



Credit Valley Conservation's Showcasing Water Innovation Project

Location: Credit River Watershed



Bringing Partners Together and Driving our Green Economy through Green Infrastructure

Showcasing Water Innovation project objectives

The goal of CVC's Showcasing Water Innovation (SWI) project was to build and strengthen community resilience by supporting LID adoption in Ontario.

Objectives:

1. Implement LID projects in a variety of land use types to improve stormwater management.
2. Monitor long-term performance data and maintenance/lifecycle costs.
3. Provide opportunities for knowledge transfer and education by creating guidance documents and other tools to assist small, medium, and large municipalities.

High-level Results

- **Reducing risk and vulnerability:** CVC's LID monitoring found that roadside LID projects provide cost-effective stormwater control even during extreme events like July 8, 2013. These sites reduced 60 per cent of peak runoff and absorbed 30 per cent of rain. LID provides quick win solutions in existing urban areas taking some of the stress off aging municipal stormwater infrastructure. These results helped the City of Mississauga pass a first of its kind in Canada resolution to consider LID in all road retrofit projects.
- **Recreating Nature:** Monitoring 12 LID sites across the Credit River watershed shows they are successfully recreating natural hydrology, absorbing approximately 90 per cent of rainfall events.
- **Improving water quality:** CVC's LID monitoring shows strong water quality results, removing up to 99 per cent of total suspended solids and 84 per cent of total phosphorous from water entering sources such as the Great Lakes.
- **Providing better data on costs:** Long-term monitoring of 12 LID sites, including tracking maintenance and lifecycle costs, is helping to define costing and provide information on LID infrastructure life expectancies for municipalities.
- **Increasing adoption of LID across Ontario:** CVC has developed user-friendly Grey to Green guides and case studies to help Ontario's municipalities implement LID.
- **Creating local green jobs and building expertise:** This project contributed to training more than 4,000 practitioners on LID and new stormwater technologies. It increased the market for local skilled green jobs, resulting in lasting employment. A survey of local businesses found sales trends showing increasing growth of up to 50% in LID projects.

Project Context

Canadian municipalities face infrastructure challenges as many water supply, wastewater and stormwater systems approach the end of their planned service life. Canadian municipalities require a combined total of \$170 billion to rehabilitate and repair this aging infrastructure¹.

Ontario's municipalities account for almost 60 per cent of this deficit, of which \$23 billion is needed to bring Ontario's existing stormwater infrastructure into a state of good repair. This estimate does not take into consideration the need for new stormwater infrastructure in existing urban areas that do not currently receive flood control or water quality treatment, which is estimated at an additional \$56.6 billion for all Canadian municipalities combined².

Low impact development (LID) – the stormwater management approach modeled after nature - manages rainfall at the source as part of the municipal stormwater treatment train. By capturing, treating and infiltrating rainwater, LID takes some of the stress off existing infrastructure, lengthening its lifespan at a fraction of the cost and time required for large infrastructure projects.

LID can assist municipalities meet a wide variety of objectives and priorities, particularly those relating to infrastructure, sustainability and climate change resilience. LID has an average 2:1 return on investment as compared to traditional development practices³.

Credit Valley Conservation (CVC) has worked with more than 40 private and public partners to advance LID in Ontario, addressing misconceptions and barriers with live research, demonstration sites and educational tools. CVC's work aligns with provincial initiatives, such as the Water Opportunities and Water Conservation Act, 2010, Ontario's Municipal Infrastructure Strategy and Go Green: Ontario's Action Plan on Climate Change.

Challenges

Although stormwater practices have advanced since the days of conveying flows as quickly as possible from paved surfaces to nearby water bodies, research has shown that conventional end-of-pipe approaches alone do not achieve all of the water quality, erosion and flood protection benefits they were intended to provide. They do not fully protect the assimilative capacity, ecosystems and biodiversity of receiving water bodies. LID offers an effective and affordable alternative to lessen the environmental impacts of urbanization, while offering beneficial outcomes to developers, municipalities and the public. While support for LID is growing within municipalities, adoption is slow. Some of the challenges to implementation include:

- Perceived cost and performance barriers of LID.
- General lack of awareness about options among plan review staff, contractors, planners, maintenance staff, engineers and landscape professionals.
- General lack of knowledge about benefits of LID among practitioner and stakeholder groups.
- Lack of funding mechanisms to implement LID projects.
- Lack of long-term performance data, making it difficult to convince decision makers to choose LID.
- Lack of municipal incentives, policies and bylaws for implementing LID.

“Municipalities have, in effect, been put on notice that potentially significant civil liability could arise from system failures and flooding events. Municipal services such as water supply and storm water management must be provided in a non-negligent manner. As more extreme weather-related damage occurs, those left with clean-up costs will be looking to recover from those who could be legally responsible.”

– Laura Zizzo, Partner,
Zizzo Allan DeMarco LLP,
Stormwater Management in Ontario:
Legal Issues in a Changing Climate





CVC's Infrastructure Performance and Risk Assessment program measures performance at 12 LID demonstration sites.

Solutions

CVC Showcasing Water Innovation project involved putting LID projects in the ground to improve stormwater management, monitoring performance data and life-cycle costs, and knowledge transfer. 12 LID demonstration sites were constructed on four land use types: road right-of-ways, business and multi-residential properties, public lands and residential lands. These sites are currently being assessed through CVC's Infrastructure Performance and Risk Assessment program to determine long-term performance, lifecycle costs and maintenance requirements (to inform municipal asset management plans in keeping with the Province's Building Together requirements). Results and data are used to overcome misconceptions and barriers by showing that LID is an effective and cost-friendly stormwater management tool.

To fill knowledge gaps about LID in Ontario, CVC focused on education and knowledge transfer to municipalities, businesses, developers, property managers, consultants and the landscaping and construction trade industry. Guidance materials, training courses, case studies and a website (www.bealeader.ca) were developed to assist these groups implement LID. CVC conducted site tours, conferences and published articles, videos and blog posts to build confidence in LID practices among practitioners, stakeholders and the public.

Six stakeholder committees were created, one for monitoring and one for each guidance document. They ensured monitoring addressed stakeholder concerns and that the content of the Grey to Green guidance documents was relevant, easy to understand and useful. Representatives from small, medium, and large municipalities were engaged in this process along with provincial, federal, and private sector experts. CVC also produced an overarching guide to help municipalities integrate watersheds and stormwater into their master planning processes.

Throughout the project, CVC leveraged over 40 partnerships, stakeholders and volunteers to help keep demonstration site projects affordable and easy to replicate. The Grey to Green guides include ideas for promoting partnerships and leveraging funding as a way to offset costs when constructing LID projects.



CVC and IMAX received the Minister's Award for Environmental Excellence in 2013 for reconstructing an innovative parking lot that uses leading edge technologies.

Results

The 12 demonstration projects show that LID is a cost-effective measure that can be incorporated into the existing urban form to improve water quality, reduce erosion and runoff volume with limited social disruption or loss of tax revenue. CVC continues to build positive partnerships with industry leaders to expand adoption of LID.

SWI project's successes:

- LID demonstration sites are performing as designed or better. Approximately 90 per cent of rainfall events are absorbed on these sites, diverting flows from municipal stormwater infrastructure and protecting the ecosystem.
- The success of CVC's demonstration sites led to the installation of more than 60 projects in the Credit Valley watershed alone.
- Based on the strength of CVC's monitoring results, the City of Mississauga has expanded their adoption of LID along roadways and within public land and is actively promoting LID for private land owners in new and existing developments.
- CVC planned and hosted two sold-out LID conferences and two bus tours in 2012 and 2013, attracting over 450 participants.
- CVC has developed five user-friendly Grey to Green guides: Business and Multi-Residential Lands, Public Lands, Residential Lands, Road-Right-of-Way, Stormwater Management Master Planning and monitoring reports.
- CVC published 18 case studies to share lessons learned about LID costs, planning, design, construction, operation and maintenance.
- The economic impact includes a significant return on investment, valuable ecosystem services, deferred costs for traditional municipal infrastructure, and business and job growth. One local business reported that 40 per cent of new work has been driven by LID and net revenues are expected to grow by \$900,000 over the next five years.

"This project will remedy a number of challenging maintenance issues and reduce our operating costs over the long term"

- Nancy Cole, IMAX



Application for Ontario municipalities

LID is a stormwater management approach that can be used in municipalities across Ontario, no matter their size, to manage water quality and quantity. CVC's comprehensive monitoring program shows that LID reduces the impact of extreme rain events on traditional municipal stormwater infrastructure and protects the ecosystem. Data shows that LID can function in warm or cold climates, and that it is cost-effective, easy to maintain and attractive. Municipalities can use these results, as well as CVC's Grey to Green guidance documents and supporting case studies, to build confidence in innovative water technologies and strengthen the business case for LID in their communities.

For more information:

Christine Zimmer, M.Sc. P.Eng
Senior Manager, Watershed Science
Watershed Knowledge
905-670-1615 ext. 299
czimmer@creditvalleyca.ca

Phil James, P.Eng
Manager, Integrated Water Management
Watershed Management
905-670-1615 ext. 234
pjames@creditvalleyca.ca



Endnotes

¹ Canadian Construction Association, Canadian Public Works Association, Canadian Society for Civil Engineers and Federation of Canadian Municipalities. 2012. Municipal roads and water system. Volume 1.

² Federation of Canadian Municipalities. 2007. Danger ahead: the coming collapse of Canada's municipal infrastructure.

³ ICF Marbek. 2010. Assessing the Economic Value of Protecting the Great Lakes Ecosystem. For details visit the "Library and Links" section of ontario.ca/healthygreatlakes; Austin, J.C., et. al. 2007. Healthy Waters, Strong Economy: The Benefits of Restoring the Great Lakes Ecosystem. The Brookings Institution.

Showcasing Water Innovation Funding Partners



MINISTRY OF THE
ENVIRONMENT AND
CLIMATE CHANGE

Showcasing Water Innovation Project Partners



Ontario Centres of
Excellence



DESIGNED
to CONNECT.



a Leader for
CleanWater

bealeader.ca

DISCLAIMER: This project has received funding support from the Government of Ontario. Such support does not indicate endorsement by the Government of Ontario of the contents of this material