Water Reuse Policy Development: Understanding Opportunities and Barriers

ALBERTA waterSMART
Water Management Solutions

Presentation at the Alberta Water Council, Water Reuse Symposium

June 26th, 2014

Alberta WaterSMART

We are committed to improving water management through better technologies and practices, for the social, economic and environmental benefit of current and future Albertans, and then sharing these solutions with Canada and the world.

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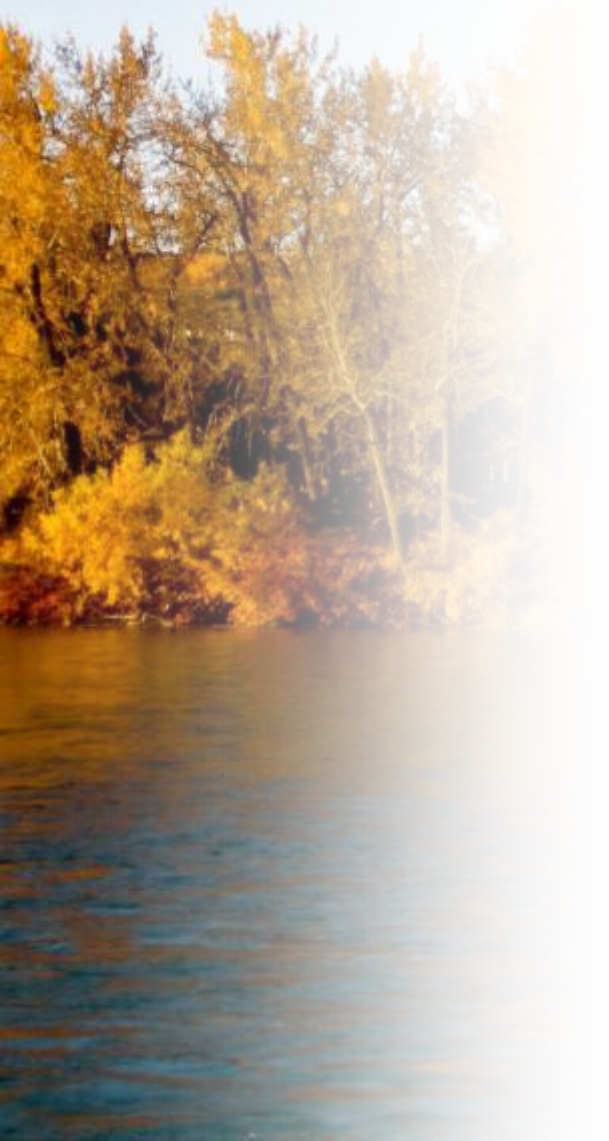
Presentation Outline



- Alberta Innovates – Energy and Environment Solutions (AI-EES) Water Reuse Project.
- Water Reuse in Alberta Today.
- Water Terminology
- Opportunities.
- Policy Barriers.
- Possible Policy Options (Part 2).

Building On Previous Work

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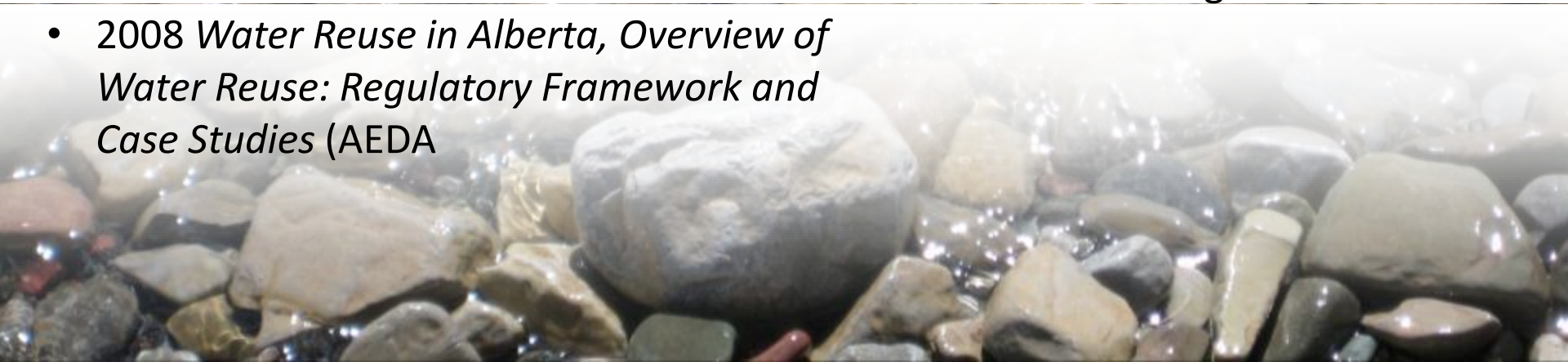
Research / Policy Papers

- 2012 *Water Reuse in Alberta: Experiences and Impacts on Economic Development* (Alberta Economic Development Authority [AEDA])
- 2011 *Grey Water Recycling and Reuse in Alberta* (Alberta Finance and Enterprise)
- 2008 *Sustainable Water Management and Economic Development in Alberta* (AEDA)
- 2008 *Water Reuse in Alberta, Overview of Water Reuse: Regulatory Framework and Case Studies* (AEDA

Projects Involving Reuse

- Bow River Project
- South Saskatchewan Adaptation Project
- Co-operative Stormwater Management Initiative (CSMI)
- Canada's Oil Sands Innovation Alliance (COSIA) Regional Water Management Initiative



AI-EES Water Reuse Project Scope

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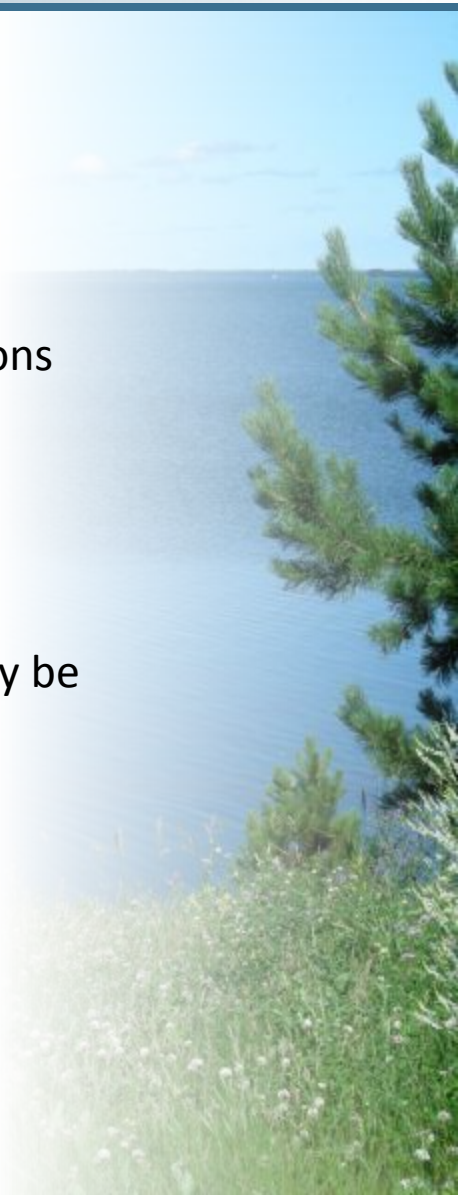
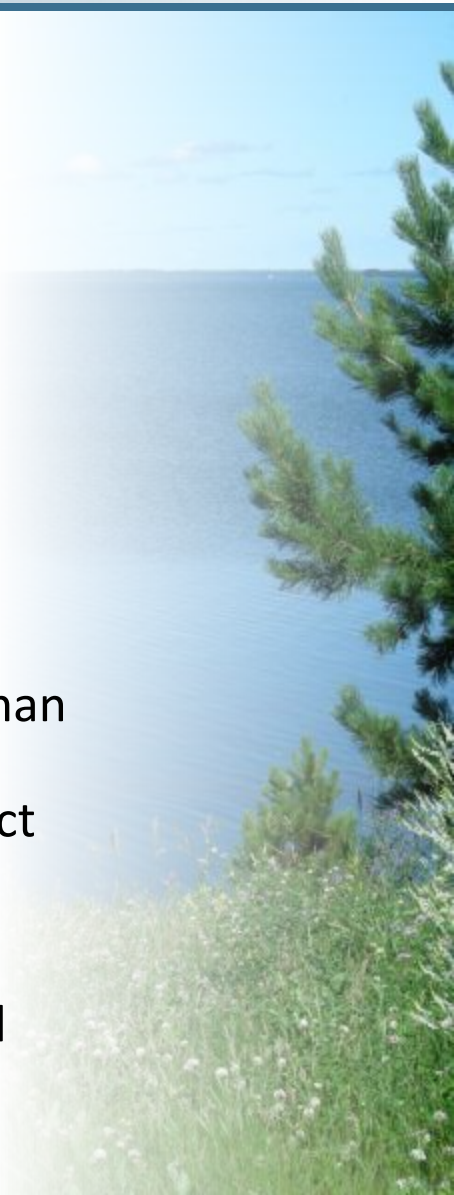
- Develop definitions for water and reuse.
- Determine water reuse and return flow linkage.
- Investigate three case studies to identify:
  - gaps in Alberta's regulatory framework and recommendations for updating it;
  - opportunities for flexibility in policy and regulation;
  - new technologies and recommendations on how standards should change; and
  - costs and benefits, and cost-allocation frameworks that may be used to inform decision making processes.
- Develop policy recommendations.
- Improve the management of reused water and storm water in the case study communities through reuse strategies and policies.

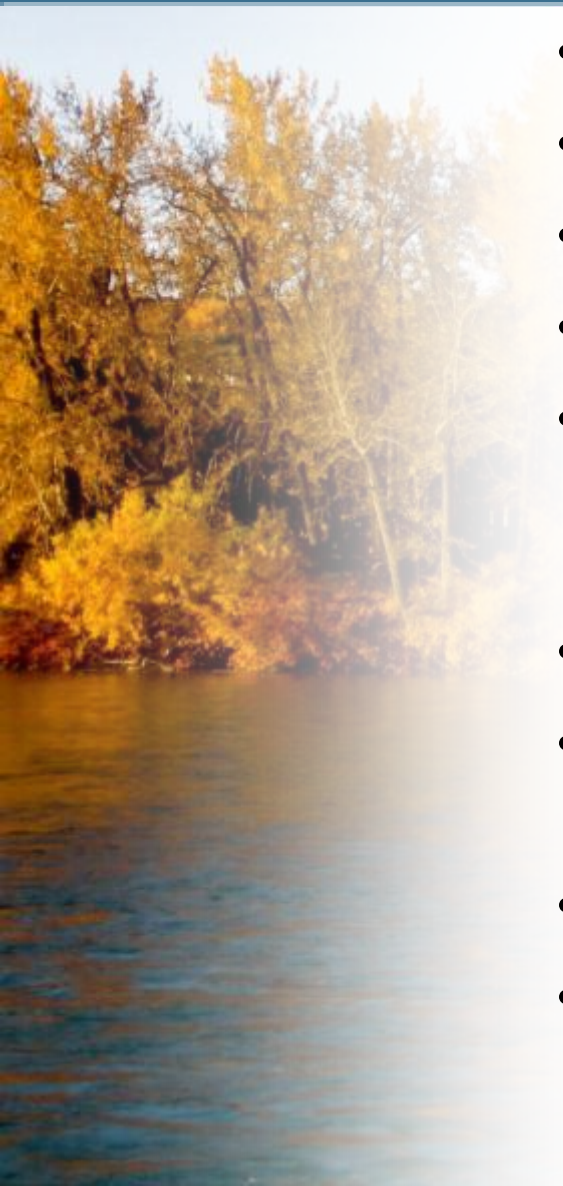


Project Methodology

- Undertake research on existing Alberta policy framework to understand current water terminology and requirements pertaining to reuse.
- Conduct a global scan of water terminology, water reuse and stormwater use in other jurisdictions.
- Assess the potential for water reuse based on licenced return flows.
- Assess potential wastewater reuse scenarios' impact on river systems.
- Using the Bow River Operational Model (BROM) and the Oldman South Saskatchewan Model (OSSK), illustrate the linkage between return flow and water reuse, and the potential impact on the receiving river systems and the Apportionment Agreement.
- Assess the potential use of stormwater based on existing legal requirements.



Guiding Principles



- Do no harm.
- Minimize environmental impact.
- Support beneficial reuse.
- Reuse for conservation and efficiency.
- Work within the *Water Act* and the *Environmental Protection and Enhancement Act* and other relevant legislation.
- Understand environmental baselines.
- Use cumulative effects management implementation with integrated resource management.
- Minimize re-licensing.
- Reduce Alberta Environment and Sustainable Resource Development (ESRD) resource requirements.

Collaborating Partners

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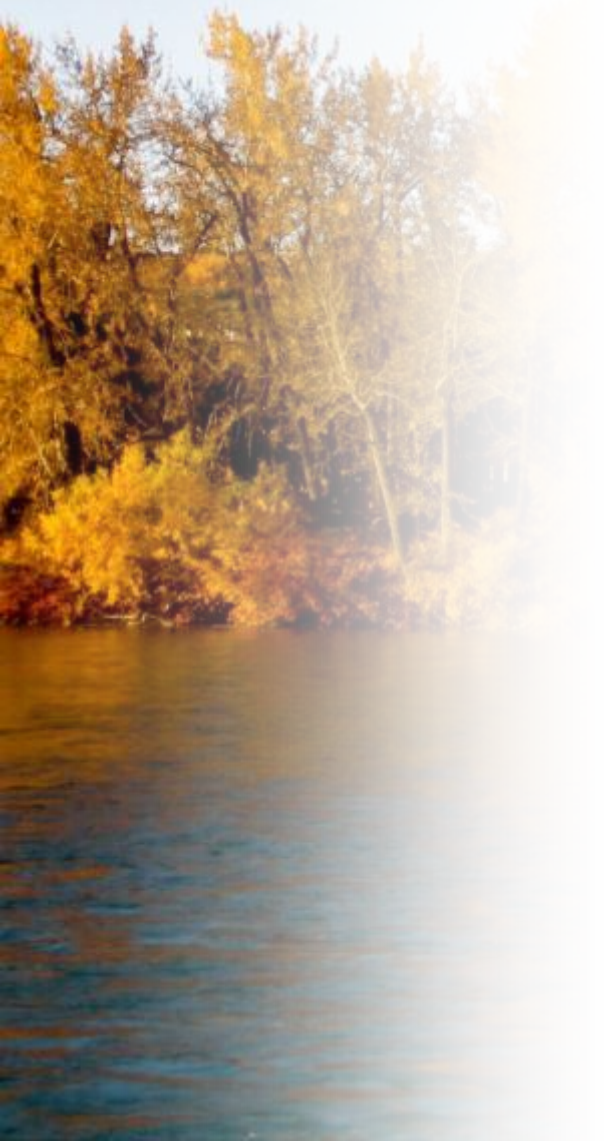
Funding Partners:

- AI-EES
- AEDA
- Alberta Environment and Sustainable Resource Development (ESRD)

Case Study Partners:

- Regional Municipality of Wood Buffalo (RMWB)
- Western Irrigation District (WID)
- City of Calgary
- Rocky View County (Westhoff Engineering)

Water Reuse in Alberta Today



- Alberta is unique - different regions have distinctive water contexts.
- Bow River Basin and Oldman River Basin are closed to new licences. Water stressed region.
- Northern Alberta has water short areas, with water quality challenges.
- Tremendous interest in water reuse and stormwater use.
- Water policy framework contains gaps resulting in water reuse and stormwater use barriers.

Water Terminology

- Project scope included developing definitions for water and reuse.
- However, research showed there are definitions missing in Alberta's water policy framework.
- Too, there is inconsistent use and/or interpretation of water terminology - a lack of shared understanding of what is meant by a given water term.
  - Stormwater, rain water, runoff water, end fate, water source, reused water, reclaimed water, recycled water, end fate, return flow, water reuse, stormwater reuse/use, etc.
- Significant barrier to water reuse and stormwater use.

Opportunity

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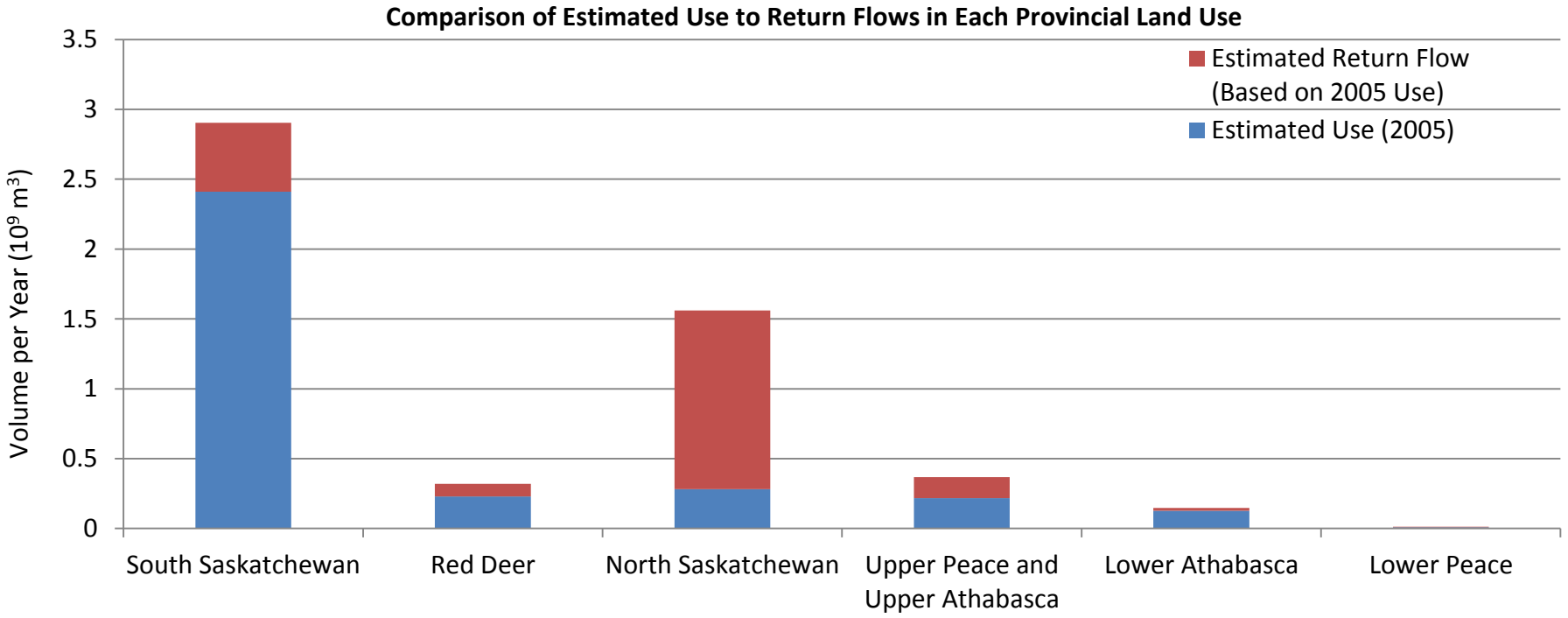
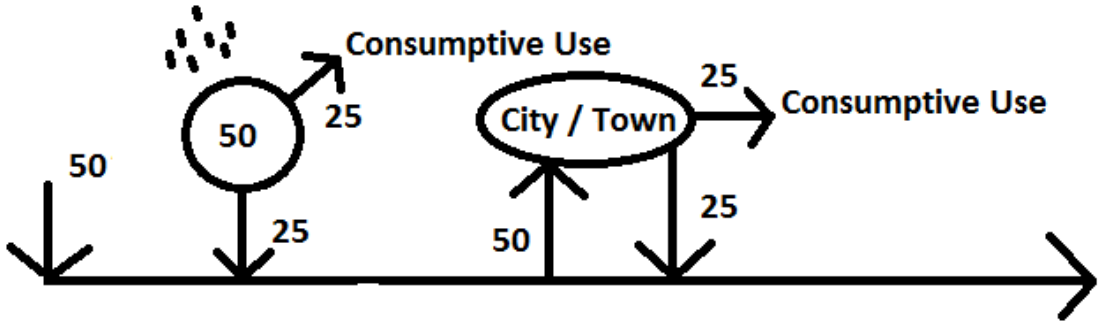
Water is available to support economic development without harming the environment, compromising *Master Agreement on Apportionment 1969* (Apportionment Agreement) or negatively impacting downstream users.

Environmental Impact Considerations

- The amount of return flow in Alberta is significant compared to total use.
- This shows estimated return flows to river systems. The South and North Saskatchewan Regions have significant return flows potentially available for use.



Master Agreement on Apportionment 1969



Total natural flow to watercourses = 100 Minimum to Saskatchewan = 50

A minimum of 50% of all natural flow in any watercourse is required to flow into Saskatchewan. 50% was the amount used for this project's analysis. However, there can be exceptions to this amount based on daily volumes to Saskatchewan.

Modelling to Assess Use of Return Flows

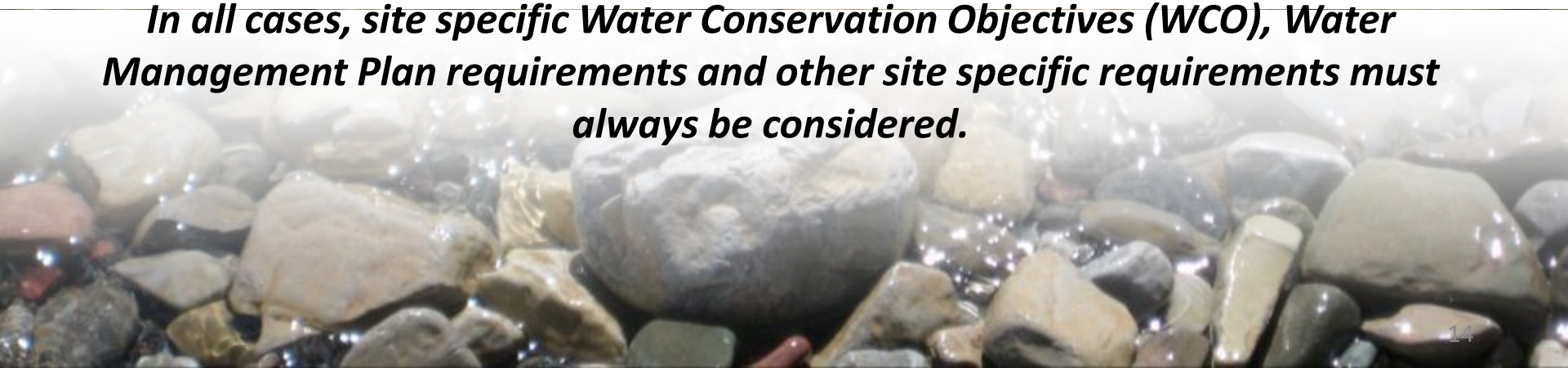
- The Bow River Operational Model (BROM) and Oldman South Saskatchewn (OSSK) Model were used to test the use of return flows while meeting the Apportionment Agreement.

- There is some room for a reduction of return flow in the SSRB.

- There is less potential for reduction in the Oldman River Basin.

- The Red Deer River Basin requires an assessment to determine how much return flow could be used.

In all cases, site specific Water Conservation Objectives (WCO), Water Management Plan requirements and other site specific requirements must always be considered.



Return Flow Use Opportunity

There are significant volumes of treated wastewater that are currently not returned to the river system, or are only returned on a seasonal basis and are typically associated with concerns of decreasing water quality during those releases. The number of facilities are shown below. Volumes for these undischarged volumes and season discharges are not monitored.

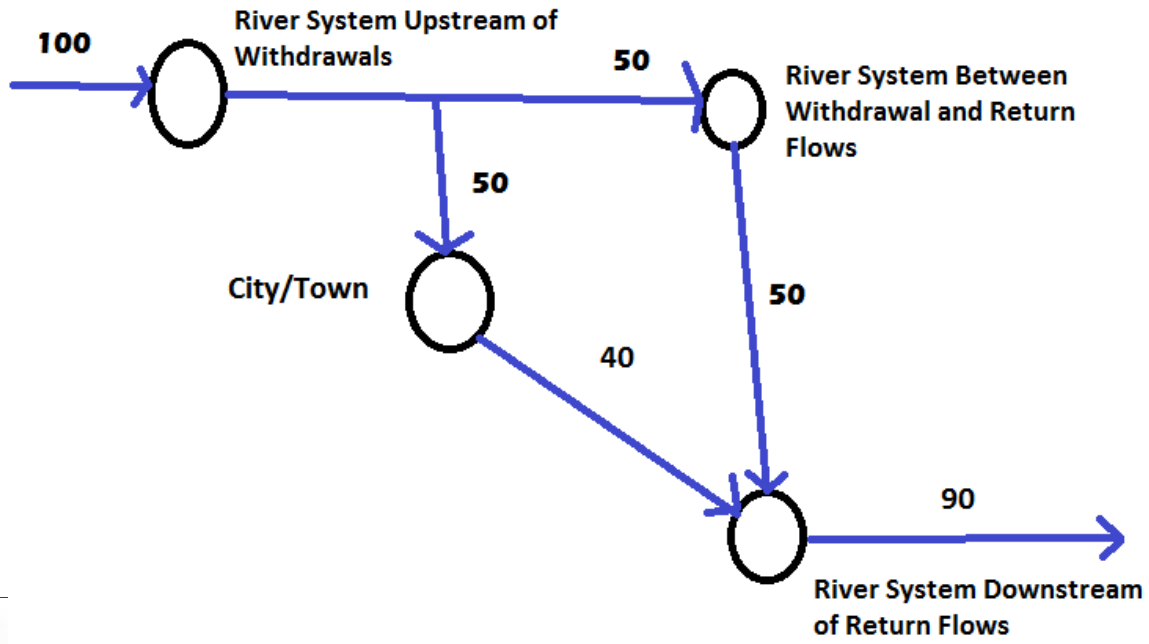
WWTP Facility	Total Report	Discharge to River or Stream	Discharge to Receiving water*	No Discharge to Stream or River
Mechanical plants	103	77	84	30
Lagoons	395	240	306	157
"Other" WWTPs	10	0	0	10
Total	591	317	390	280

*including streams, rivers, lakes, wetlands, sloughs, ponds

Source: AECOM 2009. Municipal Wastewater Facility Assessment Phase 1

Return Flow Illustration

Current Base Case



- 80% of municipal withdrawals are assumed to be returned in this conceptual base scenario. However, this is not the case for all municipalities.

Return Flow Use Opportunity

- **Exchanging Water Type for Current Use**
  - Using effluent for consumptive or non consumptive use rather than fresh water (i.e. water upstream of a withdrawal) has no impact on the river downstream;
  - It has a positive impact on the section of river between the point of withdrawal and return.

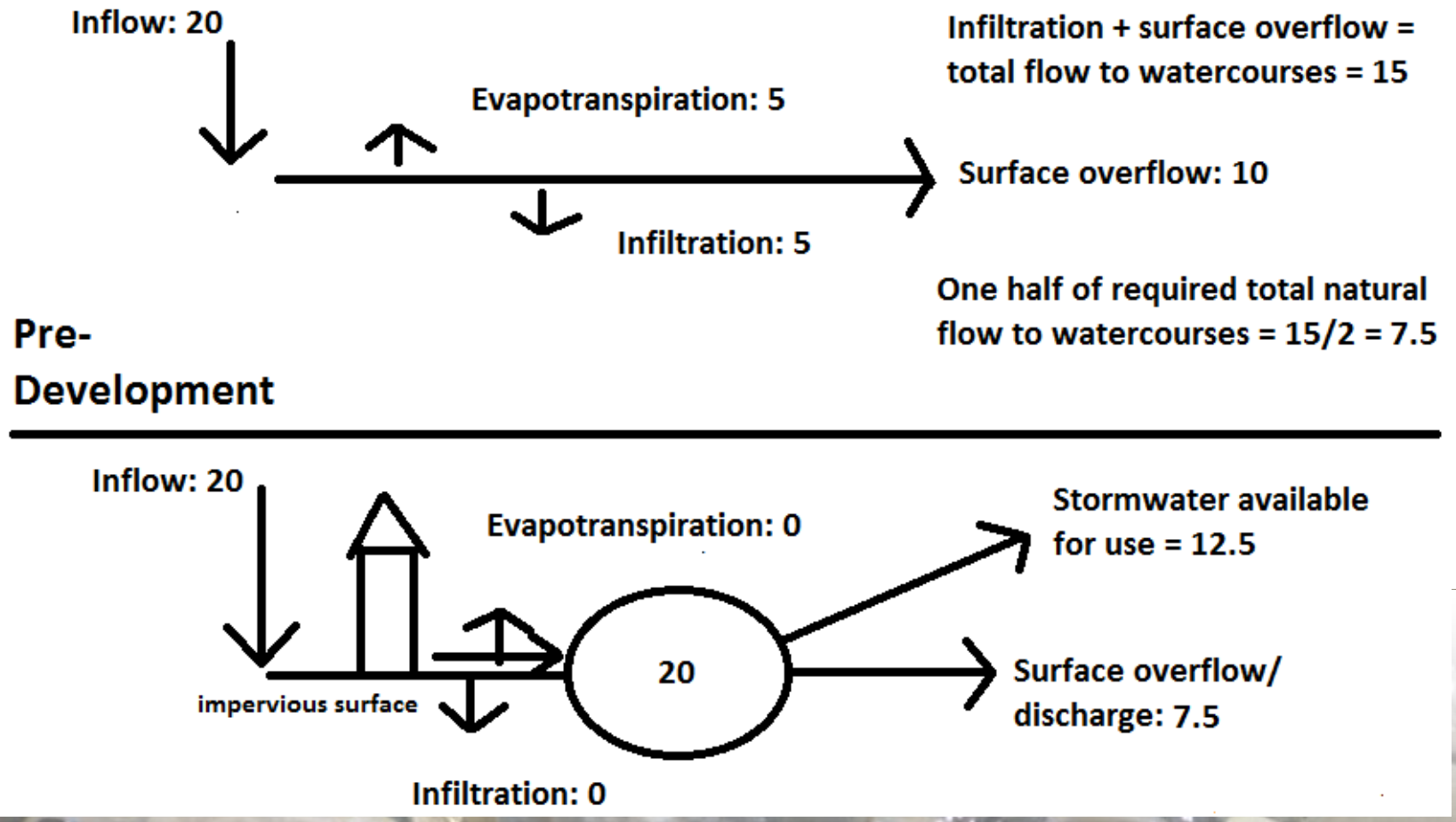
- **New Consumptive Use**
  - new consumptive use of either direct withdrawal of river water (i.e. upstream of a withdrawal) or effluent will reduce the return flow and the volume/flow of the river downstream if it is not offset with a reduction in consumptive use (e.g. conservation).

This supports the integration of reuse within existing conservation, efficiency and productivity plans that currently exist, and continue to be developed by various economic sectors across the Province.

Stormwater Use Opportunity

- 50% of stormwater that would naturally flow into watercourses could be used without violating the Apportionment Agreement.
- Downstream users and environmental health must always be considered.
- 50% of groundwater connected to surface water must also be returned.
- On this basis, in catchments or watersheds that are not hydrogeologically connected, stormwater can be used for beneficial purposes.

Stormwater Use Opportunity



Barriers Impeding Opportunities

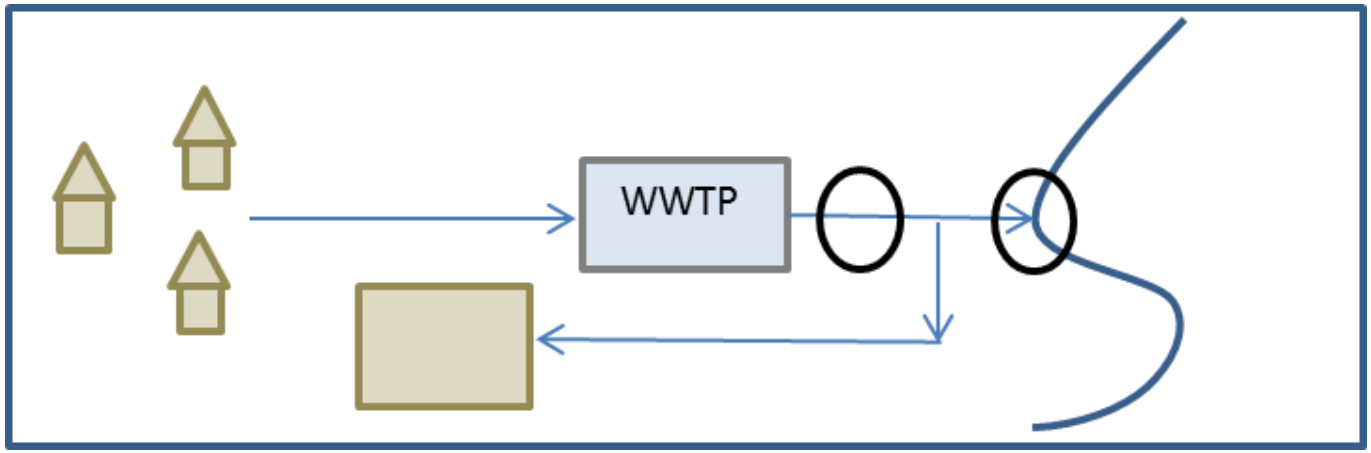
- There are legislation gaps regarding the right to use water.
- There are policy gaps on the impact of water reuse and stormwater use on river requirements.
- There are regulation gaps on the implementation of water reuse projects.

Current Practice

- Previous priorities on water management have not included water reuse due to the degree of interest and availability of water.
- This has created barriers for consistent licensing and approval opportunities.
- However, water reuse and stormwater use interest has risen considerably.
- ESRD has endeavoured to support innovative and non-impactful water reuse and stormwater use projects.
- Projects have been implemented based on various interim accepted practices and guidelines.

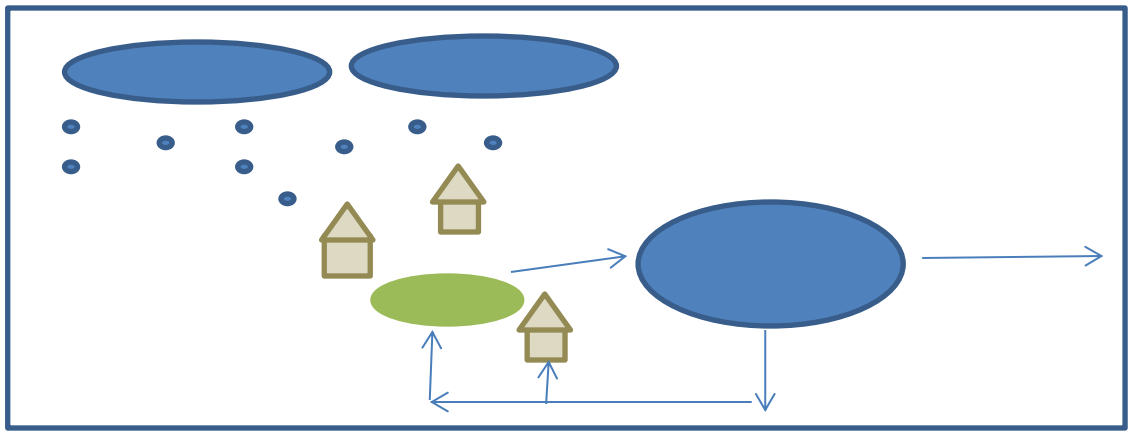
Right to Use

- There are gaps on the right to use surface and groundwater more than once.
  - No written policy or legislation indicating where or when the location or timing of right to access the water is released back to the Crown after its initial use.
  - No written policy or legislation indicating whether licensees must return the effluent after an initial use.



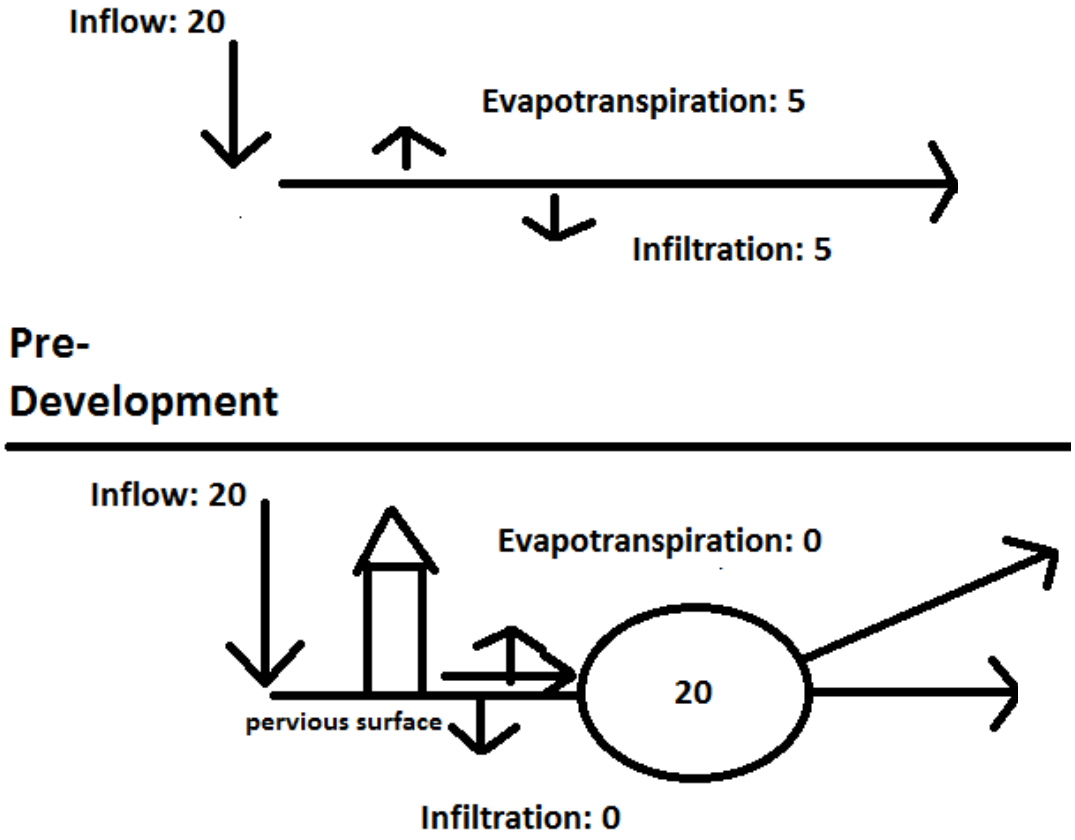
Right to Use

- The right to use stormwater and rainwater is unclear.
  - The *Water Act* indicates that a diversion is not required if the sole purpose is for "drainage", or if continued drainage of water results in "no impact" to existing household users, traditional agriculture users, or licensees. However, no written public policy indicates what constitutes drainage, or how the conditions **of meeting "no impact" are satisfied.**



An interim policy indicates stormwater can only be used for irrigation AND….

Right to Use



The volume available for use is the difference in evapotransporation for pre- and post-development.

In this example, only 5 units could be used.

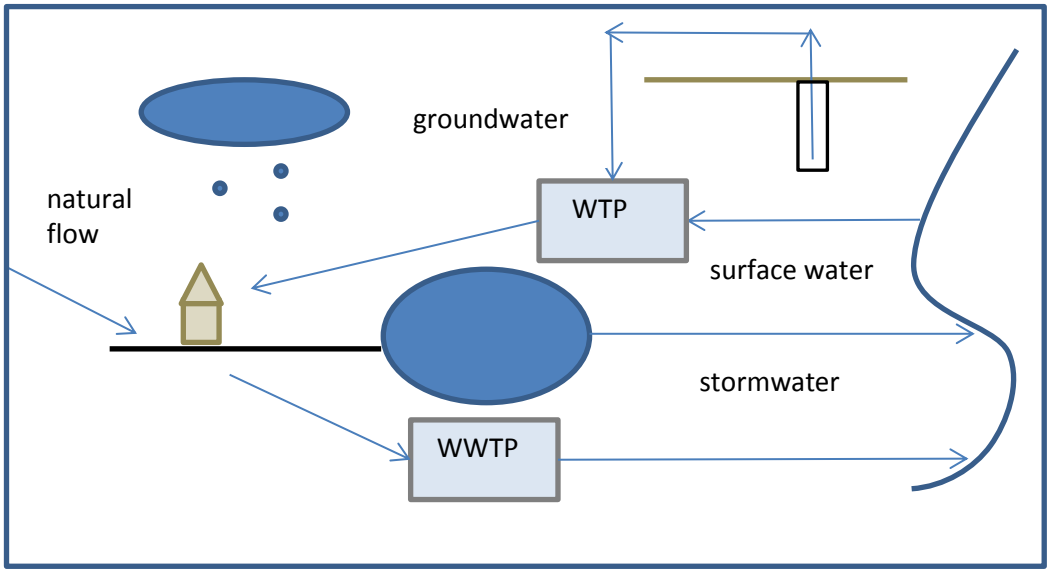
Right to Use

- Current policy does not support the right to use tailings water
  - No written policy indicates how use of tailings water will be managed, or if its use will be exempt from typical licensing or approval requirements.
  - Tailings water is considered fresh water (<4,000 mg/L), which is discouraged for use by the Oilfield Injection Policy.

River Requirements

- River requirements include apportionment agreements, aquatic health, and downstream users.

- Current policy does not identify the impact of changing inputs to the river systems due to various uses of surface water, stormwater, rainwater and groundwater.



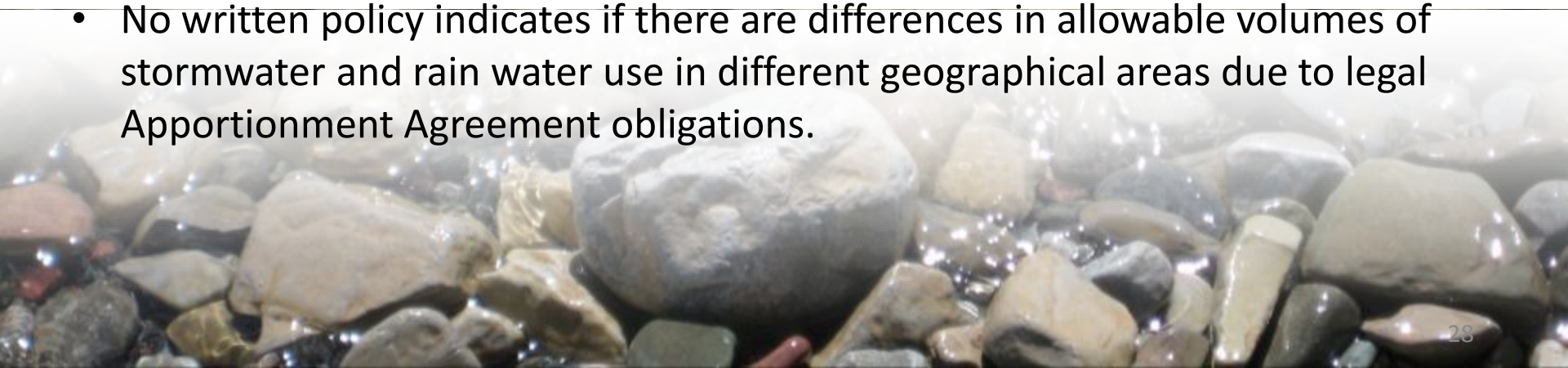
River Requirements

- Aquatic health objectives like WCOs and Instream Flow Needs (IFN) have not always been established based on science, are not reach specific, and do not exist for all stretches of Alberta's rivers and tributaries.

- Bow River Basin vs. Lower Athabasca Watershed
  - Bow River Basin is highly controlled, Athabasca River is not.
  - Low flow periods in Athabasca are much lower compared to average flow than in the Bow River.
  - These will change more due to climate change.

River Requirements

- The term stormwater is not defined in any Cabinet approved policy, and there is confusion with respect to how it relates to natural flow.
- No written policy states if collected stormwater is required to meet aquatic health objectives.
- Stormwater discharge volumes are not listed on stormwater diversion licenses, and in most cases are not monitored or reported as part of EPEA approvals.
- No written policy indicates how it is determined if Apportionment Agreement obligations are impacted by allowing each new use of stormwater.
- No written policy indicates if there are differences in allowable volumes of stormwater and rain water use in different geographical areas due to legal Apportionment Agreement obligations.



Implementation

- There is currently no licensing and approval process for water reuse projects.
- Current policy framework does not support integrated water management through reuse.
- Definitions within existing policy and among stakeholders are unclear and do not allow for implementation of effective reuse policy.

Implementation

- Alternative Use Fact Sheet – Municipal Affairs.
  - Limited to residential dwellings
- If stormwater use or reuse requires a *Water Act* licence, closed basins must be opened and license caps extended, or legislation must be changed.
- Based on the current definition of drainage in the Interim Accepted Practices, this applies to the use of stormwater for purposes other than application to land. There is no current existing authorization mechanism for stormwater use, other than irrigation and evapotranspiration equation) in a closed basin.
- This limits assurance to:
  - third parties and licensed proponents; and
  - municipalities who are responsibility for the operation and maintenance of water infrastructure in their jurisdiction

Implementation

- There are many benefits to water reuse through integrated water management. This is not formally recognized by any written policy.

- The use of tools to ensure sustainable reuse and stormwater use is not encouraged by policy, and to our knowledge, the Government of Alberta is not currently in the process of developing such tools.
  - fit for purpose
  - net environmental effects
  - quantitative risk management

Summary

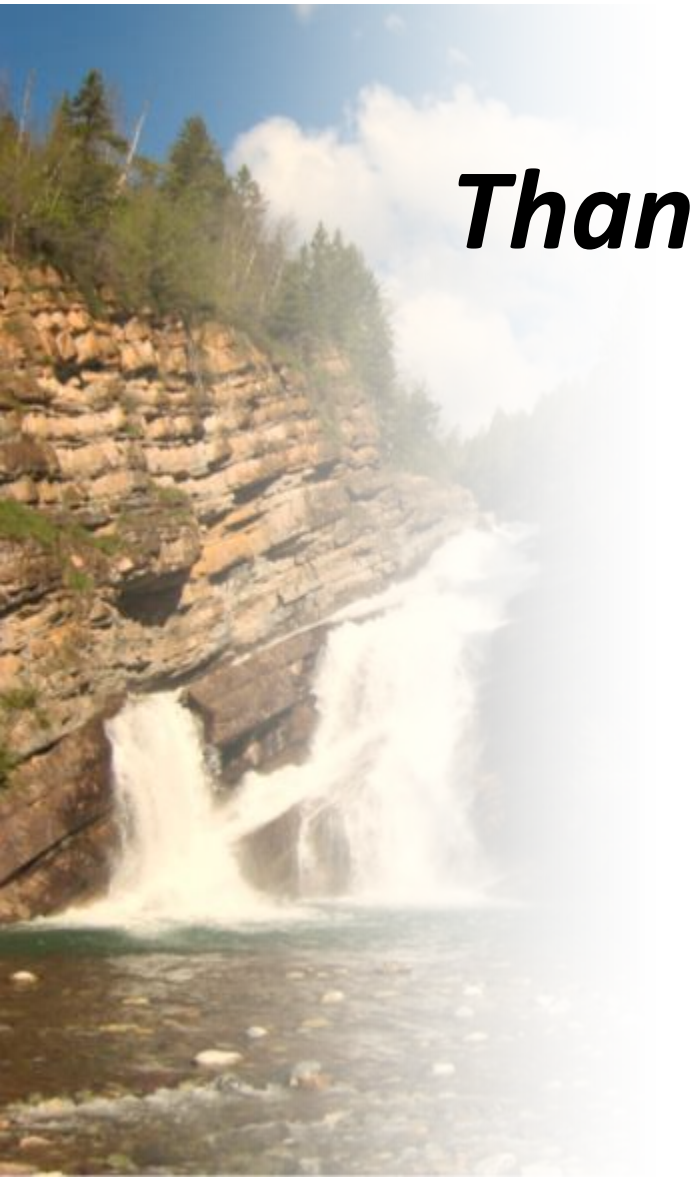
- There are gaps, inconsistent use and interpretation and a lack of shared understanding of water terminology creating barriers to water reuse and stormwater use.

- Water is available to support increased economic development

  - The amount of return flow in Alberta is significant.
  - Some volume of return flows could be used without violating Apportionment Agreements.
  - Water reuse activities have the potential to improve the environment under numerous circumstances.
  - There are numerous wastewater treatment facilities not currently returning treated wastewater, or are returning on a seasonal basis.
  - Groundwater, stormwater and mine tailings water could be used where there is no net impact.

- However, there are policy barriers that make it challenging to harness this water.

Questions and/or Comments



Thank you…

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