Making Green Infrastructure the New Normal: Lessons from Ontario

Living Cities Canada Forum
March 30, 2022

Jennifer Court
Jcourt@greeninfrastructureontario.org

About GIO

The Green Infrastructure Ontario (GIO) Coalition is an alliance of organizations that share a common vision for a healthy, green Ontario where the economic, social, environmental, and health benefits of green infrastructure are fully realized.

GIO Coalition Members

Approx. 40 general members:

- Businesses
- Industry and professional associations
- Municipal and regional governments
- Conservation Authorities
- ENGOs
- Individuals

GIO Steering Committee

landscape ontario.com
Green for Life!

Conservation ONTARIO
Natural Champions

ONTARIO PARKS ASSOCIATION
Protecting Tomorrow Today

GREEN BELT

FORESTS ONTARIO

Toronto and Region Conservation
for The Living City

GREEN ROOFS
FOR HEALTHY CITIES
www.greenroofs.org

LEAF

Credit Valley Conservation
inspired by nature

Lake Simcoe Region conservation authority

OALA
Ontario Association of Landscape Architects

Green Communities
CANADA

GIO's Goals

Green infrastructure is considered equally to grey infrastructure in decision making

Significant amounts of infrastructure funding goes towards green infrastructure (min. 15% of all funding)

Strong policy support for green infrastructure at all levels of government






GIO Activities

- Government Relations
  - Direct advocacy
  - Policy submissions
- Knowledge Sharing
  - Reports
  - Presentations
  - Workshops
  - Training
  - Collaborative projects
  - Newsletter

Why Use Infrastructure Language?

- Ensure natural features and processes are viewed as equals to road, bridges, and pipes
- Improve eligibility for federal and provincial infrastructure funding
- Embed nature into infrastructure policy to try to avoid being targeted by changes in government.
- Improve the management of natural features
- We frame green infrastructure around these key infrastructure concepts:
  - Assets
  - Cost savings
  - Secondary services/co-benefits

What is Green Infrastructure?

GREEN INFRASTRUCTURE (GI)

Nature-based Solutions (NbS)/Nature-based Climate Solutions

Natural Infrastructure (NI)

Low Impact Development (LID)

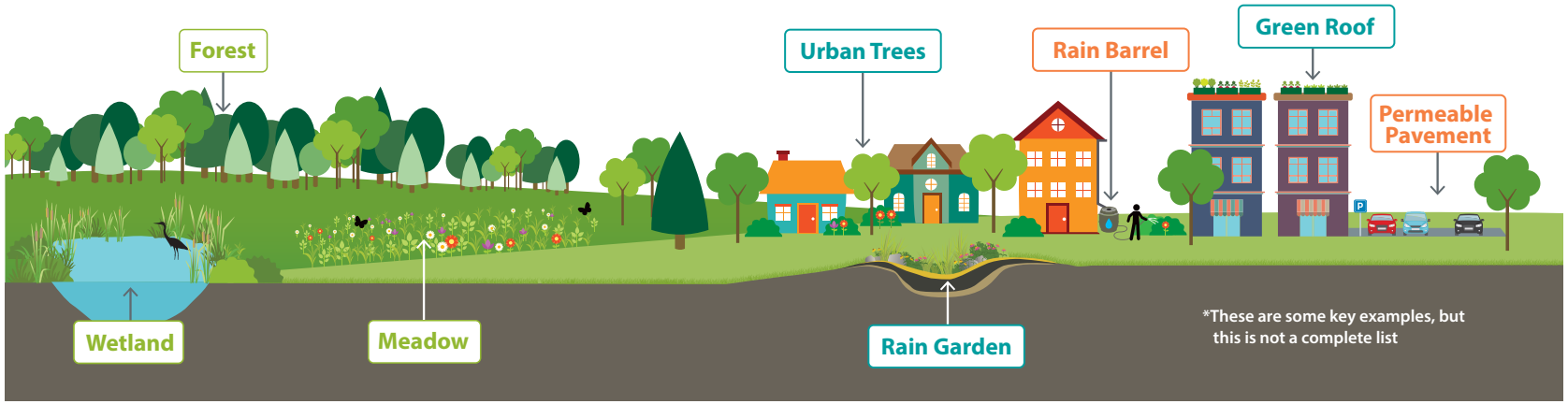
NATURAL ASSETS:*
- Wetlands
- Forests
- Parks
- Meadows
- Lawns and gardens
- Soil

ENHANCED ASSETS:*
- Rain gardens
- Green roofs and walls
- Bioswales
- Urban trees
- Naturalized stormwater ponds

ENGINEERED ASSETS:*
- Permeable pavement
- Rain barrels
- Cisterns
- Perforated pipes
- Infiltration trenches

GREY INFRASTRUCTURE:*
- Bridges
- Roads
- Parking lots
- Culverts
- Pipes

Green Infrastructure ONTARIO COALITION



Green infrastructure is defined as natural vegetative systems and green technologies that collectively provide society with a multitude of economic, environmental, health, and social benefits

Government Relations Activities

Provincial

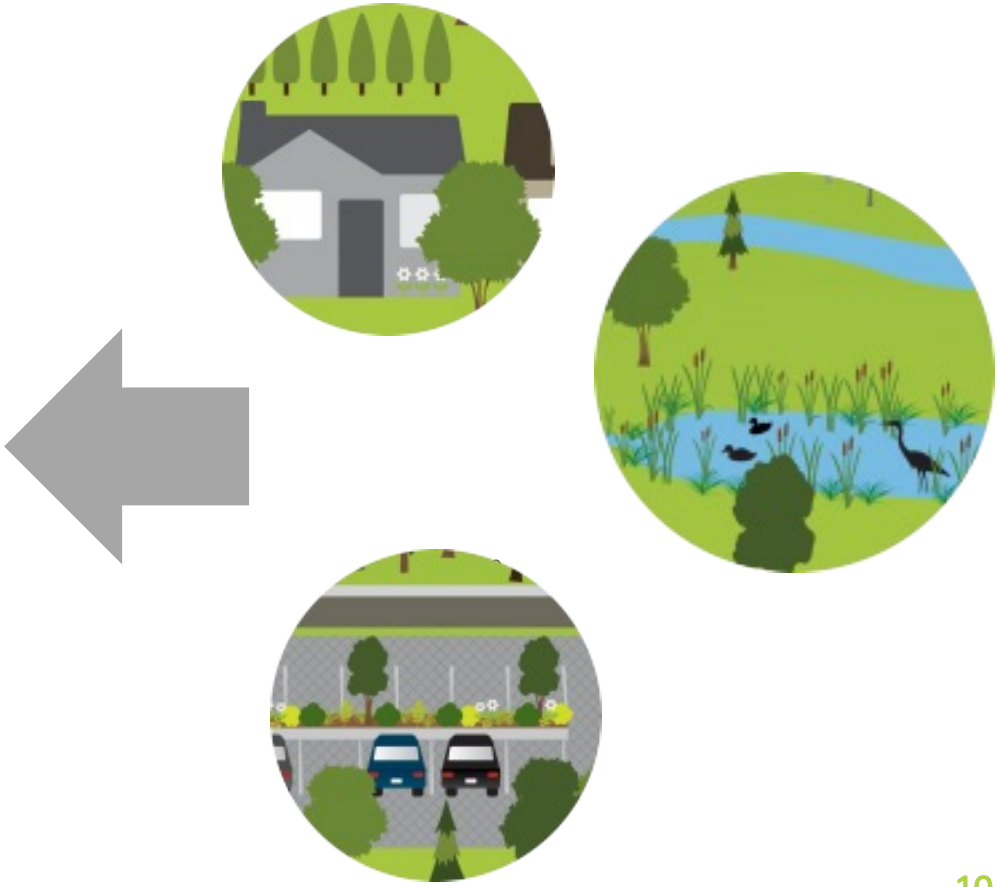
- Green infrastructure included in Provincial Policy Statement (PPS)
- Green Infrastructure included in O. REG. 588/17: Asset Management Planning for Municipal Infrastructure (2018)
- Ontario Standing Committee on Finance and Economic Affairs
- Policy meetings with Liberal, NDP, and Green party (Ontario)

Green Infrastructure in Asset Management Planning

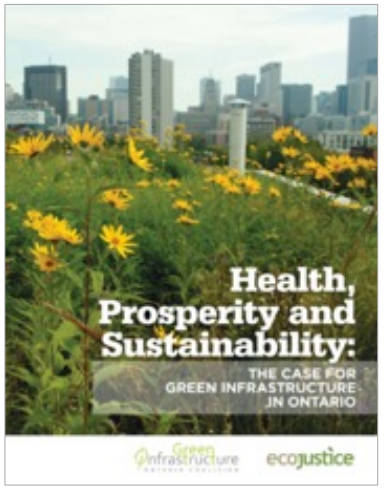
- Benefits of incorporating green infrastructure into asset management planning include improved:
  - Ability to explain and defend budgets
  - Oversight of critical infrastructure
  - Risk management
  - Decision-making in areas of appropriate investment and management
  - Greater inclusion of green infrastructure at the beginning of the development and planning process for all types of infrastructure
  - Development of robust business cases through improved reporting practices and diverse assessment methods
  - Ability to balance capital and operating expenses and reduce costs
  - Public reporting

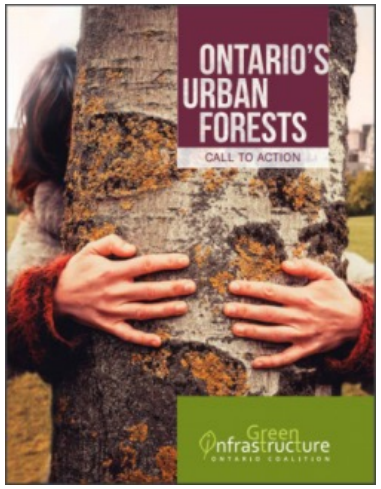
Green Infrastructure in Asset Management Planning

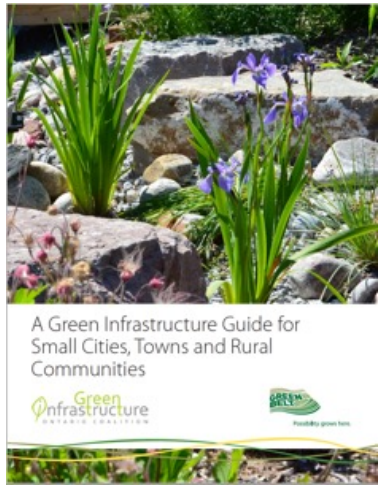
Municipal Decision Making



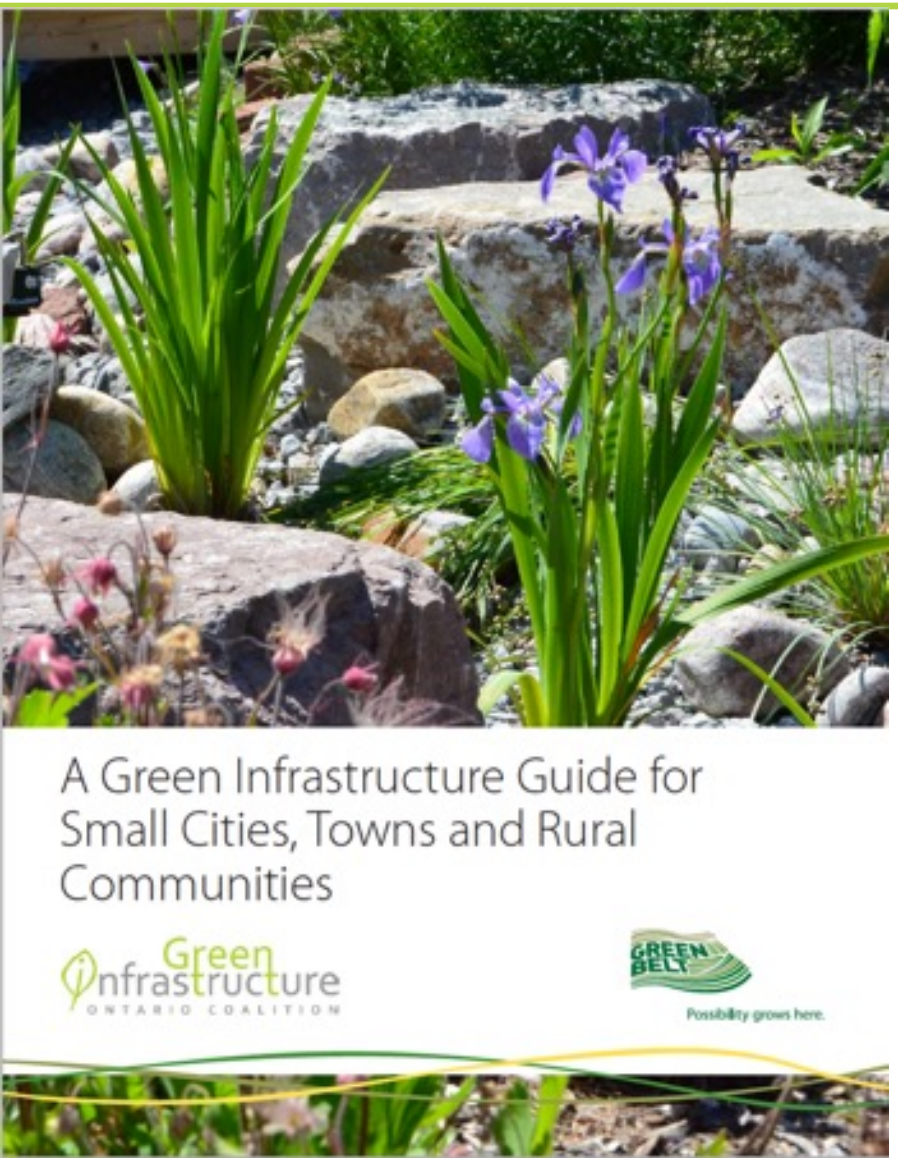
Knowledge Sharing Activities - Publications







A Green Infrastructure Guide for Small Cities, Towns, and Rural Communities



- "Green Infrastructure 101"
- A guide to the types of green infrastructure and their functions (primary & secondary)
- Planning zones
- Case studies
- Guiding Principles:
  1. Implement a GI first policy
  2. Incorporate the multiple benefits of GI
  3. Apply best practices in GI design and maintenance
  4. Preserve and protect natural heritage features & existing urban vegetation
  5. Integrate GI into asset Management

A Green Infrastructure Guide for Small Cities, Towns, and Rural Communities

The term 'Green Infrastructure' encompasses both natural systems and engineered solutions. This Guide identifies 17 types of green infrastructure that are most suitable for built areas of smaller cities, towns and rural communities.

These green infrastructure types and their primary function are described below. For ease of reference, each type of green infrastructure has a corresponding number that is used throughout the Guide.

See Section 4: "Green Infrastructure Types in More Detail" for a more detailed description of each green infrastructure type.

1 BIOSWALE (WET or DRY)
Vegetated channel that conveys, reduces, and filters runoff. Dry swales include a filter bed.

2 CONSTRUCTED WETLAND
A wetland designed and engineered to treat wastewater and manage runoff by removing sediments and pollutants.

3 DRY POND
Grassy depression that holds water following a storm and allows sediments to settle prior to discharge.

4 ECOSYSTEM PLANNING
An approach to planning for new developments that considers existing natural areas and drainage ways.

5 FILTER STRIP
Gently-sloped planted strip of grass or dense vegetation designed to filter runoff.

6 GREEN ROOF
Rooftop vegetation that provides ecological value and habitat, reduces runoff, and enhances building performance.

7 GREEN WALL
Vertical structure designed to absorb air pollution and act as a sound barrier and beautification feature.

8 HEDGEROW
Planted strips of shrubs and trees that act as a wind buffer to reduce soil erosion while providing wildlife habitat.

9 PERFORATED PIPE
An underground pipe featuring small holes or slots that allow for the entry and exit of stormwater into the ground or gravel bed.

10 PERMEABLE PAVEMENT
Surface treatments suitable for pedestrian or vehicular traffic which allow water to infiltrate into the ground.

11 RAIN GARDEN AND BIORETENTION
A planted or ornamental rock-filled depression designed to collect, infiltrate, and filter runoff.

12 RAIN HARVESTING
Use of a rain barrel or cistern to collect rainwater and supplement fresh water supply.

13 RIPARIAN BUFFER
Vegetation that slows runoff into streams, as well as reduces erosion, sedimentation, and pollution in a waterway.

14 SOAKAWAYS, INFILTRATION TRENCHES AND CHAMBERS
Underground stormwater storage systems at the individual lot level.

15 TREE CANOPY EXPANSION
Tree planting, protection and maintenance increases the total amount of tree canopy, which helps clean air, filter water and provide shade.

16 WET POND
Large permanent pool that allows sediments to settle. Biofiltration slows and filters water.

17 XERISCAPING
Groupings of vegetation with similar needs, in particular native species, to reduce watering requirements.

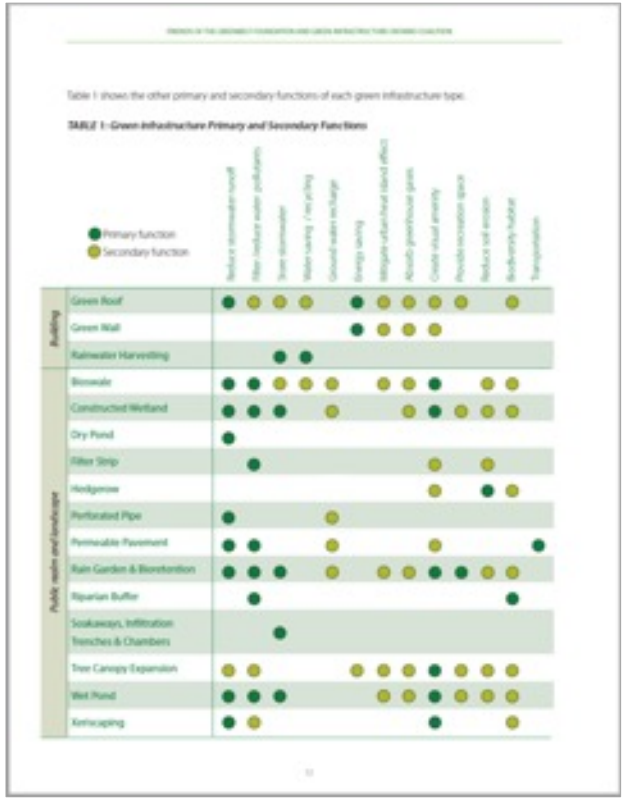


Table 1 shows the other primary and secondary functions of each green infrastructure type.

TABLE 1: Green Infrastructure Primary and Secondary Functions

● Primary function
● Secondary function

		Reduce stormwater runoff	Filter needed water pollutants	Store stormwater	Water saving / rain pitching	Groundwater recharge	Energy saving	Mitigate urban heat island effect	Absorb greenhouse gases	Create visual amenity	Provide recreation space	Reduce soil erosion	Biodiversity/habitat	Transportation
Building	Green Roof	●	●	●	●		●	●	●	●	●		●	
	Green Wall						●	●	●	●				
	Rainwater Harvesting			●	●									
Public realm and landscape	Bioswale	●	●	●	●	●		●	●	●		●	●	
	Constructed Wetland	●	●	●		●			●	●	●	●	●	
	Dry Pond	●												
	Filter Strip		●							●		●		
	Hedgerow									●		●	●	
	Perforated Pipe	●				●								
	Permeable Pavement	●	●			●				●				●
	Rain Garden & Bioretention	●	●	●		●		●	●	●	●	●	●	
	Riparian Buffer		●										●	
	Soakaways, Infiltration Trenches & Chambers			●										
	Tree Canopy Expansion	●	●				●	●	●	●	●	●	●	
	Wet Pond	●	●	●				●	●	●	●	●	●	
	Xeriscaping	●	●							●			●	

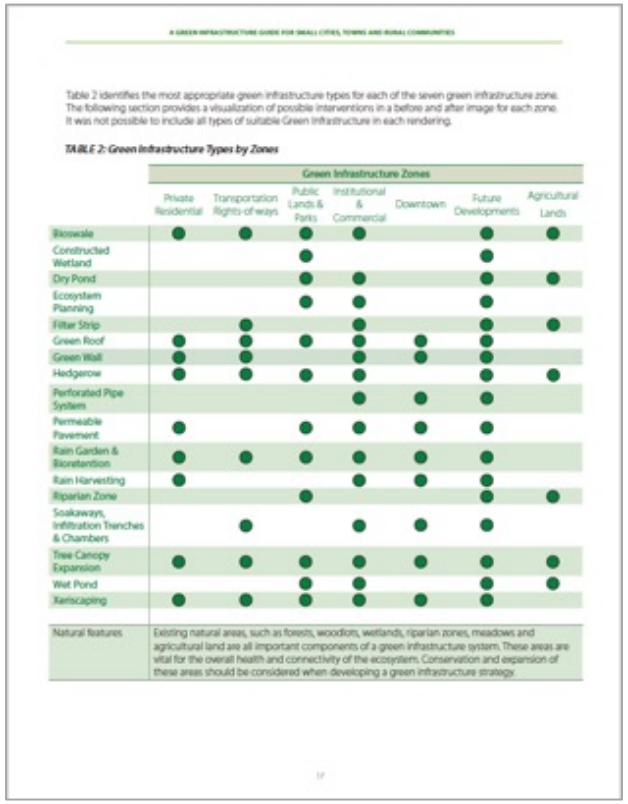


Table 2 identifies the most appropriate green infrastructure types for each of the seven green infrastructure zone. The following section provides a visualization of possible interventions in a before and after image for each zone. It was not possible to include all types of suitable Green Infrastructure in each rendering.

TABLE 2: Green Infrastructure Types by Zones

	Green Infrastructure Zones						
	Private Residential	Transportation Rights-of-ways	Public Lands & Parks	Institutional & Commercial	Downtown	Future Developments	Agricultural Lands
Bioswale	●	●	●	●		●	●
Constructed Wetland			●			●	
Dry Pond			●	●		●	●
Ecosystem Planning			●	●		●	
Filter Strip		●		●		●	●
Green Roof	●	●	●	●	●	●	
Green Wall	●	●		●	●	●	
Hedgerow	●	●	●	●		●	●
Perforated Pipe System				●	●	●	
Permeable Pavement	●		●	●	●	●	
Rain Garden & Bioretention	●	●	●	●	●	●	
Rain Harvesting	●			●	●	●	
Riparian Zone			●			●	●
Soakaways, Infiltration Trenches & Chambers		●		●	●	●	
Tree Canopy Expansion	●	●	●	●	●	●	●
Wet Pond			●	●		●	●
Xeriscaping	●	●	●	●	●	●	
Natural features	Existing natural areas, such as forests, woodlots, wetlands, riparian zones, meadows and agricultural land are all important components of a green infrastructure system. These areas are vital for the overall health and connectivity of the ecosystem. Conservation and expansion of these areas should be considered when developing a green infrastructure strategy.						

An Economic Impact Assessment of the Green Infrastructure Sector in Ontario

- In 2018, Ontario's green infrastructure sector was responsible for:
  - $8.6 billion in gross output (revenues)
  - $4.64 billion in direct GDP ($8.3B including indirect and induced)
  - 84,400 direct jobs (122,000 including indirect and induced)
- Good green jobs!
- Local supply chain
- Strong growth potential
- Capital and operational cost savings for traditional gray infrastructure

Advancing Municipal Action on Green Infrastructure

- *Goal:* to identify gaps and barriers to the wider implementation of green infrastructure in the province of Ontario, as well as improving the access to resources and tools available to municipal stakeholders
- Year long engagement with green infrastructure champions:
  - 28 municipalities
  - 6 conservation authorities
  - 9 NGOs
  - 2 private companies

AMA Findings

Gaps, challenges, or barriers:

- Funding (more funding; more accessible funding for GI)
- Lack of technical knowledge and understanding
- Maintenance (cost and requirements)
- Knowledge and education/buy-in (gaps exist at various levels):
  - Public/residents
  - Other municipal staff
  - Local elected officials
- Lack of standardized materials and practices
- Challenges coordinating different departments or levels of government
- Space restrictions (there are opportunities to implement more GI on private property)
- Need for guidelines, bylaws or codes
- More documentation of successful projects (especially local examples)

Advancing Municipal Action on Green Infrastructure

Green Infrastructure Ontario Coalition

In partnership with the Ontario Parks Association (OPA) and funded by a grant from the Greenbelt Foundation.

The Advancing Municipal Action on Green Infrastructure Project sought to identify gaps and barriers to the wider implementation of green infrastructure (GI) in the province of Ontario, and also improve the access to resources and tools available to municipal stakeholders.

Project Objectives

1. Develop tools to reduce barriers and fill knowledge gaps in municipal GI policy to help municipalities take action.
2. Develop and activate resources, tools, and training to support municipalities in incorporating GI into policies and plans.
3. Provide additional support to municipalities that lead to practical implementation of and investments in GI.
4. Promote the widespread adoption of new tools, resources, and strategies amongst municipalities across Ontario.

Top Recommendations for Municipalities

Having a municipal champion is key, and cross-departmental support is even better.

It's important to get council and resident support. Hands on engagement encourages buy-in and planning small pilot projects coupled with strong communication campaigns can also help build this support. Often, flooding has been a catalyst.

Budget for the full life cycle of a project. Capital costs are just a small piece, operating costs are more significant.

Using consistent language, both internally and within the sector, is helpful.

Incorporate green infrastructure into asset management plans and use a consistent methodology for the valuation of green infrastructure assets.

Key Barriers to Implementing GI

Participants communicated gaps, challenges, and barriers to implementing GI in their communities including:

- lack of accessible funding for GI implementation and maintenance,
- lack of technical understanding,
- lack of standardized materials and guidelines,
- challenges with coordinating different departments,
- need for guidelines, bylaws, or codes that support GI implementation and maintenance, and,
- more documentation of successful projects.

Participating Stakeholders

The participants of this project were green infrastructure champions who already had a high level of knowledge about GI, and included:

- 28 municipalities,
- 6 conservation authorities,
- 9 NGOs, and
- 2 private companies.

www.greeninfrastructureontario.org

Top Recommendations for Municipalities:

- Having a municipal champion is key, and cross-departmental support is even better
- It's important to get council and resident support. Hands-on engagement encourages buy-in and planning small pilot projects coupled with strong communication campaigns can also help build this support. Often flooding has been a catalyst.
- Budget for the full life-cycle of a project. Capital costs are just a small piece, operating costs are more significant.
- Using consistent language, both internally and within the sector, is helpful
- Incorporate GI into asset management plans and use a consistent methodology for the valuation of green infrastructure assets

Training & Municipal Support

Training

- How to Incorporate Green Infrastructure into Asset Management Planning webinar series (with TRCA)
- Next Steps in Incorporating Green Infrastructure into Asset Management Planning (with TRCA & CVC)
- Introduction to Green Infrastructure

Municipal Support

- Advancing Municipal Action on Green Infrastructure project
- Green Infrastructure Leadership Exchange - Green Stormwater Infrastructure (GSI) Asset Management Resources Toolkit
- Municipal Hub – resources

Final Thoughts

- Green infrastructure is critical infrastructure!
- Guiding principles for decision and policy making to support green infrastructure:
  1. Implement a GI first policy
  2. Incorporate the multiple benefits of GI
  3. Apply best practices in GI design and maintenance
  4. Preserve and protect natural heritage features & existing urban vegetation
  5. Integrate GI into asset management






Green Infrastructure
ONTARIO COALITION

Let's Make Green Infrastructure the NEW NORMAL!