



Community Water, Energy & Resource Recovery

- Challenges & Learnings -

Alberta Innovates | WIP Forum 2019

waterwerx
- healthy communities -

 ALBERTA INNOVATES

 UNIVERSITY OF
ALBERTA

Prof. Nicholas Ashbolt, PhD; Ken Pacholok, MSc, Peng; Prof. Yang Liu, PhD, Peng

VISION

Research Hub

Embedded within purpose-built demonstration community

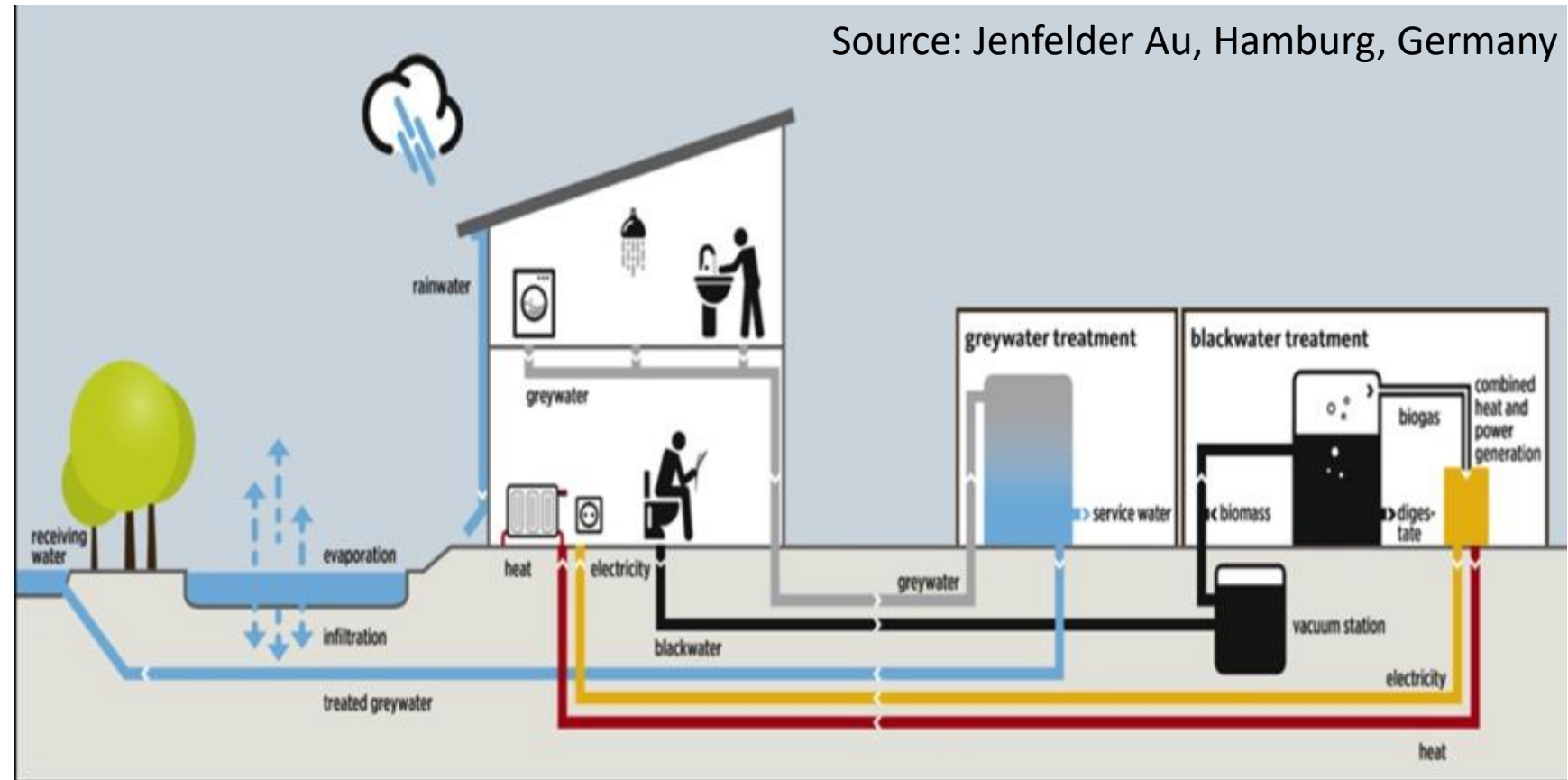
Integrated Water Management

Black, Grey, Storm & Riparian

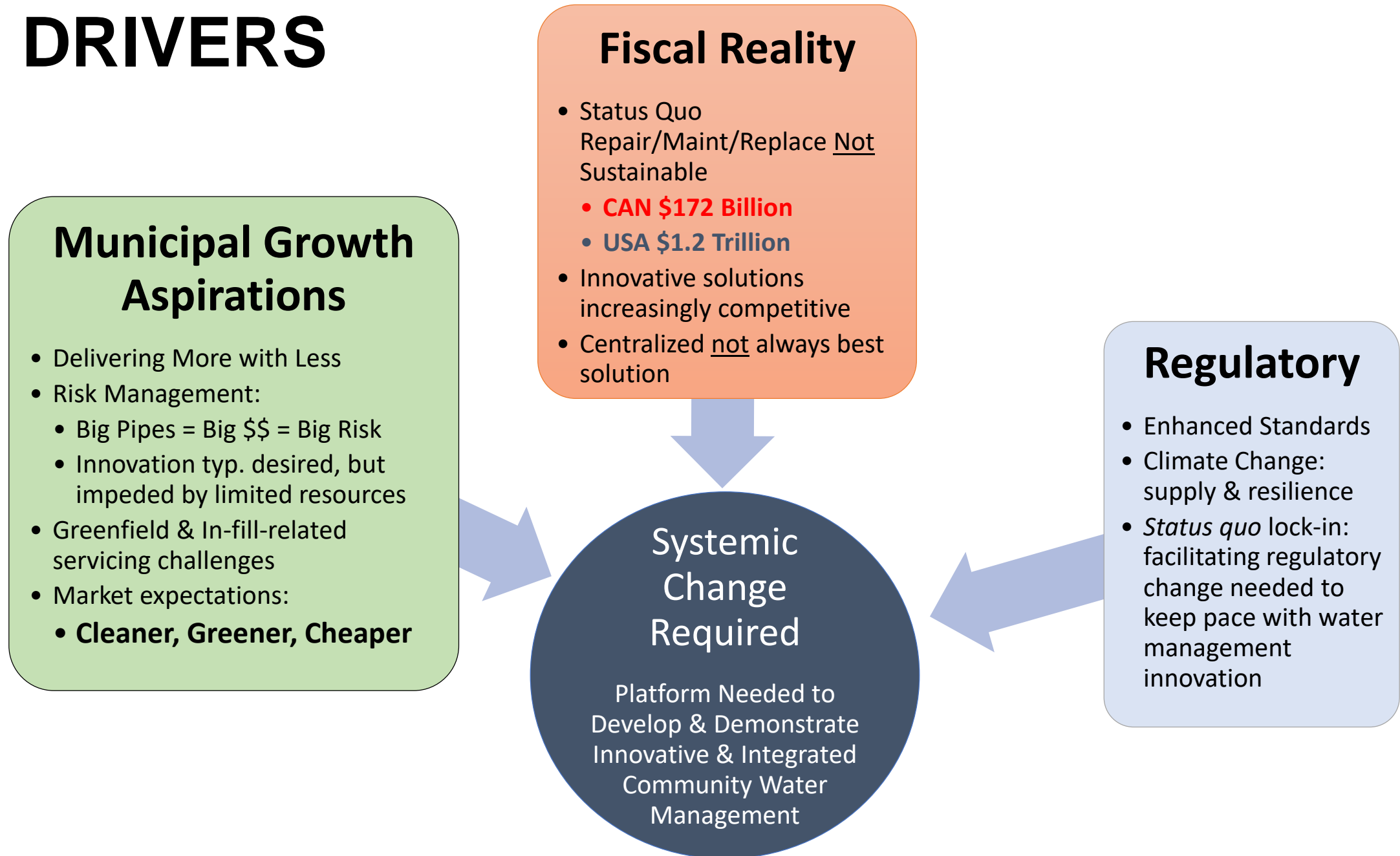
Multi-Stakeholder Approach

Academia, Government, Industry & Community Stakeholders

Advance community sustainability through innovative water, energy & nutrient solutions



DRIVERS



OBJECTIVES

80% less*

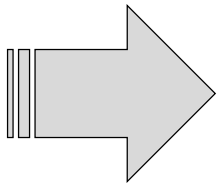
Potable Water

40% less*

GHG Emissions

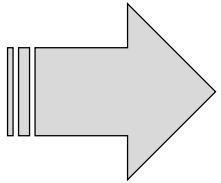
50% less*

Lifecycle Costs



Novel Water Infrastructure Capacity

Diverted blackwater for energy & nutrient recovery



Phase 2: Greywater and Stormwater

Close loops & enhance environmental protection

* Depending on community needs & solution configuration (Xue *et al.* 2016. Water 8: w8040154)

LEVERAGING STRENGTHS



ARRC: Alberta Resource Recovery Centre

GOA: AEP, Seniors, Municipal Affairs, EDT / AI

IRC: NSERC Industrial Research Chair in Sustainable Urban Water Development

ALES: St. Albert Research Station

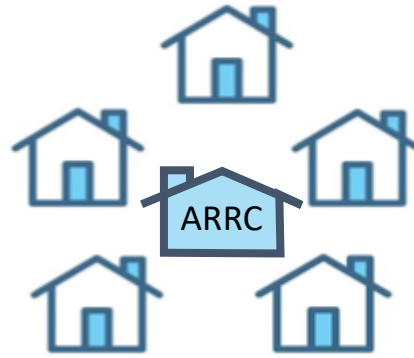
SVSSA: Sturgeon Valley Special Study Area

STAGING



Research Facility

- **Community Resource Recovery**
 - Blackwater (E&N Recovery)
 - Greywater (ReUse)
 - Stormwater (Use)
 - Riparian (Resilience)
- **Product Development**
- **Learning**
- **Training**



Demonstration Community

- Innovative Spatial Planning
- Urban Scale (> 1,700 pe)
- Purpose Built to support & showcase ARRC
- Potential hub for Community Innovation District featuring Water, Food & Energy Nexus



Off-Site Implementation

SUPPORTING INITIATIVES

Laboratory

- NSERC Industrial Research Chair in Sustainable Urban Water Development
- Source-Diverted & Combined Treatment Systems
- LifeCycle Analysis (LCA)
- System Dynamics Modelling (SDM)

Advocacy

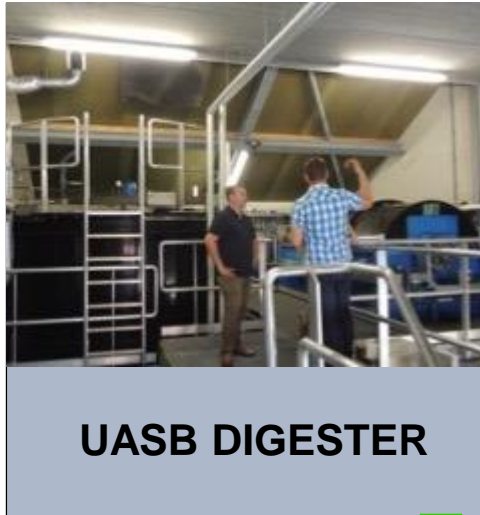
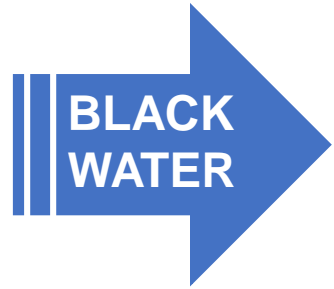
- Water Reuse Reg (AB, CAN, USA)
- Northern Communities, WHO, Gates Fdn, Legionnaires NAS
- NSERC IRC partners

Offsite Pilots

- Cities of Calgary, Okotoks, Devon, etc.

PHASE 1 - RESEARCH FACILITY

NEIGHBOURHOOD RESOURCE RECOVERY



Biogas



District Heating



Struvite



PHASE 1 - RESEARCH FACILITY

NEIGHBOURHOOD RESOURCE RECOVERY



**NUTRIENT RECOVERY
SYSTEM**

- AWAITING TRANSPORT -



POLITICAL CHALLENGES

Advancing Community Sustainability

>> What could possibly go wrong . . .??



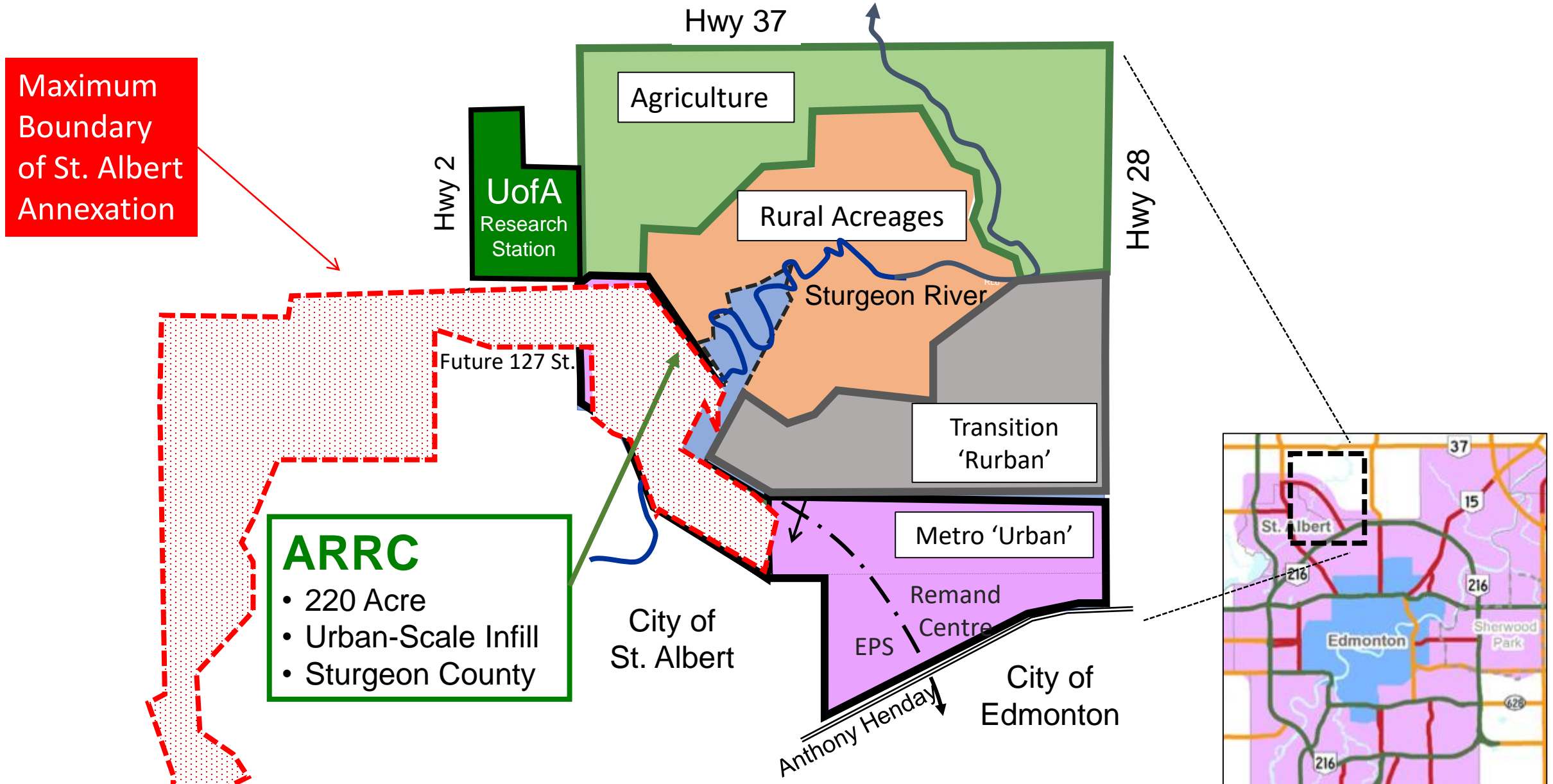
POLITICAL CHALLENGES

Project Landscape: Evaluate feasibility of Urban-Scale Neighbourhood Resource Recovery

- **Q3-2016: Ideal site chosen with suitable density & infrastructure**
 - Density: prescribed as 'urban' since 2003 (IDP); ratified as 'urban' in 2010 regional growth plan
 - Sanitary trunk at or near capacity (no municipal cost recovery to influence servicing solutions)
 - **Q1-2017: AI Project Begins**
 - Q1-2017: Equipment designed & commissioned on urban scale (1,700 pe)
 - Q2-2017: WW & Sturgeon County sends staff to tour European installations
 - Q3-2017: Development Permit submitted & 20m setback accepted
 - Q3-2017: Municipal Election; new Mayor & 3 new Councilors support sustainability (& ARRC)
 - **Q1-2018: Project on Hold >> Regional Plan Amendment**
 - Sturgeon provides reasonable assurance ARRC lands will remain status quo 'urban'
 - At request of Sturgeon, project on-hold until regional plan amendment expected in Q2-2018
 - **Q4-2018: Project ReStarted:**
 - 'Special Area' approved Q4-2018 with ARRC land remaining 'urban' (as per 2003 . . .)
 - **Q4-2018: St. Albert Annexation**
 - Q4-2018: St. Albert 'conceptually supports' ARRC, but imposes **+3 yr project moratorium** on all annexed lands
 - St. Albert views ARRC as **potentially incompatible** with new alternate servicing plan . . .
- **Status: ARRC proceeding with support of Sturgeon County**

2 yrs delay
to approve
density
prescribed
15 yrs
prior . . .

REGIONAL PLANNING



MILESTONES

Water Reuse Guidelines

- ✓ Draft developed, within ministries for final release
- ✓ Input & published USA non-potable reuse standards
- ✓ Input & published Canadian/USA (CSA/ANSI) rainwater-stormwater standard

Pilots & Demonstrations

- ✓ Blackwater Pilot -> project complete & relocated offsite (Clover Bar)
- ✓ Greywater Pilot -> construction 95% complete
- ✓ Blackwater Demonstration -> equipment 95% complete

IRC Lab Research

- ✓ Blackwater feedstocks evaluated & designed for BTP
- ✓ Life-cycle assessment underway & greywater options manuscript submitted

Land Use Planning

- ✓ Urban density re-confirmed Dec 2018 by regional board (EMRB)
- ✓ Host municipality supportive & recommending to **advance project !**
 - **Risk: If lands are annexed by adjacent community => Possible Project Delay / Relocation . . .**