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There are numerous drivers for implementing volume targets, loading objectives, and other measures to achieve resilient outcomes. But when do you implement what and to what stringency? What are various jurisdictions across North America doing and why? What tools are being used and where should we go from here?

Drivers to be discussed include:

- level of service,
- protection against overland flooding and surcharge conditions,
- fisheries and habitat protection,
- small stream and wetland protection,
- source water and groundwater protection, and
- prevention of harmful algae blooms.

Featuring presenters from British Columbia, Ontario, Minnesota and Colorado and an opportunity for discussion.

ALIDP Alberta Low Impact Development Partnership

Presentations

Minnesota's Minimal Impact Design Standards (MIDS) Experience- Collaborative Development of Statewide Volume Reduction Targets and Tools

The Minimal Impact Design Standards (MIDS) project began in 2009 when the State of Minnesota Legislature directed the Minnesota Pollution Control Agency (MPCA) to develop performance standards, design standards, or other tools to enable and promote the implementation of low impact development and other storm water management techniques. With input from developers, municipalities, and others, a 40+ person workgroup representing industry, regulators, and stormwater management practitioners throughout the state was formed to guide and participate in development of the MIDS work products. The stakeholder group worked closely with MPCA staff and their consultants, meeting monthly to review progress and provide input from multiple stormwater management perspectives.

The objective of the MIDS project was to provide guidelines and tools to help stormwater practitioners and regulators more uniformly and effectively implement Low Impact Development (LID) stormwater management practices. The MIDS project included development of volume reduction performance goals, or targets, for new development, re-development and linear projects; development of design standards for a variety green infrastructure Best Management Practices (BMPs); development of methods for quantifying stormwater volume and pollutant reductions from BMPs; design of a user-friendly calculator for determining stormwater "credits" and associated training materials; and development of a community assistance package for MIDS implementation. During the workshop, we will discuss the various aspects of the project, with a focus on the science-based approach to establishing the volume reduction performance goal, development and use of the MIDS calculator, and the process of achieving 'buy-in' from the diverse MIDS working group.

Janna Kieffer, MS, PE, is a Vice President and Senior Water Resources Engineer with Barr Engineering Company. Janna has 18 years of water resources management experience and serves as a project principal and technical expert for municipal clients and watershed management organizations. Her work includes hydrologic and hydraulic modeling, infrastructure vulnerability assessments, stormwater permitting, water quality modeling, water management plans, lake management studies, best management practice (BMP) performance assessments, engineering feasibility studies, and stormwater analyses for low-impact development sites. She was one of the primary consultants for the MIDS project.

Jay Michels is a Senior Project Manager with Emmons & Olivier Resources. He is a Certified Professional in Erosion and Sediment Control (CPESC) with over 30 years of experience in construction management, erosion control and stormwater management. The emphasis of his work is in Low Impact Development (LID) and stormwater management, erosion and sediment control planning and implementation, ordinance and storm water policy, program and outreach and education development. Jay is known for his work throughout the upper Midwest and Canada as an educator on low impact development, storm water management and erosion and sediment control.

Making Green Infrastructure Mainstream in Vancouver, British Columbia

The City of Vancouver, a mid-sized city of approximately 600,000 on the west coast of British Columbia, Canada, is striving to change how we think about and manage rainwater. With approximately 1200 to 1500 mm (47 to 59 inches) of rain falling on Vancouver annually, we are a community with deep cultural connections to rain and both practical needs and tremendous opportunities around rainwater management and green infrastructure.

While Vancouver has long had a commitment to urban sustainability, the Greenest City by 2020 goal established by Council in 2009 created a new mandate to accelerate and expand the scope of our actions and to take a more integrated and innovative approach. In the past, we have primarily focused on the separation of our sewer system into separate sanitary and drainage pipes, pilot projects and one-off green infrastructure features through unique development opportunities. Today, we have approximately 200 green infrastructure installations city-wide, with another 150 in design and planning stages. So, while the idea of green infrastructure is not new in Vancouver, the City recognizes the need for a more comprehensive, integrated and systematic approach.

We are striving to use green infrastructure to not only manage rainwater but also as an opportunity to meet multiple City objectives, including: Combined Sewer Overflow mitigation, resilience to changing climate patterns, environmental protection, place-making in the public realm, urban biodiversity and habitat, community building, green job creation and helping our citizens have greater connection with nature and natural processes.

In November 2017, City of Vancouver Council adopted the ambitious *Rain City Strategy*, a green infrastructure and urban rainwater initiative. The strategy has a long-term vision to embrace rainwater as a valued resource for our communities and natural systems and establishes three goals: (1) Water quality, (2) resilience and (3) livability through healthy urban ecosystems. The strategy will provide a roadmap for green infrastructure implementation to 2050, with a long-term target to capture and clean 90% of Vancouver's average annual rainfall.

We've established an inter-disciplinary Green Infrastructure Team of engineers, landscape architects, planners, an urban ecologist, policy and financial specialists to develop policies, programs, design prototypes, demonstration projects, process maps, community partnerships and an implementation plan to support integrated rainwater management throughout the city, in both the public and private realm.

This presentation will focus on the actions Vancouver is taking to transform our thinking and our city-building to embrace rainwater as a resource that both shapes and serves our city, including the work underway to create a comprehensive green infrastructure implementation plan for what we expect to become a broadly applied new municipal asset class for the City. The presentation will focus on our integrative and inter-disciplinary approach and the ways in which we are engaging a broad cross-section of municipal departments including Engineering, Planning, Parks, Social Planning and Development Services, to make green infrastructure commonplace in how we create and build communities in to the future.

Melina Scholefield, P.Eng., is a professional engineer with a long-standing dedication to sustainability and innovation in the municipal sector, leadership development and collaboration across disciplines. Melina is Manager of Green Infrastructure Implementation for the City of Vancouver. She and her team are responsible for developing an implementation plan for the City's ambitious *Rain City Strategy: A green infrastructure and urban rainwater management initiative*.

Prior to taking on this new role, Melina was engaged in the private sector in the field of green buildings, both as a construction management consultant and a Built Green certified residential builder with a special interest in passive house design and construction methods.

Previously, Melina worked nearly 11 years with the City of Vancouver. As Manager of the City's Sustainability Group, Melina's portfolio included advancing the Greenest City goals as well as climate protection, renewable energy, climate change adaptation, green building programs, employee sustainable commuting programs and sustainable City operations for the 2010 Olympics. She also spent nearly eight years in the Transportation Division, where she developed expertise in community engagement, integrated land use and transportation planning and sustainable transportation.

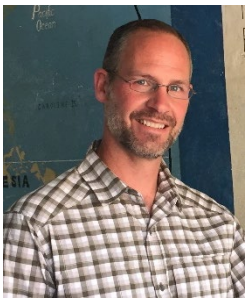
It is time to revisit stormwater management design standards to protect our waters – The Credit Valley, Ontario, experience

Credit Valley Conservation (CVC) has been collecting flow and water quality data since major portion of its jurisdiction was rural. However, now some of its area municipalities are fastest growing municipalities in Canada putting pressure on the natural resources, especially water. The Credit River has also been identified as one of the major contributors of phosphorous to Lake Ontario on the Canadian side, which primarily comes from urban centres. There has been increase in flooding, algal growth, water treatment plants disruptions, wastewater bypasses etc. which raises concern not only for natural resources but also for infrastructure vulnerability, human health and wellbeing, and economics. Some of the urban centres that were developed in early 20th century do not have water quality and quantity control. The newer areas are designed with stormwater management ponds, however; still do not include the changing climate and cumulative impacts of urbanization in stormwater management designs. Therefore, a change in design standards is needed to mimic natural hydrology and to account for unforeseen future climate extremities. This presentation will demonstrate, using historic and current real-time gauging data, how the Credit Valley watershed and nearshore Lake Ontario got stressed over time with development pressure and what changes in stormwater management are necessary to provide resilience.

Dr. Amanjot Singh, P. Eng., works at the Credit Valley Conservation Authority as a Senior Engineer, Water and Climate Change Science. He has over 28 years of experience in water resources from Canada, the US, Germany, and India. His professional interests are in watershed, lake, and Best Management Practices modeling and monitoring, risk assessment, rural and urban stormwater management, climate change, Low Impact Development design and performance evaluation, real-time water quality response, source protection, and spill response. He also has affiliation with University of Guelph and McMaster University as an Adjunct Professor.

Title TBD

Description pending



Dr. Scott Struck has more than 18 years of water resources experience. His practice focuses on the planning and implementation of distributed and centralized source control measures and other stormwater management approaches to meet drainage and regulatory requirements. He is experienced in infrastructure prioritization, modeling, design, optimization, monitoring, performance assessment, economic and triple bottom line cost analyses, and integrated watershed planning. He has participated in projects throughout North America. He has contributed to the development of several computational and cost tools, including the cost module of EPA's National Stormwater Calculator and the US National Academies of Sciences Watershed-Based Planning Approach and toolbox. He has worked with the City of Calgary and Credit Valley Conservation near Toronto and participated in the Bioretention Design and Bioretention Construction Canadian Standards for CSA.

Dr. Struck has over 50 publications including journal articles, technical reports, book chapters, and conference proceedings. He also serves as an associate journal editor for the Journal of Sustainable Water in the Built Environment.