



# LID for Small Stream Stability

## Part 1

Thursday, October 20, 2022  
9-11:30 a.m.

### **Background for the Fall/ Winter Series**

Small streams are heavily impacted by the difference between pre- and post-development runoff, especially on the dry prairies. In Alberta, this phenomenon has --so far-- been *the* driver for the implementation of mandatory runoff volume control targets (VCTs). In our fall 2022/ winter 2023 three-part series, we will explore this topic through the lens of two local streams: Nose Creek in the Calgary area and Horse Hills Creek in the Edmonton area.

We will begin in October with a conceptual overview of the issue, review the history of efforts to characterize impacts in our example streams from different perspectives, explore mitigation options at a high-level including channel hardening, and re-trace the initial steps taken in Nose Creek to set and implement runoff volume control targets (VCTs).

In November we will take a deep dive into analytical approaches from different starting points (shear stress analysis, flow duration curves) and what is generally happening in practice to achieve VCTs from an analytical perspective. We will look to the future, with the use of watershed-wide models that integrate water quality, volume, and flood control into one tool which allows for optimization of land use and stormwater management decisions.

In January we will discuss planning and implementation strategies at different stages for large-scale developments and bring the Calgary-area Cooperative Stormwater Management Initiative into the mix. While irrigation from stormwater ponds has been a dominant means to achieve VCTs, is this as good as it gets?

# Agenda

9:05 **Welcome and Announcements**

David Seeliger, MPE Engineering, ALIDP President

9:15 **How we got here: A brief history of (stormwater) time in Alberta**

Bert van Duin, City of Calgary

9:30 **Impacts of hydromodification on small streams and a scan of regulatory responses**

Chris Johnston, Kerr Wood Leidal Associates

What is the role of small streams in overall watershed function and how are they impacted by urbanization? A review of impacts of urbanization on small streams from a fluvial geomorphological, environmental, and safety perspective and how some jurisdictions are responding to manage the challenge from a regulatory point-of-view.

9:50 **BREAK**

10:20 **A Tale of Two Creeks**

10:20 **Developing Horse Hills Creek and the Edmonton Energy and Technology Park (EETP)**

Josh Maxwell, WSP Canada

The EETP offers more than 4800 ha of greenfield development in Canada's largest hydrocarbon processing region, the Industrial Heartland. The area drains into Horse Hills Creek, which is highly erodible. While the area has been slated for development for 30+ years, the investment required for a stormwater trunk has not been forthcoming from any party. Various studies over the years have looked at stormwater management options across the gamut, ranging from full source-control to complete armoring of the creek.

10:35 **Horse Hills Creek Erodibility Testing and Maintaining a Natural Sediment Flux through Channel Hardening**

Angela Thompson, Northwest Hydraulic Consultants

Why are some creeks more erodible than others, or are they? A glimpse into the world of erodibility testing.

Analysis of what would need to be done reach-by-reach to maintain a natural sediment flux using channel hardening options.

10:50 **Nose Creek History and Initial Implementation of VCTs**

Clint Goodman, City of Airdrie & Nose Creek Watershed Partnership

The Nose Creek watershed is challenged by rapid urbanization. Nose Creek originates west of Crossfield and flows south through Calgary where it joins the Bow River near the Calgary Zoo. The Nose Creek Watershed Water Management Plan guides water management and is supported by all Partners, including the Calgary Airport Authority, Cities of Airdrie and Calgary, Town of Crossfield, Rocky View County and Alberta Environment and Parks. The Plan includes progressively more stringent VCTs that have been instituted by Partners beginning in the late

2000s. This presentation will discuss the history and need for VCTs and provides an update on the current status of VCT implementation.

11:15 **Panel Discussion**

11:25 **Closing Remarks**

11:30 **Afterglow until noon**  
Informal networking and discussion spillover

# LID for Small Stream Stability

## Part 2

Thursday, November 17th, 2022  
9-11:30 a.m.

9:05 **Welcome and Announcements**  
David Seeliger, MPE Engineering, ALIDP President

A Tale of Two Creeks Recap

9:20 **Modelling Approaches – Nose Creek**  
Bert van Duin, City of Calgary  
Jonathan Slaney, City of Calgary

The 2005 Instream Flow Needs Study for Nose Creek identified the need to control the entire range of flow conditions from low flow to flood conditions. While the need to mimic the *flow duration curve* to maintain the geomorphic integrity of the creek was already identified at the time, this was simplified to *average annual runoff volume*. In 2008, a pathway of increasingly stringent targets over time was adopted so that the professional community would have time to get familiar with the implementation of the necessary provisions. Since the targets were initially implemented, not only has the hydrology of Nose Creek been revisited, there has also been an evaluation of to what extent there is an opportunity to increase discharge during the low-flow season in a non-erosive manner. The resulting low-energy release approach means we have come full circle to the implementation of flow duration curves envisioned back in 2005. A multi-year watershed-wide modelling exercise is also currently underway that integrates water quality, morphology and flood control considerations into one tool. This tool is intended to be used to further the evaluation of potential land-use and stormwater management scenarios in the watershed.

10:00 **BREAK**

10:30 **Modelling Approaches - EETP**  
Mat Langford, formerly Northwest Hydraulic Consultants  
Russell Barth, ISL Engineering and Land Services

Analysis of Horse Hills Creek started by determining shear stresses with a dynamic HEC-RAS model and calculating sediment flux. A relationship between volume flux of water and volume flux of sediment was then developed, yielding an annual runoff volume target to maintain creek stability.

11:00 **Discussion**

11:30 **Afterglow until noon**  
Informal networking and discussion spillover

# LID for Small Stream Stability

## Part 3

Thursday, January 26th, 2023  
9-11:30 a.m.

9:05 **Welcome and Announcements**

Anton Skorobogatov, MAGNA Engineering, ALIDP Vice-President

A Tale of Two Creeks Recap

9:15 **Drilling Down - EETP**

Russell Barth, ISL Engineering and Land Services

Kerri Robinson, EOR

The 2020 Approach taken with the EETP Stormwater Management Plan is a modular development, per quarter section, using a pond and stormwater for irrigation back to large bioretention areas in extended arterial ditches. Pond and bioretention designs are intended to reduce the desirability of the facilities for migratory birds, as much of the area is within the DND Bird Hazard Zone.

In addition to the pond and bioretention approach, a feasibility-level assessment of stormwater beneficial use was undertaken. This investigation looked at the regulatory environment, possible uses of water in an industrial/commercial context and implementation challenges and opportunities. A summary of next steps needed to facilitate implementation in the EETP's industrial/commercial land-use setting, by the Province, City of Edmonton, EPCOR, and future developer will be provided.

9:55 **BREAK**

10:15 **Drilling Down – Nose Creek – The Good, the Bad and the Ugly**

Bert van Duin, City of Calgary

A Municipal Perspective on Implementing Runoff Volume Control Targets

Andrew Chan, Matrix Solutions

A case study: Nose Creek Low Energy Release Approach

Sahil Sharma, Magna Engineering

A case study: Cabana Community Storm Park

(A combination of constructed wetland, storm pond, biofiltration treatment, and greenspace irrigation)

10:55 **Drilling Down – Cooperative Stormwater Management Initiative**

David Seeliger, MPE Engineering, ALIDP President

The Cooperative Stormwater Management Initiative (CSMI) has brought together The City of Calgary, Rocky View County, the Town of Strathmore and the Western Irrigation District to develop a regional stormwater solution in an area where there are limited natural drainage

courses and where water quality is a concern. The initiative provides a means to fund and manage the system. Guidance pertaining to the analysis and design of the necessary stormwater infrastructure is being developed to ensure consistency and clarity on how to meet the stormwater requirements. The plan incorporates stormwater monitoring to verify performance and a research program to address knowledge gaps. The learnings and work from CSMI will inform approaches and considerations for stormwater management within the Nose Creek watershed.

11:15 **Discussion**

11:30 **Afterglow until noon**

Informal networking and discussion spillover