Removing Barriers to Implementation in the City of Calgary: Why and how would a municipality implement stormwater reuse in Alberta?

Alberta Water Council Re-Fresh 2014 Symposium

www.calgary.ca call 3-1-1

THE CITY OF CALGARY

City of Calgary Sustainability Direction: A Systems Thinking Approach

Water Quality

Calgary's public health and the health of its watersheds are protected by delivering safe and reliable drinking water, collecting and treating wastewater, and minimizing the impact of Calgary's urban form.

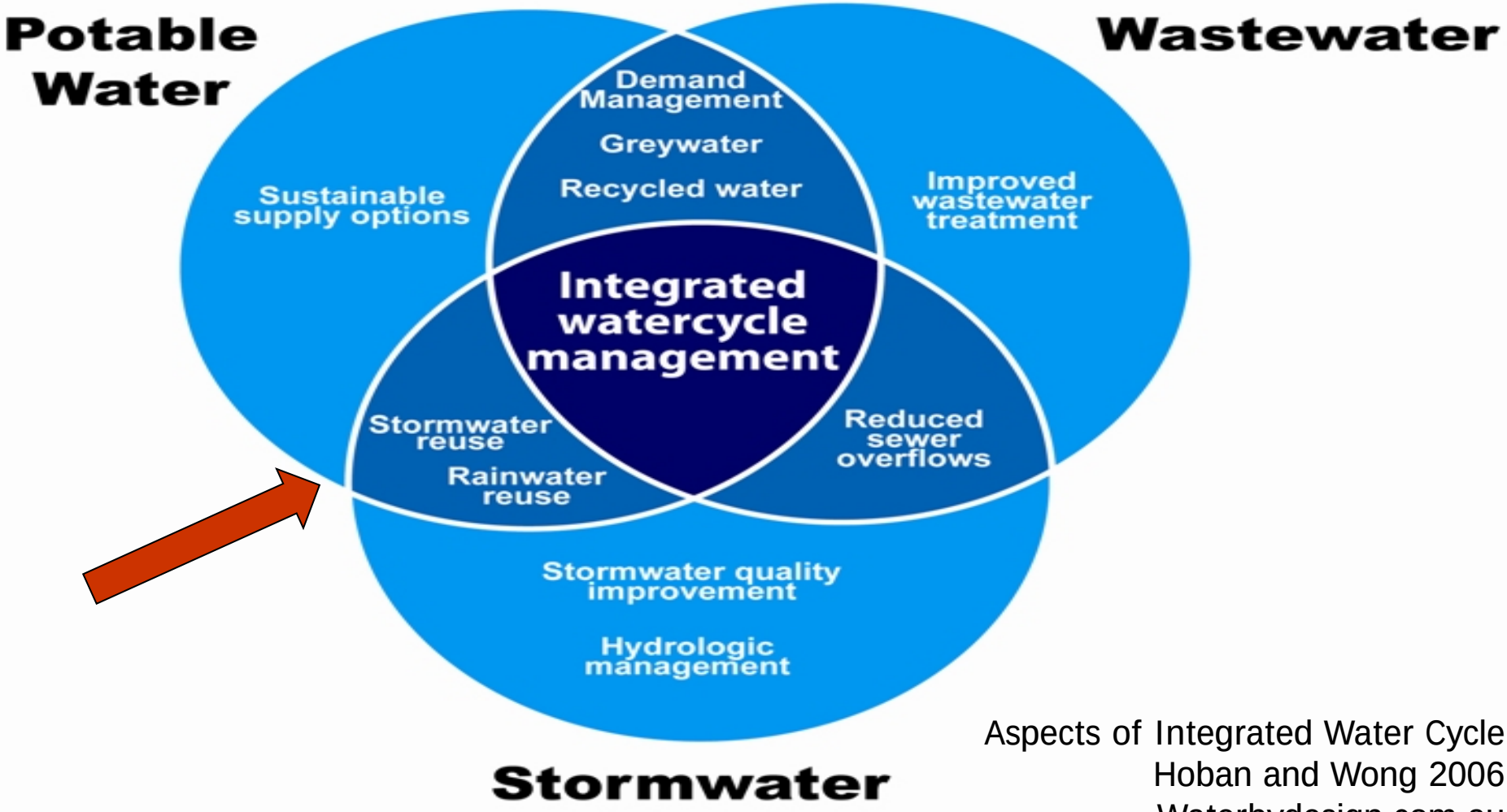
Water Quantity

The long term sustainability and resiliency of Calgary's water supply meets the current and future needs of a growing city and region.

In a nutshell:
Urban Water Management Issues for Calgary

- “Not Enough” Water
  - water supply and demand
- “Too Much” Water
  - stormwater quantity
- “Dirty” Water
  - stormwater quality

Integrated Water Management = Integrated Water Cycle



Aspects of Integrated Water Cycle
Hoban and Wong 2006
Waterbydesign.com.au

Let's put the Water Sustainability Principles in a more holistic context, creating a link to Integrated Urban Water Management

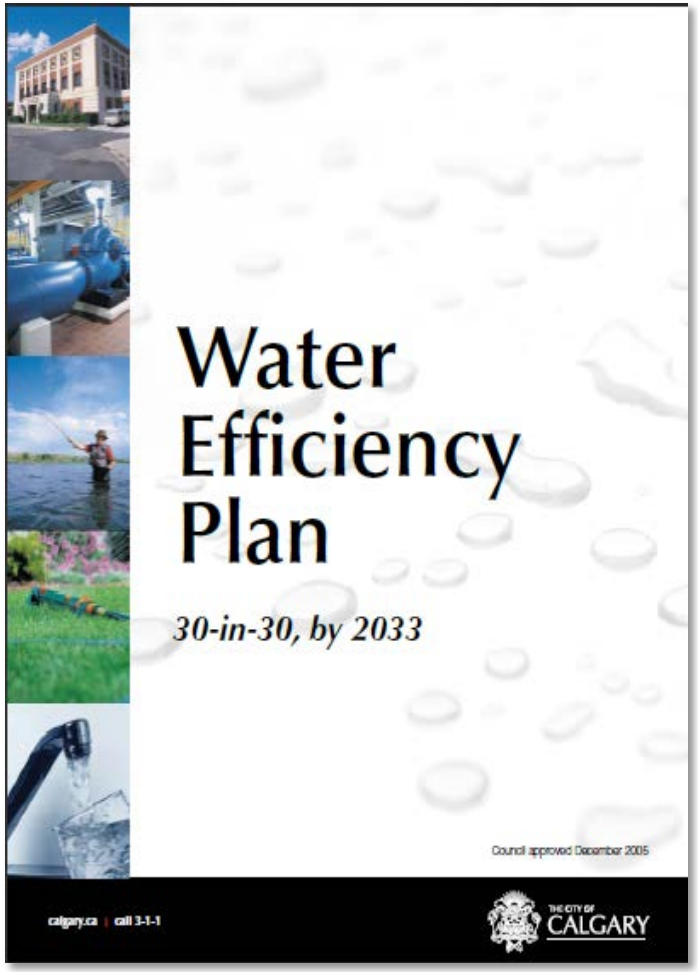
Water Sustainability Principles:

- Sustain our community with an appropriate supply of potable water of good quality
- Sustain our community with appropriate stormwater management
- Sustain the Bow and Elbow Rivers
- Sustain our creeks
- Sustain our wetlands
- Sustain our landscape

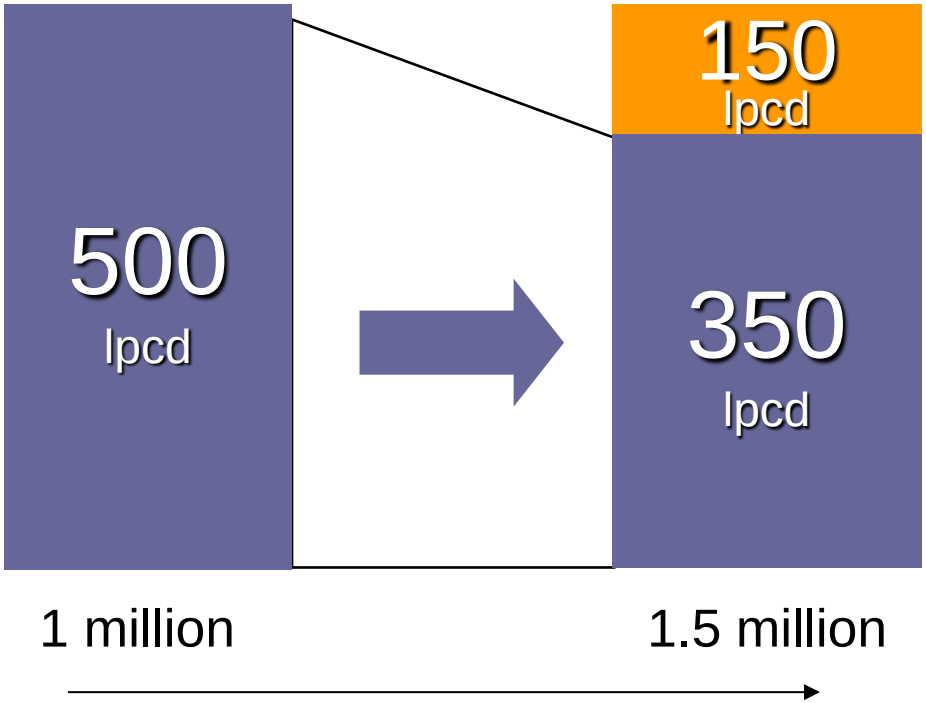
Sustain our community

- The vast majority of the water taken out of the river is returned!
- Reduced demand and minimized leakage “losses” delay the need for infrastructure upgrades
- Can we reduce the consumptive demand?

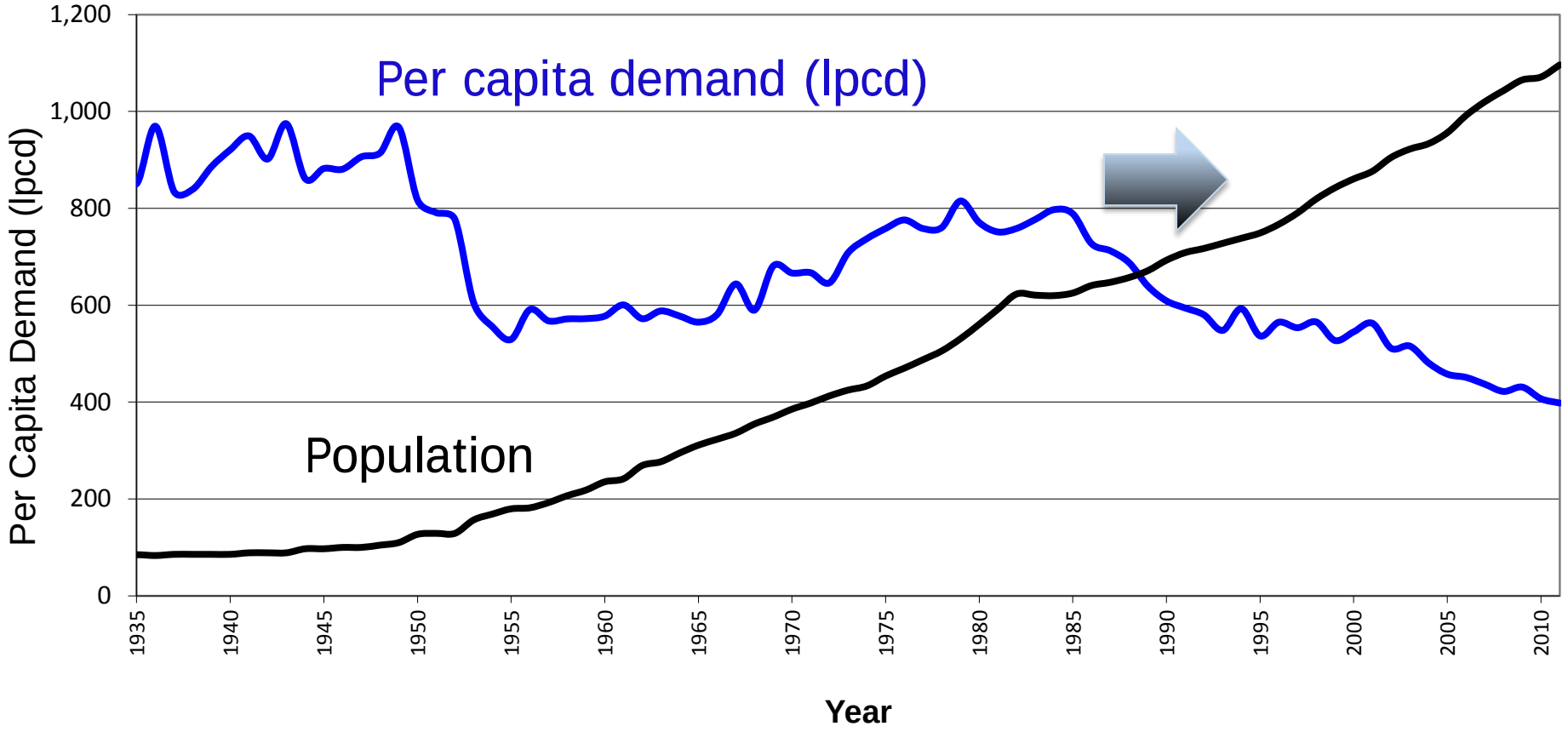
What has the City of Calgary done?
2003 Water Efficiency Plan



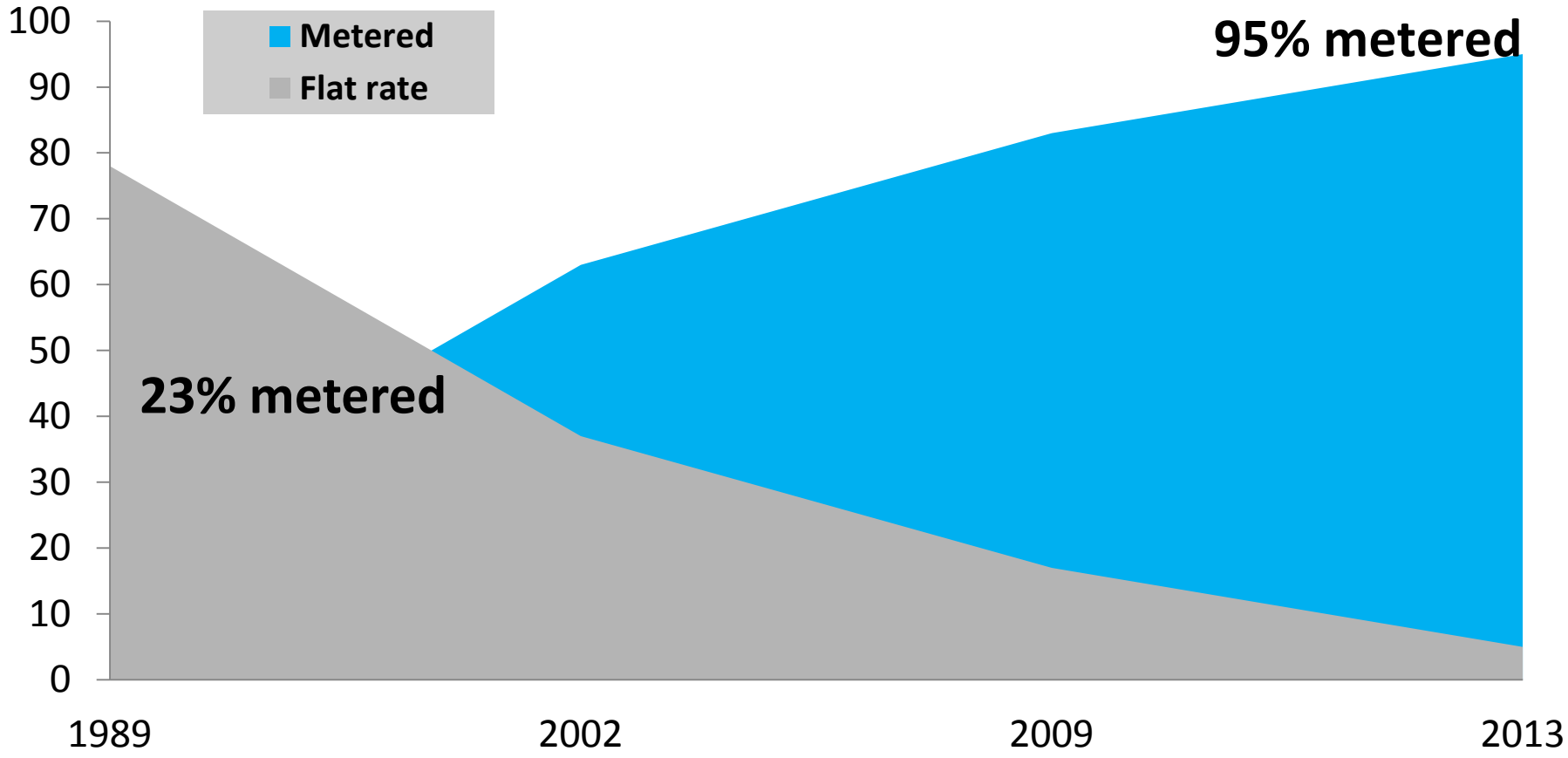
Goal: accommodate future population growth with same amount of water removed from the river in 2003



By moving from Supply to Demand Management



Through for instance household water metering



Sustain our community:
Need for appropriate Stormwater Management

There is a need to provide an appropriate level of service to protect our citizens and minimize damage to infrastructure and private property

Sustain the Bow and Elbow Rivers

- Maintain Instream Flow Needs in the Bow River
- Apportionment agreement with Saskatchewan

Sustain the Bow and Elbow Rivers

We also need to control the contaminant loadings into our rivers through:

a) Reducing the concentration

b) Reducing the volume

Treatment of stormwater is more difficult than that of wastewater

The Alberta Low Impact Development Partnership has stated it succinctly:

Or, in short, for the purposes of this symposium: Better stormwater treatment in the upper reaches of the watershed lowers downstream potable water treatment costs

Sustain our creeks

Our creeks suffer the consequences from an exponential increase in runoff associated with development

This is evidenced by the scour observed!

Sustain our creeks

Runoff volume control targets introduced in various Water Management Plans

BTW – the same water quality concerns about stormwater loadings

Nose Creek Watershed Water Management Plan

October 2008

Prepared for:

The Nose Creek Watershed Partnership

Compiled by:

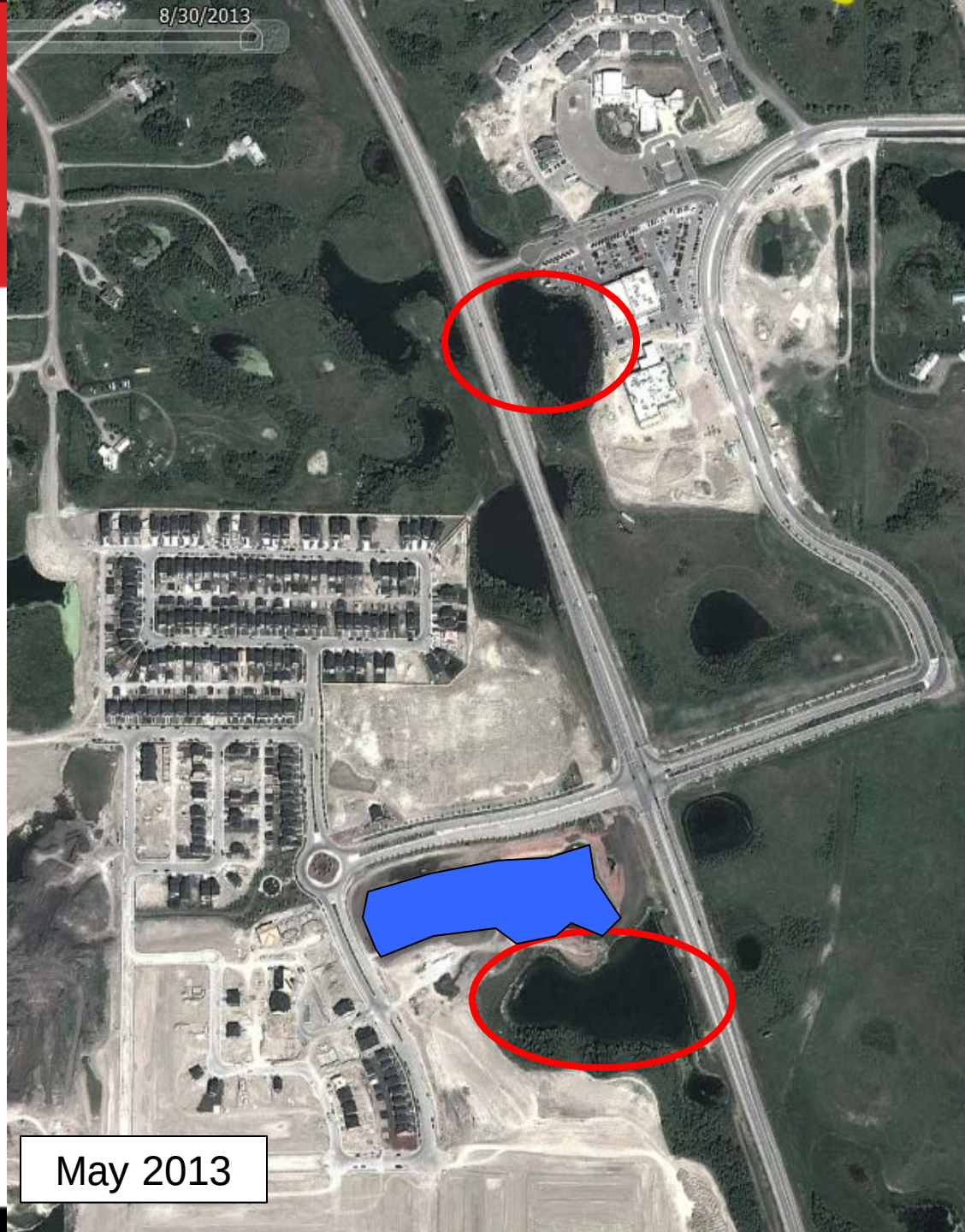
Palliser Environmental Services Ltd.

Sustain our wetlands

Need for adequate supply of appropriate quality stormwater to provide adequate moisture to the wetland when the pre-development catchment is cut off when the land is developed

Sustain our wetlands

If one wants to retain the habitat in the existing wetland, one can't jump dump stormwater in there. It would become an operations and maintenance nightmare!



Sustain our landscape

Our landscapes needs moisture to survive: however, why would this need to be potable water?

Sustain our landscape

Australian experience: a parched landscape leads to people adopting a sedate life-style

In short,
Stormwater: curse or blessing?

- Minuses
  - Flood damage (reduce rate and reduce volume)
  - Morphological change of creeks (reduce rate and reduce volume)
  - Contaminant loadings discharged to receiving water bodies (reduce rate, reduce volume and treat runoff)
- Pluses
  - Sustains the Bow River with volume of runoff
  - Sustains wetlands with appropriate quantity of runoff, of appropriate quality
  - Sustains our landscape

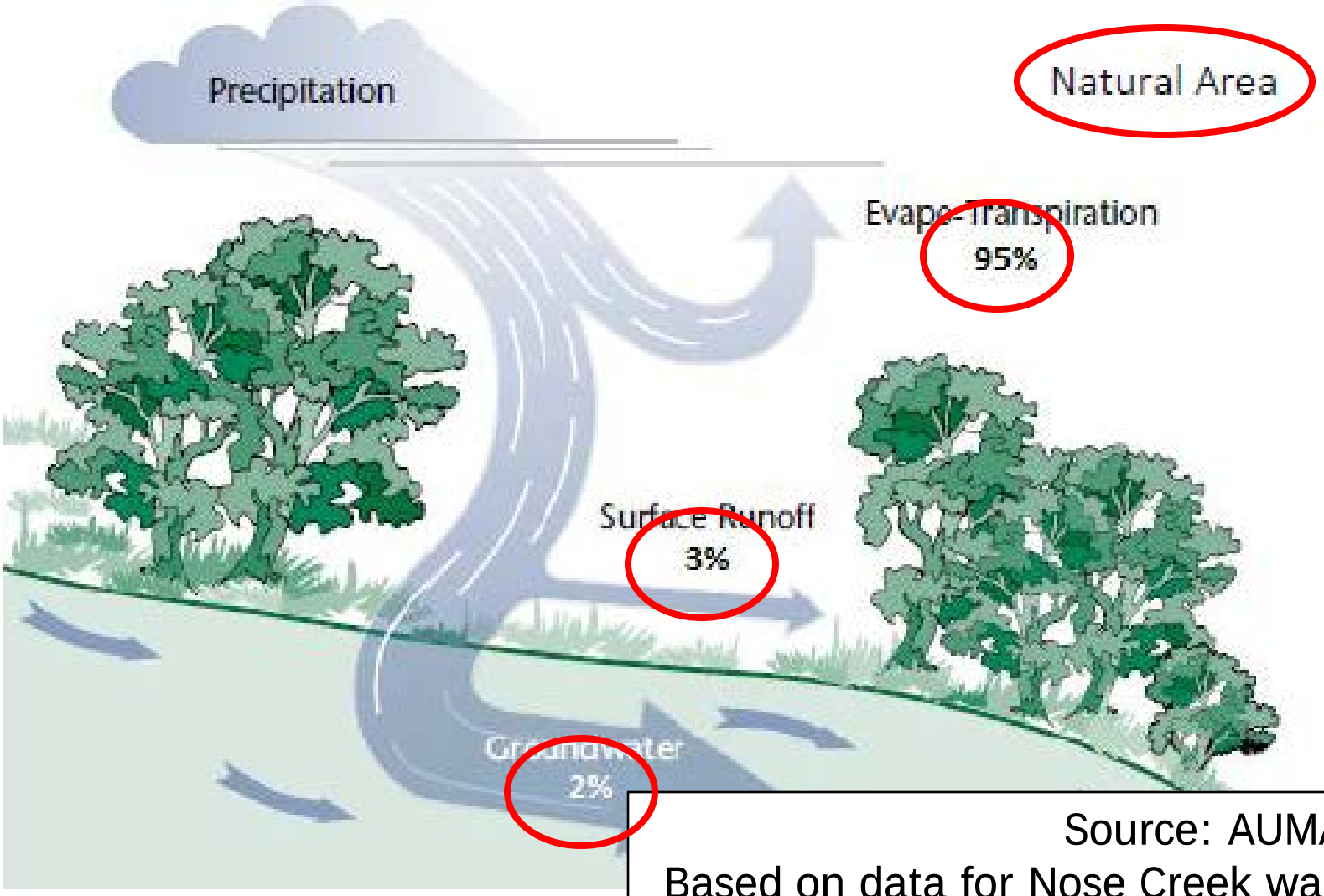
This calls for an appropriate regime of Stormwater Management

For this appropriate Stormwater Management regime, we have an LID Toolbox at our disposal

- Absorbent Landscaping
- Bioretention / Bioswale
- Green Roofs
- Permeable Pavement
- Rainwater Harvesting and Use/Reuse
- Stormwater Capture and Use/Reuse

Remember from yesterday: LID implementation is the single-most important approach in Australia!

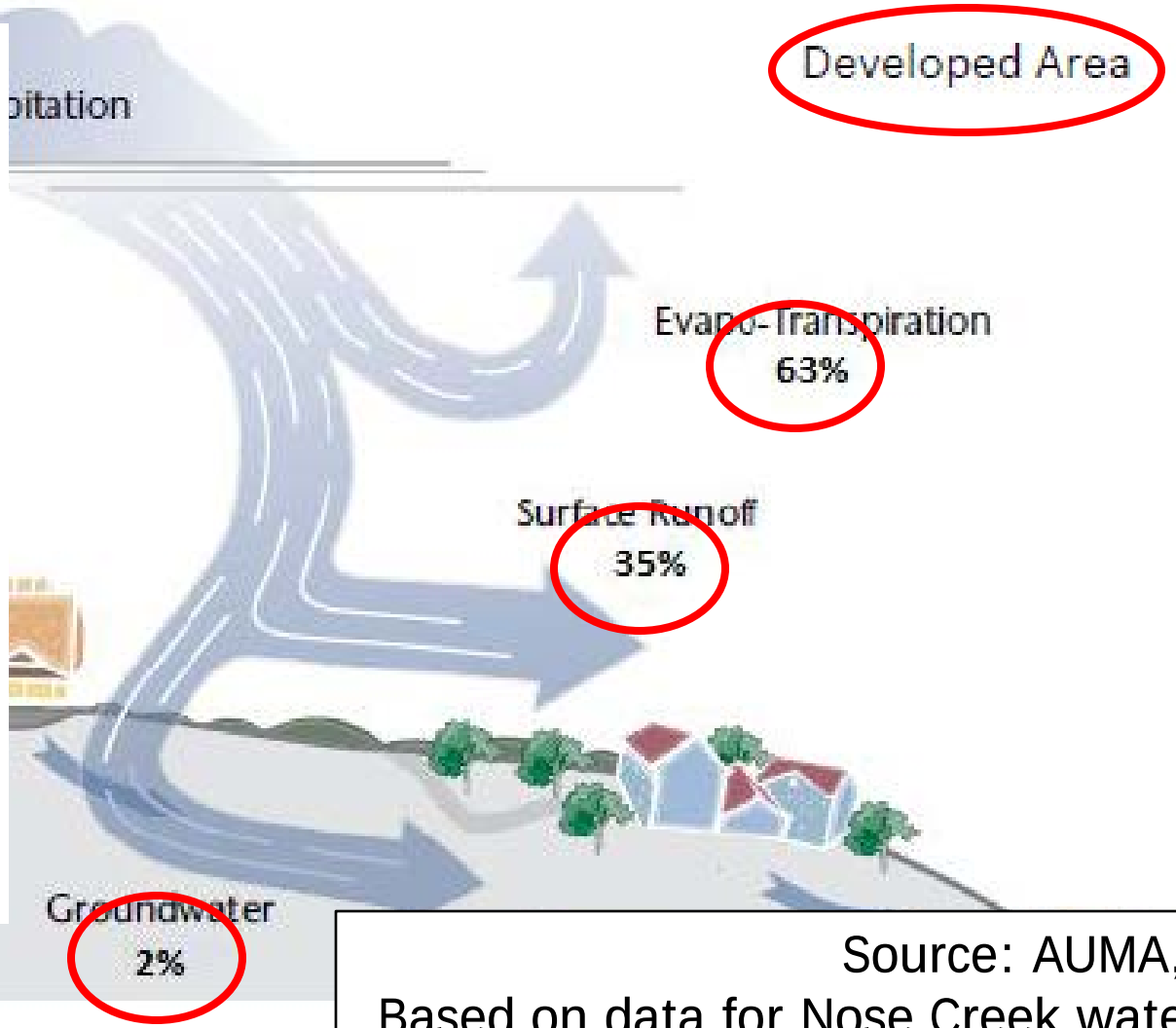
Is there ground for concern that we might not sustain the Bow River? Let's step back ...



Source: AUMA, 2014
Based on data for Nose Creek watershed

and now for post-development conditions using traditional development practices

Even with our Water Management Plans that call for runoff volume control, there is an increase over natural conditions!



Source: AUMA, 2014
Based on data for Nose Creek watershed

In short, we sustain the Bow

- Over 98% of the water taken out of the river is returned!
- Plus, over 100 mm of stormwater runoff is added, whereas this was only 6 – 30 mm per year for pre-development conditions

but what is the fate of the “moisture” in use/reuse systems?

And effectively, there is little infiltration

Source Control Practice	Primary Fate
Absorbent Landscaping	Evapotranspiration
Bioretention	Storm Sewer System → River
Green Roof	Evapotranspiration
Permeable Pavement	Storm Sewer System → River
Rainwater Harvesting and Reuse	Evapotranspiration or Sanitary Sewer System → River
Stormwater Capture and Reuse	Evapotranspiration or Sanitary Sewer System → River

Key Message: The “moisture” is not being lost!

What are the municipal concerns in case of use/re-use systems?

- Are we authorized to do this or not?
- What happens when the user stops utilizing the water?
- What is required to protect the public?
- What kind of maintenance is required to ensure that the system will remain in optimal operating conditions?
- What kind of inspections and monitoring are required to demonstrate that the system operates properly?
- What kind of administrative system is required to ensure that the system is properly operated and maintained?

This is not an academic exercise – it is occurring NOW! We need to look honestly at the whole range of issues. So, how can we move forward?

Let’s put matters into context in Calgary:

- The City of Calgary Water Resources receives over 700 “development applications” per year
- Our interim stormwater targets for runoff volume and water quality control require the application of LID
- As a result, all of these applications may have a stormwater reuse need in the future

For interim City of Calgary Stormwater Targets, see:
http://www.calgary.ca/PDA/DBA/Documents/urban_development/bulletins/ud-bulletin-water-resources-interim-stormwater-targets-2014.pdf

Municipal Concern:
Are we authorized to do this or not?

- Municipalities should be allowed to authorize stormwater reuse systems provided:
  - Water Management Plans are being adhered to;
  - The public is protected; and
  - Appropriate inspection, monitoring and data management systems are in place
- If authorized, this provides an efficient regulatory scheme to deal with >> 700 applications that we may see in the future
- This provides a simpler, one-window approach for the development community and citizens

Municipal Concern: what happens when the user stops utilizing the water?

- Examine failure scenarios as part of proper design
- Have proper O&M procedures and checklists
- Have inspection program

Or forgetting to turn on the irrigation system in spring

E.g., a user going bankrupt

Municipal Concern:
What is required to protect the public?

- Specify appropriate pre- and post-treatment as function of source water and application (e.g., filtration and UV disinfection for spray irrigation)
- Meet relevant codes
- Eliminate any potential for cross-connections
- CSA approved materials
- Make installations tinker proof
- Installers shall be certified
- Proper O&M procedures and checklists
- Inspection and monitoring program
- Do not accept proposals that constitute unacceptable risks

Municipal Concern: what kind of maintenance is required to ensure that the system will remain in optimal operating conditions?

- Function of the type of system being implemented
- Operation & maintenance manual shall be prepared for each and every project
- Maintenance logs (with inspection frequency) shall be present
- Keep it simple for installations on residential property

Municipal Concern: what kind of inspections and monitoring are required to demonstrate that the system operates properly?

- Function of the type of system being implemented (e.g., micro-biological testing for spray irrigation systems?)
- Keep it simple for installations on residential property
- Designer shall sign off that the system was properly installed
- Third-party inspections by certified professionals at regular intervals?

Municipal Concern: what kind of administrative system is required to ensure that the system is properly operated and maintained?

- Operation & maintenance manual shall be prepared for each and every project
- Maintenance logs (with inspection frequency) shall be present
- Third-party inspection and monitoring results provided to local jurisdiction?
- Database for each installation

What is the City of Calgary doing?

- Preparing Stormwater Reuse Strategy
- Developed LID Technical Guidance documents including rainwater harvesting and stormwater capture and reuse
- Developing Stormwater Reuse Management Program
  - Stormwater Reuse Safety Plan ???
- Developing Monitoring and Compliance Program
- Continuing implementation of Development Approvals Management System (DAMS)

So, what is the risk to our communities?

http://jgluvers.blogspot.ca/2013_07_01_archive.html

Or, are we merely afraid to get our toes wet?

Are we jumping off a cliff?

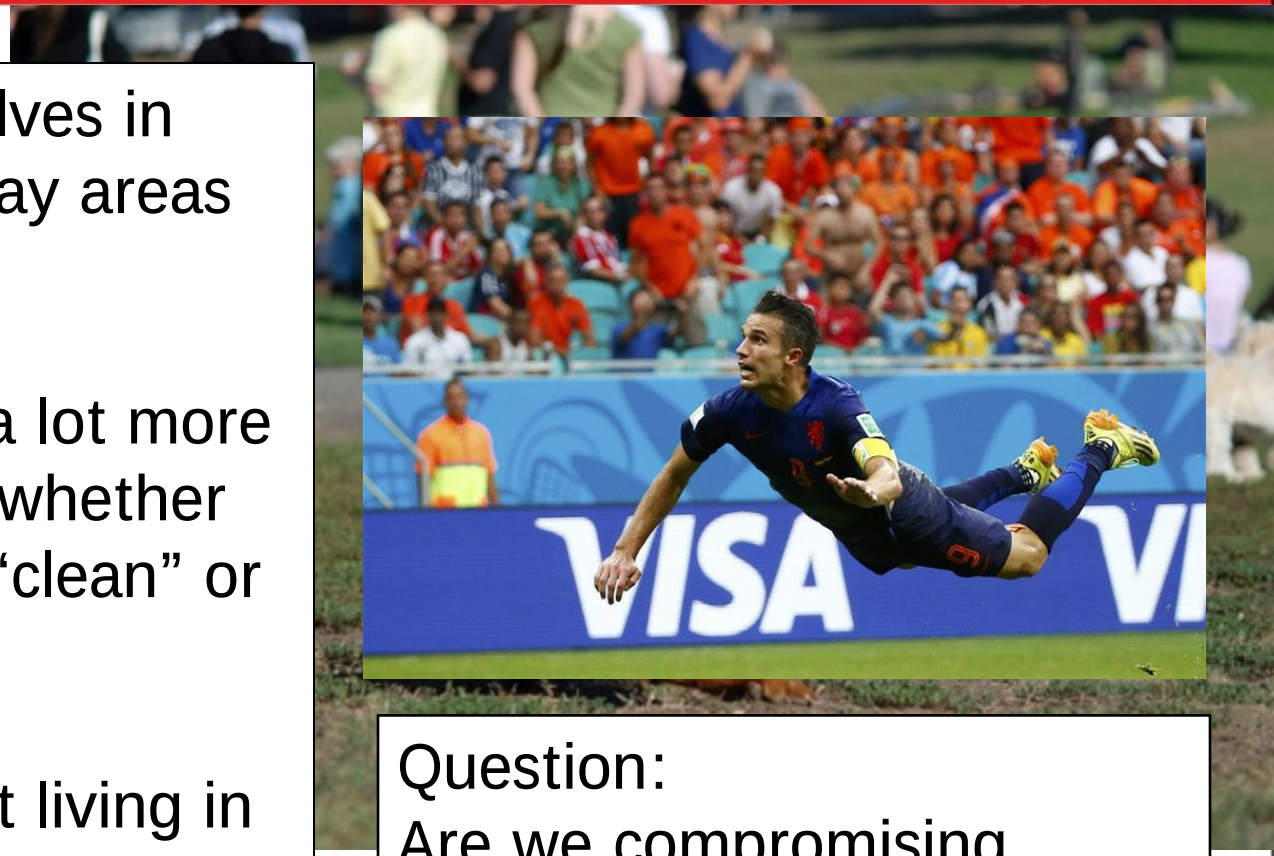
http://cherilucas.files.wordpress.com/2010/08/launching-off-a-cliff-cala-tarida-ibiza.jpg

So, what is an acceptable level of risk? Let's put matters into context

Let's not fool ourselves in thinking that our play areas are clean

There are actually a lot more factors to consider whether our play areas are "clean" or not ...

After all, we are not living in a sterile environment!



Question:
Are we compromising Sustainability by being risk adverse?

In closing ...

Stormwater reuse is nothing new on an international level

We have had stormwater reuse in Alberta for decades

and Calgary Parks has been a leader in stormwater reuse for over 10 years

Thank You

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