterbodies, 10 m buffer along ravines) | | | | | | |
| West | 538 | 88 | 58 | 683 | 9,130 | 7.5% |
| East | 8 | 90 | 232 | 332 | 2,632 | 12.6% |
| Total | 546 | 178 | 290 | 1,015 | 11,762 | 8.6% |
| Provincial Policy Scenario (6 m buffer on waterbodies, no buffer on ravines) | | | | | | |
| West | 468 | 18 | 22 | 508 | 9,130 | 5.6% |
| East | 5 | 18 | 142 | 166 | 2,632 | 6.3% |
| Total | 473 | 36 | 164 | 674 | 11,762 | 5.7% |

Total Wetlands Area Estimate

| Wetland Area (ha) | | | | | | | Total Area (ha) |
|-------------------|-----------------|---------------------|--------------------|-------|-----|---|-----------------|
| Class II Marsh | Class III Marsh | Class IV Open Water | Class V Open Water | Swamp | Bog | | |
| West Area | 559 | 0 | 0 | 4 | 9 | 1 | 573 |
| East Area | 312 | 1 | 99 | 9 | 12 | 1 | 434 |

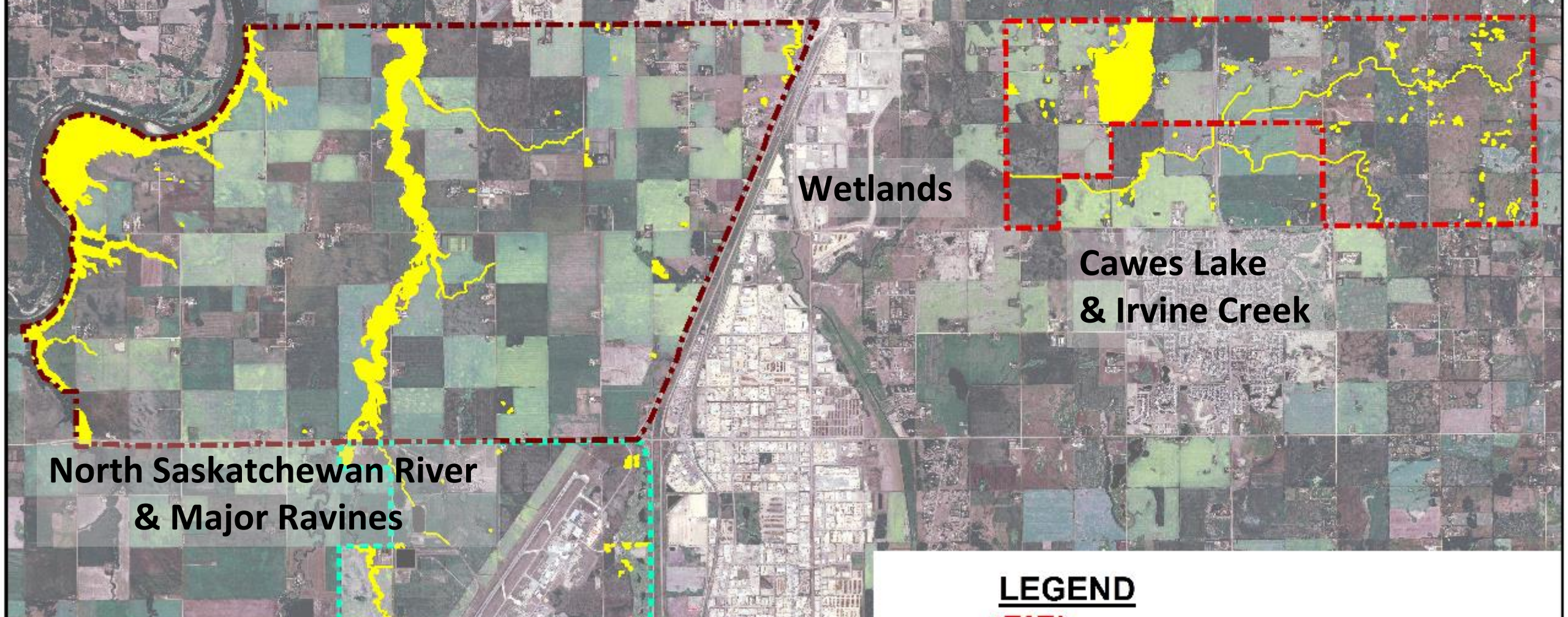
Comparison to Past Assessments

Consistently identified features:

- North Saskatchewan River valley & major ravines
- Large permanent lakes
- Edmonton regional studies (Ribbon of Green 1992, EPEC 1981, RVA 2008)
- Leduc County (Westworth & Associates 1990, Fiera 2015)

Fiera (2015) ESA Study:

- Wetland delineation = 97% accuracy, classification = 50% accuracy
- Identified 'significant' sites only (higher value)
- Limits application for ER estimation







Wetlands

Cawes Lake
& Irvine Creek

North Saskatchewan River
& Major Ravines

LEGEND

-  East Annexation Area
-  West Annexation Area
-  Airport
-  Environmental Reserve Lands

Key Conservation Areas

Conservation Recommendations

Conservation Recommendations – NSR and Tributary Ravine Systems



ECOLOGICAL VALUES

Terrestrial and aquatic habitat

Potential to conserve and enhance headwaters systems

- Wildlife connectivity
- Water quality protection
- Flood control
- Downstream aquatic habitat enhancements/protection

RECOMMENDATIONS

Conserve wetlands to provide flood control

Maximize vegetated buffers with ER dedication

Restore vegetated buffers on headwater streams

Locate future land uses in areas away from streams, ravines and river valley

Reduce wetland loss & stream modifications (e.g., Low Impact Development (LID) principles)

Conservation Recommendations – Cawes Lake and Irvine Creek Systems

ECOLOGICAL VALUES

Part of Beaver Hills moraine

- Abundant wetlands, important to regional hydrology (water quality, flood control)
- Extensive past human impact in some areas

Fish-bearing waterbodies

High terrestrial biodiversity

RECOMMENDATIONS

Watershed level drainage planning & restoration

Conserve wetlands where possible

- Improve water storage and water filtration/quality
- Improve aquatic and terrestrial habitat
- Enhance wildlife connectivity to Edmonton, Strathcona County (and Beaver Hills)

Conservation Recommendations - Wetlands

ECOLOGICAL VALUES

Key role in regional hydrology, biodiversity and Ecological Goods and Services (EGS) functions

Abundant Class II marsh habitat – high potential loss and consequence



RECOMMENDATIONS

Implement LID strategies to maintain water functions

- Groundwater recharge
- Water filtration, nutrient reduction
- Habitat

Conservation of wetlands, and adequate buffer

- City-policy maintains 30 m buffer
- Potential retention and enhancement through wetland mitigation

Edmonton's Conservation Toolbox

Assessment Policy

- NSRV Area Redevelopment Plan (Bylaw 7188)
 - *Environmental Impact Assessment*
- Natural Areas Systems Policy
 - *Ecological Network Report*
 - *Natural Site Assessment*
 - *Ecological Design Report*
- MGA ER / MR dedication
 - *COE Wetland Policy*
 - *Top of Bank Policy*
- Federal/AB legislation

Strategic Plans

- The Way We Grow (MDP)
- The Way We Green
- Natural Connections Strategic Conservation Plan
- Urban Parks Management Plan
- Ribbon of Green Master Plan
- Plan of Action for the Capital Region River Valley Park

Local Planning

- Area / Neighbourhood Structure Plans
- Area / Neighbourhood redevelopment plans
- Natural Area Management Plan
- River Valley Parks Master Plans

Other Tools

Land Ownership / Easements

- City land purchase (Tablelands / River Valley)
- Edmonton Area Land Trust
- Conservation Donation / Easement

Corporate Stewardship

- Departmental Programs:
 - *Roadways and Parks Naturalization Programs*
 - *Naturalization of Stormwater Facilities / Constructed Wetlands*

Citizen Stewardship

- Public Parks & Biodiversity Programs:
 - *Partners in Parks*
 - *Urban Forestry*
 - *Integrated Pest Management*
- Community Services Facilities Programs:
 - *John Janzen Nature Centre Programs*
 - *Valley Zoo Programming*
 - *Muttart Conservatory Programming*
- Other NGO Partnerships



Conclusions

- Key features:
 - Abundant wetlands, ravine and stream systems...and associated Ecological Goods and Services
- City has means to conserve and enhance features and functions:
 - City policies (ER buffers and setbacks, Environmental Sensitivities Project)
 - Land use planning to manage features at landscape level (streams, watersheds)



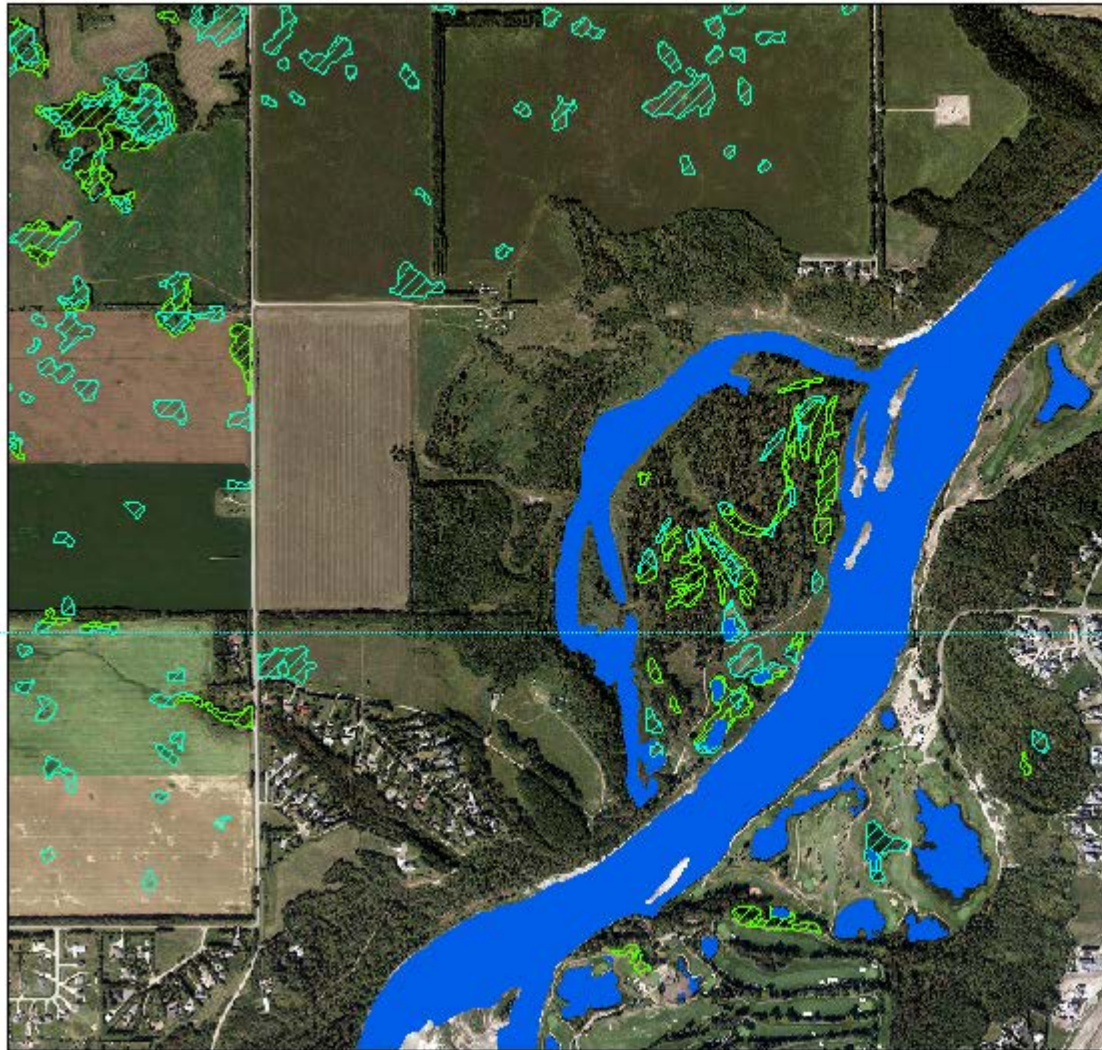
Credit: City of Edmonton

Questions?



Wetlands

Wetlands



Legend

Wetlands S_K_Class

- I
- II
- III
- IV
- V
- Bog
- Willow Wetland
- uPLVI Waterbody

1:15,399

Streams – Intermittent to Permanent

Horton Stream Orders



Legend

STREAM_ORDER

Horton Class

— 4; 5; 6

1:100,000

Ravines

