Toronto examines a new stormwater management approach

Stormwater Sep 1, 2015 1

By Eric Meliton and Alyssa Cerbu

With degraded watersheds and a changing climate creating heightened flood risks, and population growth placing pressure on aging infrastructure, urban areas find themselves facing greater stormwater management and water treatment challenges. Hurricane Sandy in 2012 caused infrastructure damage in nine states at a cost of over US$70 billion. Hurricane Katrina in 2005 caused US$81 billion in property damage and is estimated to exceed a US$150 billion economic impact in Louisiana and Mississippi.

Traditionally, municipalities have addressed such concerns through large infrastructure projects. But these massive undertakings have their downsides, notably high capital costs and long lead times.

Partners in Project Green is a group within the Toronto and Region Conservation Authority that assists businesses in adopting sustainable practices. It is exploring the possibility of developing a network of smaller, facility-level water projects in the private sector to alleviate the burden on municipal stormwater management and water treatment infrastructure.

The Lessons of July 2013

The Greater Toronto Area (GTA) has felt a particular strain on its water system as its population has expanded. An extreme storm event in July 2013 unleashed 126 millimetres of rain on Toronto within a two-hour period, resulting in widespread power outages, hundreds of commuters stranded, and an estimated $1 billion in damages. The Insurance Bureau of Canada has ranked it as the most costly natural disaster in Ontario's history.

While the now-legendary storm has not yet repeated itself, climate change experts agree that the GTA is likely to see both more frequent and more intense storm events, with potentially damaging impacts on local safety, infrastructure and economy. Most of the water infrastructure in the GTA is not built to handle storm events of such magnitude.

Continued population growth promises to place further strain on an already overburdened water system. The Federal Ministry of Finance projects that the population of the GTA will reach 17.8 million by 2041. While some municipalities within the GTA, notably the Region of Peel, are investing heavily in projects to meet growing water demands, there are others, such as the City of Toronto, that struggle even to find the resources for routine retrofitting of their water and wastewater infrastructure.

It is increasingly clear that the GTA needs to rethink its approach to managing stormwater and water treatment. Rather than relying on costly, large-scale infrastructure projects, the municipalities that make up the GTA need to consider a more flexible, diversified approach to tackle their water concerns. This should incorporate both large-scale and smaller, facility-based projects.

Diversified solutions

One solution to the problem of aging stormwater management infrastructure is lot-level stormwater management technologies, otherwise known as Low-Impact Development (LID). These technologies, which include filter swales, permeable pavement, rainwater harvesting systems, rain gardens and green roofs, focus on retaining, infiltrating and treating and/or controlling stormwater where it lands. This re-introduces traditional hydrologic and environmental functions, maintains water balance and can help restore watershed functions. Recognizing the potential, Partners in Project Green is encouraging industrial, commercial and institutional properties, with large areas of impermeable surfaces, to undertake retrofits that incorporate lot-level stormwater management technologies.

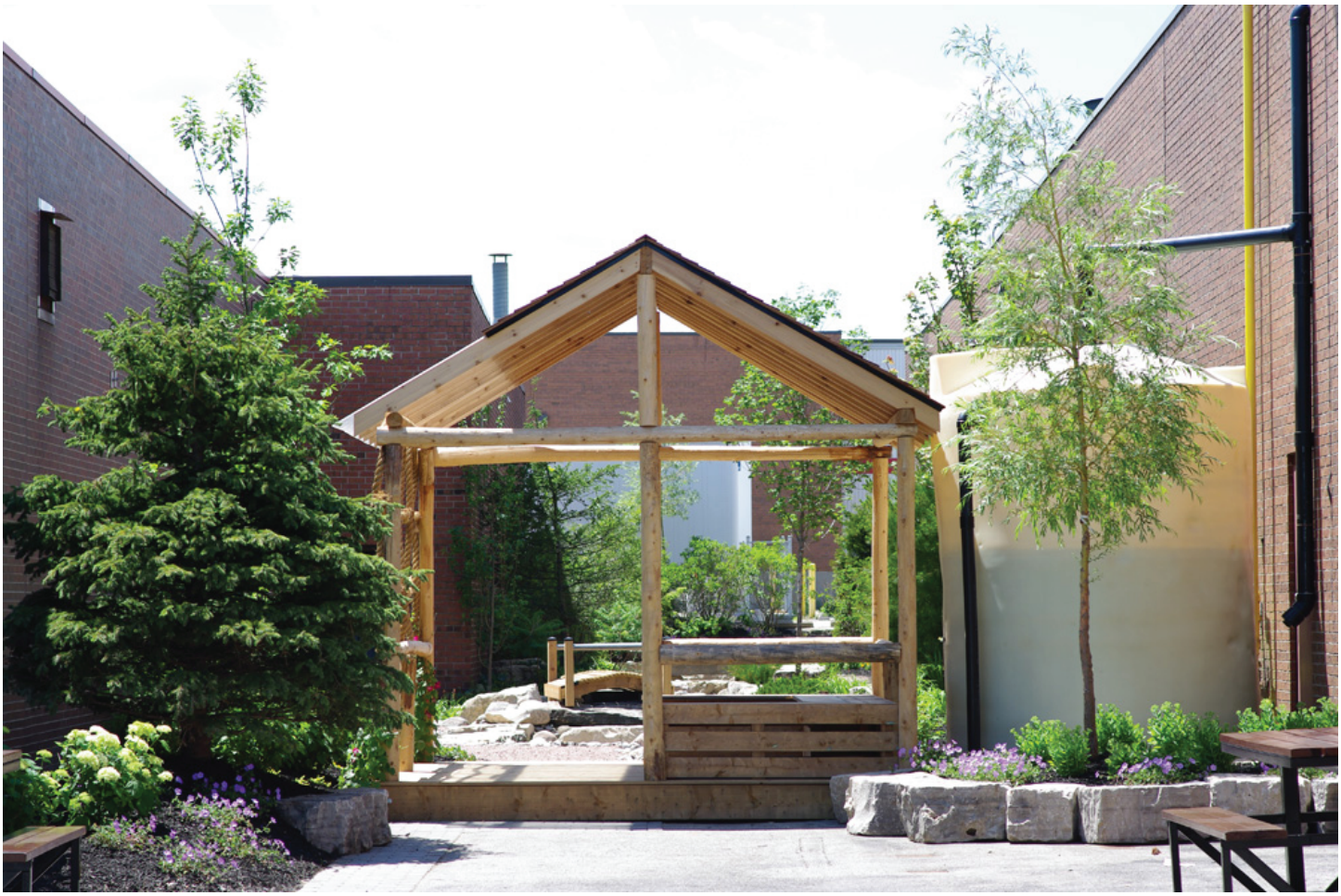
The degree to which LID solutions can impact local water infrastructure depends on the size and number of properties that adopt them. A property that successfully retains 100% of the rainfall on its site will nevertheless make little impact if none of its neighbours with sizable impermeable surfaces are engaged in water stewardship initiatives. The key to maximizing the potential for infiltration, detention and watershed restoration is to pull together local networks of properties implementing LID projects.

On the wastewater and process water management side, Partners in Project Green is focused on providing support to existing municipal programs, operated by Toronto Water and the Region of Peel's Public Works department. These are designed to help businesses reduce their water footprints. Since the industrial, commercial and institutional (ICI) sector extracts large amounts of water and sends significant volumes of process and wastewater through the municipal sewer systems, these kinds of efficiency programs can have a dramatic impact.

Above all, municipalities and businesses need to view stormwater, treated water and wastewater as interconnected systems facing similar challenges, rather than as separate, mutually-exclusive entities.

A view of the ponds and recycled materials walkway at Calstone Inc. in Scarborough Ontario, which was the first of Partners in Project Green's Collective Stormwater Infrastructure projects.

A successful pilot

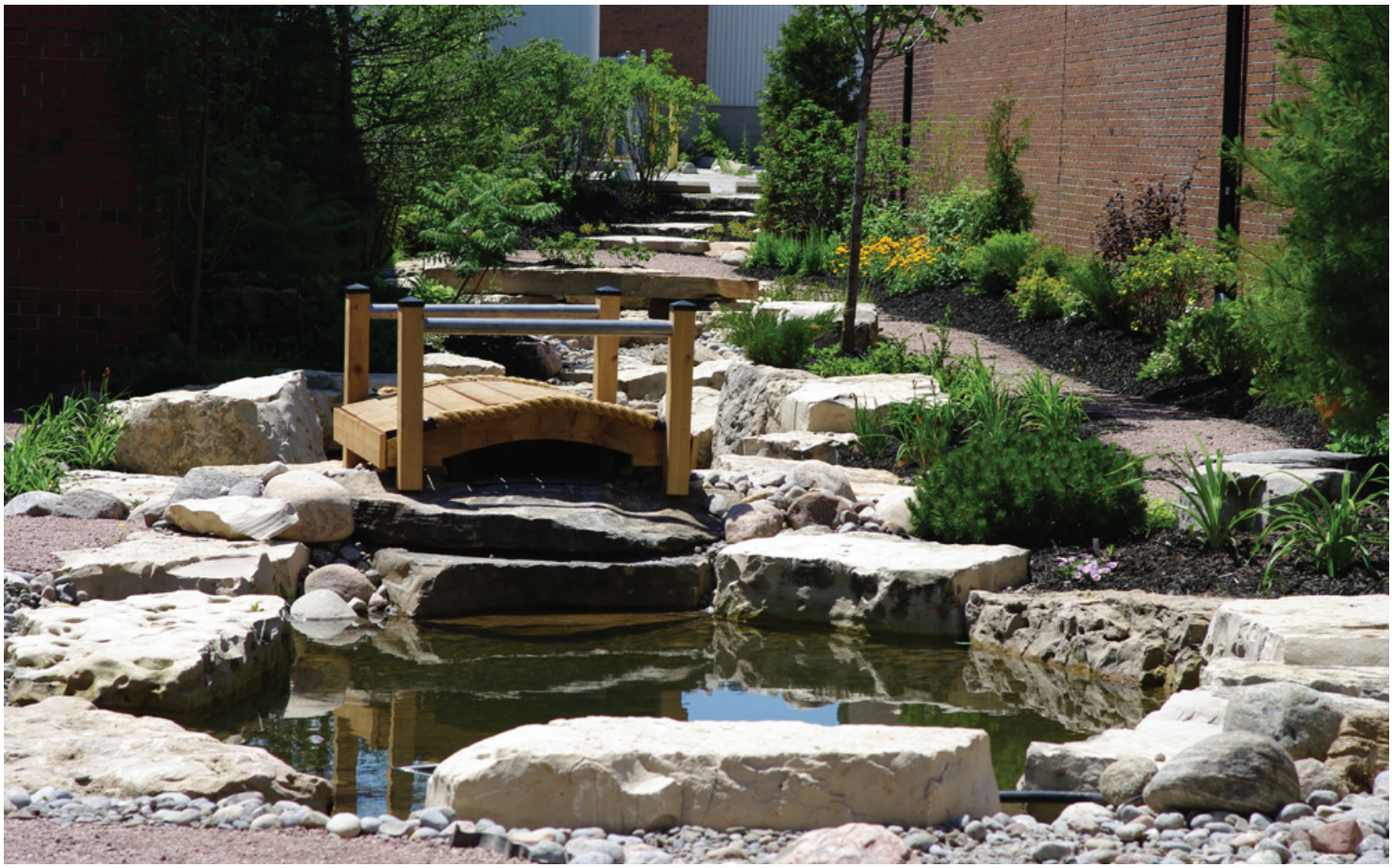


The Collective Stormwater Infrastructure Project at Calstone Inc., which features both a rainwater harvesting tank and retention pond seen above.

Supported by project funding from regional municipal partners, Partners in Project Green pursues collaborative sustainable initiatives with hundreds of private companies and public organizations. In 2014, its Water Stewardship team focuses on projects aimed at developing innovative low-impact stormwater management technologies on ICI sector properties, using a network of service and technology vendors. The first installation was completed in 2015 at Calstone Inc., a mid-sized steel furniture manufacturer in Scarborough, Ontario.

Calstone initially approached Partners in Project Green after receiving the City of Toronto's $5,000 Hometown Heroes award, with the goal of completing a small rainwater harvesting and garden project. Using funds from the Ontario Ministry of the Environment and Climate Change's Showcasing Water Innovation program and water stewardship capital grants, as well as leveraging exclusive discounts from its vendor network, Partners in Project Green was able to scale-up the value of the project to more than $125,000.

The Calstone project involved disconnecting three of six downspouts from the company's 42,000 ft2 roof to feed into a series of LID features. One downspout connects to a 9,300-litre rainwater harvesting tank. When full, it irrigates Calstone's on-site garden and vegetation, and overflows to a retention pond that serves as an attractive water feature. The other two downspouts are connected to an infiltration trench at the back of the property. During larger storms, these will overflow into a pair of connected infiltration ponds, allowing the water to slowly return to the water table and, eventually, flow to Highland Creek. The 8,400 ft2 infiltration and retention system will divert an estimated 1.9 million litres of rainwater annually.



The series of stormwater retention and infiltration ponds at Calstone Inc.'s installation with Partners in Project Green.

This collective infrastructure project expanded upon an existing Calstone water stewardship initiative. More than a decade ago, the company's President and CEO Jim Ecclestone happened upon an old milk pasteurization tank while walking through a farm field, and decided to find a use for it. The Calstone team disconnected one of their downspouts to flow into the salvaged tank, and, since then, has used the greywater both for their toilet fixtures and to cool spot welders in their manufacturing operations. In addition to relieving the strain on the local storm sewer system, this creative retrofit reduces potable water use. Calstone's ultimate goal, however, is to remove itself completely from the municipal grid.

Performance evaluation of the system is now underway, and will continue for two years. Partners in Project Green will use the results to evaluate the effectiveness and cost viability of these kinds of stormwater technologies, and to promote the installation of future ICI retrofits across southern Ontario.

Building a network of projects

One-off projects cannot, on their own, generate significant results on a watershed-level or municipal scale. It takes networks and clusters of projects to create measurable impacts on local water and stormwater footprints. Individual projects must be informed by a holistic outlook that takes into account not just an organization's own water usage, but also the water falling beyond its property line. Projects such as Calstone's demonstrate the advantages of such an approach.

Partners in Project Green looks forward to continuing its efforts to develop a network of unique, ICI sector water stewardship initiatives. Through such projects, the group hopes to promote best practices and efficiency in stormwater and process and wastewater management, and to connect organizations within and across watersheds to form the "Watershed of the Future."

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