



## **Final Report to Places to Grow Implementation Fund**

### **Roads and Runoff: Implementing Green Streets in the Greater Golden Horseshoe**

**10 March 2016**

**Prepared by Clifford Maynes, Executive Director,  
Green Communities Canada**

This project, undertaken by Green Communities Canada (GCC) in partnership with Credit Valley Conservation (CVC), included event planning, promotion, preparation and distribution of an advance discussion paper, a one day workshop (1 March 2016) and follow-up. The project, funded by Places to Grow Implementation Fund of the Ontario Ministry of Municipal Affairs and Housing, has been highly successful, exceeding targets and expectations.

## Participants

---

Attendance at the one-day workshop, 1 March 2016 in Port Credit, totaled 135, including partner staff and trade show exhibitors. Exceeding our target of 100 by 35 percent.

We had an additional waiting list of 29.

Attendance on the day of the workshop was strong despite warnings of a major winter storm expected to hit the region beginning mid-day. Further, a feared mass exodus during the afternoon presentations failed to materialize.

As the attached list indicates, we were very successful in attracting the desired participant mix, including municipal staff with a variety of related responsibilities (including transportation and planning as well as stormwater management), municipal councillors, conservation authorities, consultants, suppliers and contractors, community organizations, environmental NGOs, and others. A show of hands indicated a mix of professions, including engineers, landscape architects, designers, and planners.

The participants closely matched the diversity of skills, perspectives, and roles needed for success in implementing green stormwater infrastructure in general and green streets in particular. No single player is positioned on their own to make this happen: experience shows that cross-sectoral collaboration is needed to get the right skill mix and broad base of support required to overcome barriers.

The partnership between Credit Valley Conservation and Green Communities Canada helped to ensure good attendance. Promotional outreach was extended to our complementary networks. CVC's positive profile with municipalities and conservation authorities assisted in attracting participation from these sectors. Similarly, GCC is closely connected to the NGO sector and the Green Infrastructure Ontario Coalition.

The Ministry of Municipal Affairs and Housing had two representatives at the event, which was excellent and much appreciated. However, there was no representation from Ontario's

environment or transportation ministries, nor CMHC, Environment Canada, or Infrastructure Canada. These and other senior government players will have an important role to play in supporting green streets implementation through research, capacity-building, policy, funding, and more.

## **Advance paper**

---

A draft of the advance paper was included in the interim report. See the final version as circulated to participants is attached. The paper was intended to supply background information and prompt thinking about barriers and solutions to implementation of green stormwater infrastructure in rights-of-way. The quality and quantity of interaction during the table discussions suggests participants came prepared to address the questions of the day (see below).

## **Program for the day**

---

GCC and CVC organized an excellent program for the workshop (See attached program. Presentations are available on request).

Robert Goo, an industry leader from the United States Environmental Protection Agency, traveled from Washington, DC to provide the keynote. Robert was the perfect choice. He was inspiring and visionary, positive and humorous, focused on the big picture backed up by decades of real-world experience, an industry leader. Robert urged workshop participants to de-emphasize stormwater in talking publicly about green streets—since stormwater is not a topic close to the hearts of all audiences—but instead to emphasize themes of aesthetic beauty, liveability, walkability, place-making, economic revitalization, and sustainability. “I am not in the stormwater business,” he said. “I am in the community development business. Green streets are multi-functional.” Robert cited several US cities that have restructured their internal bureaucracy to implement green streets. He said everybody is still learning how best to implement and maintain green streets. “We have to cooperate and hold each other’s hands.”

Scott Perry, City of Mississauga, outlined how his City came to embrace low impact development in the right of way, realizing that “business as usual is not good enough anymore.” Scott described various existing and planned Mississauga projects in active partnership with Credit Valley Conservation, which have “exceeded expectations” for performance, including peak as well as volume reductions.

Steve Grace, Halton Hills, described his experience with a “green community” subdivision spearheaded by a local developer, Intracorp. The project is designed to manage stormwater

onsite through a variety of measures, including “enhanced grass swales” along the roads, permeable paving, a bioswale, and downspout soak-away pits on most properties. Some modifications had to be implemented to correct initial problems, but monitoring to date shows that the system is “working well,” including much reduced volumes in a stormwater pond that was included in the design for redundancy.

John Nemeth, Peel Region, walked the room through a ten-step planning process to integrate green stormwater infrastructure into major regional roads from the beginning of the design stage. John noted that two-tier governments have somewhat confused the division of responsibility for stormwater management in rights-of-way, which needs to be clarified. An engineer himself, he said engineers need to get past attitudinal resistance—“I’m an engineer; I don’t need anybody”—and learn to collaborate with other professions. John expressed his conviction that it is technically feasible to absorb all runoff from regional roads within the right-of-way, even with “tight” soils. “Six to eight lanes all without the need for stormwater drains—it is possible!” he said.

Sheila Boudreau and Patrick Cheung, City of Toronto, presented on their work to develop green streets technical guidelines, which will be formally released at a multi-day event this November. Sheila (a landscape architect) and Patrick (an engineer) said they co-present to communicate the need for collaboration between the two professions and departments, as well as others. Patrick said wryly: “I had to learn what a tree needs to thrive. I am an engineer. It’s not in my training.” Sheila and Patrick spoke to the importance of “embedding” Green Streets (designing for stormwater management) in Complete Streets (designing for the needs of all users, including pedestrians and cyclists). They said there can be a good synergy between the two, and they are being coordinated in Toronto. The green street technical guidelines will include an Excel spreadsheet to help determine which infiltration landscaping measures are appropriate for which streets. They noted that road salts aren’t necessarily a barrier to green infrastructure, showing photos of two sets of street trees: one with watering by runoff, the other without. Notwithstanding salts, the trees with access to runoff are much larger and healthier in appearance than those maintained and watered under typical maintenance regimes.

## **Table discussions**

---

In order to stimulate interactive discussion and thought, CVC and GCC included a long lunch, morning and afternoon networking breaks, and scheduled table discussions. Judging from the evaluation, the table discussions were among the most popular features of the day; and judging from the notes assembled from the sessions, they were also very productive.

Interestingly, the table sessions were cut short in order to get participants out the door before the storm. But this does not seem to have hindered the volume or quality of the discussion.

We organized a facilitator at each table to focus discussions on the top three barriers to implementing LID in the right-of-way, and solutions for each. Facilitators were supplied with prompt questions if the flow ebbed.

To cut time on the day in response to the threat of bad weather, we eliminated report-backs to the plenary. Possibly this adjustment enhanced the popularity of the discussions, because report-backs are generally scattered, repetitive, and long-winded. Our strategy to make the report-backs work was a good one: each table was to report only a single priority barrier and solution, with no repetition of barriers and solutions already presented. This is something worth trying in the future.

A ten-page summary of the table discussions is attached, organized thematically under the headings awareness and acceptance; costs and benefits; design; policy, regulations, and standards; operations and maintenance; performance; communication; marketing and promotion; tools, training and guidance. Three word clouds are provided:

- All discussion words,
- Words related to barriers
- Words related to solutions

The breadth of topics addressed in the table discussions is impressive. GCC and CVC will hold a debriefing and strategy session in the near future to consider the barriers and solutions in the notes and decide on next step. See below.

## **Trade show**

---

CVC and GCC decided to provide for exhibitor booths as part of this event, primarily in order to ensure a broader range of perspectives in the room, accentuate the focus on practical solutions, and add interest to the breaks. This element was a great success. The room was lined with displays from suppliers, contractors, and consultants, including Ecosystem Recovery, Deeproot, Permacon, Aquafor Beech, WSP|MMM Group, Oaks, and Xeroflor. In addition, Credit Valley Conservation, Toronto Region Conservation, and Green Communities Canada all had tables that attracted lively interaction. \$2,800 was raised to offset costs of a future event on similar topic for waitlisted people and follow-up meetings.

## Partnership with Credit Valley Conservation

---

Credit Valley Conservation was a superb partner for Green Communities Canada, extremely friendly and accommodating, eager to help, and highly professional and competent. CVC did much of the heavy lifting on logistics for the event, mobilizing their workforce experienced in staging events of this time. Although an impressive team provided support, in particular, we want to acknowledge two individuals:

- Phil James, Manager of Integrated Water Management, led the CVC team in helping to plan and execute the event, including identification of an excellent program for the day
- Julie McManus, Corporate Services Assistant — Watershed Management organized logistics, and is personally responsible for the smooth running of the day's event.

## Evaluations

---

Participant evaluations were very positive (see Workshop Feedback, attached). 56 per cent of respondents were highly satisfied with the event overall; 42 per cent were satisfied; and 2 per cent were neutral. Ratings were similar for the keynote, the presentations; the break-out session (table discussions), and the venue.

Almost seven in ten participants (69 per cent) said the information learned at the event will help them in implementing green streets in their community. Another 29 per cent said “maybe,” and only two per cent said “no.”

Comments suggest that participants were pleased with our approach to the workshop, i.e. a focus on real-world experiences, barriers, and solutions, with a diversity of perspectives among speakers and participants. They repeatedly use language like “applied examples,” “lessons learned,” “case studies,” “very practical,” and “best practices.” One respondent liked the fact that the discussions were less technical (i.e., designing of right-of-way measures) and “more based on how to start implementing these projects.” Another liked “specific examples of how it works from a planning, funding, and maintenance perspective.”

Respondents liked being part of an event with “various perspectives,” “diversity of opinion,” “multiple disciplines and backgrounds,” and “different people at the table.” They liked “connecting with industry people,” and “the opportunity to talk through barriers and generate solutions across disciplines.”

Surprisingly, many thought the break-out session (table discussions) was the most beneficial part of the workshop. A participant at one table started the conversation by declaring that

break-out sessions are “always a big waste of time.” But he went on to inspire an interesting exchange about his own favoured solution: the need for runoff reduction targets at a watershed scale that provide for the progressive implementation of low impact development over time. He said this framework is needed to drive right-of-way initiatives in new roads and reconstruction.

The evaluation comments include a great many ideas for topics to be covered in future—enough to fill a dozen events. They included discussions about policy and approval processes, implementation nuts and bolts, operational and maintenance challenges, road salt, LID performance, success in removing contaminants, public involvement, design and construction, stormwater user fees, and LID on private land. Additional comments:

- “Discussion of funding, maintenance of green streets. Placing a uniform policy throughout Ontario.”
- “Current legislation—provincial—what needs to change?”
- “create a permanent community of practice for knowledge-sharing, relationship-building, and telling success stories.”

Finally, other comments generally praised the event, the venue, and the food (including use of a green caterer). Mildly negative comments addressed the temperature of the venue (too cold?), the shortage of nearby parking, and the length of the event (“two days needed”).

We had only one real criticism, a respondent who thought the event needlessly repeated well-known barriers and solutions instead of making real progress on implementation. (For the most part it appears we did a good job of making everybody happy, regardless of their pre-existing level of sophistication, by planning a program that would be newcomer-friendly while incorporating detailed reports from the front lines. But it is certainly worth considering how future events and other activities could be structured to maximize forward motion.)

## Conclusions and follow-up

---

The Roads and Runoff project met its objective of creating a high impact learning experience for diverse target audiences, including municipal decision-makers with responsibility for implementing green stormwater infrastructure in the right-of-way. Participants gained a better understanding of the practical issues surrounding implementation of road-side low impact development. A strong majority believe they learned information they can put to use locally in implementing green streets, and most of the rest think they might. The event was positive and exciting. It created momentum: people heard from their peers and others about progress in

individual projects that work, and progress in making right-of-way green infrastructure business as usual.

For Green Communities Canada, perhaps more than Credit Valley Conservation, the event was a wonderful opportunity to add some on-the-ground specifics to our bird's eye view knowledge of green streets, in a Canadian context.

As part of the follow-up we are asking participants to subscribe to our monthly *Umbrella Stormwater Bulletin*, which features news and resources from the world of green stormwater infrastructure, including right-of-way implementation. We are also promoting our *Soak it Up! Toolkit*, which provides an overview of programs and policies for local implementation of green stormwater infrastructure across the landscape, again including rights-of-way.

The event more than confirmed our view that focussing the topic is a good engagement strategy. Instead of addressing green stormwater infrastructure in general, Roads and Runoff focussed on one category of application, the public right-of-way. Perhaps as a result we got a great response, including transportation department staff who would normally not attend an event about stormwater management. Future planned activities by Green Communities Canada will use a similar strategy, including a webinar for urban forest champions about the role of trees in intercepting and soaking up rain; a one day workshop for urban parks managers about increasing the hydrological function of parks while respecting and enhancing other uses; and a one-day forum on stormwater user fees and other market-based instruments for incenting runoff volume reductions on private property.

The project broadened and deepened the partner relationship between Green Communities Canada and Credit Valley Conservation, likely leading to other fruitful partnerships in future.

## Next Steps

---

GCC and CVC will meet in the next month for a debriefing and strategy session. The agenda will include the possibility of collaborating on further events, but will also include other activities and strategies. Drawing from participant comments and our other work topics will include:

- **Engagement of senior government departments, provincial and federal.** How can they be more active players in facilitating green stormwater infrastructure in general and right-of-way implementation in particular? Potential targets include provincial ministries with responsibility for municipal affairs, transportation, environment, natural resources, and infrastructure. Federal government targets include CMHC and ministries with a similar range of responsibility. Given the federal and provincial commitments to support



infrastructure development financially it is particularly important that financing recognizes and supports “green” infrastructure as well as “grey.”

- **The provincial policy framework.** How can we ensure that the province’s stormwater volume reduction expectations in the LID Guidance Document will help drive green stormwater infrastructure implementation? For example, will these expectations apply to all road construction and reconstruction? (It would certainly have an impact if, for example, the province decides that it expects the first 25 mm of rain to be managed onsite, through source controls.) Further, can the requirement for water sustainability planning under the Water Opportunities Act be a driver for integrated watershed planning and management, and therefore for LID implementation?
- **Community of practice.** Credit Valley Conservation and Toronto Region Conservation are providing training and detailed research and technical information. Green Communities Canada publishes the *Umbrella Stormwater Bulletin*, and is promoting the *Soak it Up! Toolkit*. Are there nevertheless gaps in available information and communications channels? We note the role of the US EPA in supporting a Green Infrastructure Collaborative: “a network-based learning alliance created to help communities more easily implement green infrastructure.” Does Canada/Ontario need something similar?
- **Research.** Some participant comments referenced the need for more science-based information about LID performance, maintenance, cost-effectiveness, and particular issues like road salt. LID performance in the Canadian climate and tight soils (clay) is a perennial issue. Is there a gap in Canadian research on this topic? Or is there adequate research but a need to “mobilize” this knowledge for target audiences (i.e., translate, communicate).
- **Local implementation.** A number of the comments related to aspects of local implementation, including policy, process, staffing/structure, and partnerships. Would this be a good focus for a workshop?
- **Public engagement.** Some participants saw public understanding, buy-in, and participation in source control solutions as a top priority. Would this be a good focus for another event?

These and other topics will be addressed at a debriefing/strategy session involving GCC and CVC (and possibly others) in the very near future. We would be pleased to inform MMAH of the outcome or involve the Ministry in strategy discussions.

# Roads and Runoff

## Implementing Green Streets in the Greater Golden Horseshoe



HOSTED BY



## CREDIT VALLEY CONSERVATION

BROUGHT TO YOU BY



*Thanks to the Places to Grow Implementation Fund (Government of Ontario) for financial support*

# Roads and Runoff:

## Implementing Green Streets in the Greater Golden Horseshoe

### Agenda

8:00 – 9:00 a.m.	<b>Registration and Refreshments</b>
9:00 – 9:20 a.m.	<b>Welcome:</b> Clifford Maynes, Executive Director Green Communities Canada Tim Mereu, Director of Watershed Management, Credit Valley Conservation
9:20 – 10:15 a.m.	<b>Keynote Address:</b> <i>Using Green Infrastructure to Enhance Public Right-of-ways</i> Speaker: Robert Goo, USEPA
10:15 – 10:45 a.m.	<b>Break</b>
10:45 – 12:15 p.m.	<b>Panel Presentation: Implementing Green Streets</b> Speakers: <ul style="list-style-type: none"><li>• <i>The Evolution of Green Streets in Mississauga</i> Scott Perry, Storm Drainage Coordinator, City of Mississauga</li><li>• <i>Lessons Learned, Residential Subdivision and Low Impact Development</i> Steve Grace, Town of Halton Hills</li><li>• <i>Ten Step Process of Regional Road Design, Incorporating LID</i> John Nemeth, Infrastructure Programs and Studies, Region of Peel</li></ul>
12:15 – 1:30 p.m.	<b>Lunch and Networking</b>
1:30 - 2:30 p.m.	<b>Breakout Discussion</b> Participants will work with a facilitator at their table to answer the question: <i>From your perspective, what are the top three barriers to green street implementation in your community? How can these be addressed?</i>
2:30 - 3:00 p.m.	<b>Break</b>
3:00 - 3:50 p.m.	<b>Presentation</b> <i>Toronto Green Streets Building a Resilient City Through Green Infrastructure</i> Shelia Boudreau, Urban Designer, City of Toronto Patrick Cheung, Senior Engineer, City of Toronto
3:50 – 4:00 p.m.	<b>Final Remarks:</b> Green Communities Canada and Credit Valley Conservation

## About Our Speakers



### Jon MacMull - Master of Ceremonies

#### Credit Valley Conservation

Jon is Supervisor, Marketing and Communications for Credit Valley Conservation. He leads outreach campaigns focused on community engagement and partnership building.



### Robert Goo Keynote Speaker

#### USEPA

Robert Goo currently works USEPA in the Office of Water. His areas of concentration include: integrated water resource management, water sensitive urban design, voluntary codes and standards such as LEED, SITES and the International Green Construction Code. He has over 25 years of experience promoting decentralized stormwater and wastewater treatment systems and green infrastructure/low impact development practices. Robert helped develop the National Pollution Discharge Elimination System (NPDES) Stormwater regulations under the Clean Water Act and works actively to promote the development of policies and programs that are intended to protect and restore watersheds. In the past he worked on a variety of other issues including biosolids management, the water energy nexus, rangeland management and voluntary environmental



### Scott Perry City of Mississauga

Scott has been employed with the City of Mississauga for the last 9 years in various storm drainage positions. Currently, he's the Storm Drainage Coordinator with the City's Environmental Services Section. In this role, his focus has generally been on stormwater management, including the inventory of stormwater management facilities and prioritizing their sediment removal. More recently, he has been involved with the coordination of the City's road LID projects.



## **Steve Grace** Town of Halton Hills

Steve Grace, C.E.T., is the program Manager Water Resources for the Town of Halton Hills where he is responsible for over-seeing the review, approval and Town's technical requirements of Storm Water Management initiatives. In addition, Steve provides the technical lead on subdivision and site plan review, inspection, administration and any requirements associated with Source Water Protection. Prior to joining the Town of Halton Hills in 2000, Steve was employed for 26 years in the private sector with a local Consulting Engineering firm.



## **John Nemeth** Region of Peel

John is a graduate of Ryerson University and has over thirty years' experience in the land development business focusing on the design, implementation, operations and maintenance of stormwater infrastructure and its role to both service the land and protect the environment. As chair of the National Benchmarking Initiative Stormwater annual Workshop and the Southern Ontario Municipal Stormwater Discussion Group he has had the opportunity to participate in national and provincial exercises to improve stormwater practices and contribute to policy frameworks put forth to protect the environment.



## **Shelia Boudreau** City of Toronto

Sheila is a landscape architect and urban designer in City Planning at the City of Toronto. Her work is city-wide and includes developing guidelines and standards, designing and constructing capital works projects (innovative pilot projects), coordinating interdivisional/multidisciplinary working groups, community outreach, and the initiation and development of the Street Tree Triple-Bottom-Line Benefit-Cost Analysis project as well as the Adopt-a-Street-Tree program. As co-lead on the Green Streets Technical Guidelines project with Toronto Water (construction standards for green infrastructure in the right-of-way, to meet Toronto Green Standards objectives), Sheila strives to integrate best practices in planning and designing a more resilient and vibrant city. Sheila also represents the Ontario Association of Landscape Architects on the Green Infrastructure Ontario Coalition, and City Planning on the Toronto Cancer Prevention Coalition / Toronto Public Health's Shade Policy Committee (advocating for natural shade through sustainable tree planting).



## **Patrick Cheung** City of Toronto

Patrick Cheung is a senior engineer in the Policy and Program Development unit of Toronto Water. He has over thirty years of experience in municipal infrastructure servicing engineering field. He is currently co-leading the development of Toronto's Green Streets Program (the implement of the Toronto Green Standard in the right-of-way). Patrick has provided input into a number of City of Toronto guidelines, studies and programs such as the Avenues and Mid-Rise Study, Toronto Green Standards, Greening Surface Parking Lots Guidelines, Tree Planting in Hard Surfaces, Development Infrastructure Policy and Standards Review and Complete Street Guidelines.



## Awareness and Acceptance

Barrier	Solution
Buy-in from different municipal departments (i.e. operations department)	<ul style="list-style-type: none"> <li>• Invite public works and operations staff to develop new building standards</li> <li>• Need champion in departments to facilitate communications</li> </ul>
Support <ul style="list-style-type: none"> <li>• Political will/interdisciplinary team desire</li> <li>• \$</li> <li>• Collaboration</li> <li>• Communication</li> <li>• Champions – both political and staff</li> <li>• Need emotional tie-in</li> </ul>	<ul style="list-style-type: none"> <li>• Develop cooperative working team comprised of municipal staff, agencies, political representations and consultant (technical)</li> <li>• Bring different elements to table to get through barriers including access to financial support, education, legislation. Work towards pilot/demonstration project (subdivision level more challenging)</li> </ul>
Staff/Public awareness <ul style="list-style-type: none"> <li>• Understanding of opportunities/challenges</li> <li>• Lack of long-term monitoring</li> <li>• Collaboration needed</li> <li>• Public outreach (benefit to property values)</li> </ul>	Continue to monitor pilot and demonstration projects to get long-term data. Benefit from partnership with research institutions (living lab). Develop more pilots in communities to increase public awareness with universities. Showcase developers or companies that are doing a good job or leaning by example with LID
Education and Awareness – driving culture change	<ul style="list-style-type: none"> <li>• Training and education of decision makers</li> <li>• Public outreach/engagement</li> <li>• Needing policy/targets to drive change</li> <li>• School curriculum</li> <li>• Public signage/engagement around pilot sites</li> </ul>
Political and Public Support	<ul style="list-style-type: none"> <li>• Improve messaging - consistency</li> <li>• Education – tours of pilot projects, commercials on TV, involve community etc.</li> <li>• Collaboration with community groups</li> <li>• Engaging politicians (tours, presentations)</li> </ul>
Emotional (Fear) (lb)	<ul style="list-style-type: none"> <li>• Education</li> <li>• Promotion of demo projects that work well</li> <li>• Residents need to feel heard – get their feedback! People don't like bump-outs/traffic calming</li> <li>• Provide rewards – i.e. credits, property value, neighbourhood green brand</li> <li>• Help residents deal with stormwater problems like Toronto backwater – get cities to act</li> </ul>
Support from Residents, municipal staff, elected officials. Need to manage expectations	<ul style="list-style-type: none"> <li>• Education so that the community demands the LID. Tours to educate residents and they pressure their councillors to implement in their neighbourhood.</li> <li>• Building the right residential units, the right landscape for the right location. Design is critical</li> </ul>

## TABLE DISCUSSION NOTES – ROADS AND RUNOFF

<p>Acceptance</p> <ul style="list-style-type: none"> <li>• Senior management</li> <li>• Council</li> <li>• General Public</li> </ul>	<ul style="list-style-type: none"> <li>• Education for all three groups</li> <li>• Education done by outside/external organizations</li> <li>• Engaging the public</li> <li>• Engaging youth</li> <li>• Partnerships – NGO's/Private sector</li> <li>• Market research segment</li> </ul>
<p>Lack of support from public works at municipal level – general lack of trust, lack of data, lack of knowledge, inflexible and unwilling to change (i.e standard road cross section)</p>	<ul style="list-style-type: none"> <li>• Direction from top of organization to put priority on LID</li> <li>• Get council support</li> <li>• More outreach and education to public and municipal leadership</li> <li>• Better integration between departments (i.e. SWM, maintenance, operations.)</li> <li>• Create a sustainability coordinator position that crosses departments that</li> <li>• Considers bigger benefits (i.e. placemaking, health, well-being etc.,) and has this vision!</li> </ul>
<p>Development industry resistant to change</p>	<ul style="list-style-type: none"> <li>• BILD credits</li> </ul>
<p>Public Acceptance</p>	<ul style="list-style-type: none"> <li>• Market green streets</li> </ul>
<p>Liability/Risk</p>	<ul style="list-style-type: none"> <li>• More education</li> <li>• Improve modelling of LID's</li> <li>• Clarity around insurance – it is perceived risk or real risk</li> </ul>




## Costs and Benefits


Barrier	Solution
<p>No incentives for developers to implement</p>	<ul style="list-style-type: none"> <li>• Explore risk tolerance tied to scale of development (i.e. 5ha vs 200ha site_</li> <li>• Need to communicate successes and challenges</li> <li>• Appetite for change to status quo</li> <li>• Need strict criteria vs guidelines</li> </ul>
<p>Finances – capital and maintenance</p> <ul style="list-style-type: none"> <li>• Equitable spending</li> <li>• No money for inspecting built project</li> <li>• Development charge by-law</li> <li>• Low income areas</li> <li>• Old infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• User fee</li> <li>• Tax and incentives</li> </ul>
<p>Lack of LID lifecycle cost benefit analysis information (triple bottom line approach)</p>	<ul style="list-style-type: none"> <li>• Long-term monitoring of in the ground features. This should also entail a triple bottom line approach.</li> <li>• Need to accept that this will be an ongoing process.</li> <li>• Can be done through public-private partnerships</li> </ul>




## TABLE DISCUSSION NOTES – ROADS AND RUNOFF

	<ul style="list-style-type: none"> <li>Need environmental economists to do a triple bottom line analysis and tie funding to it.</li> </ul>
Financial/cost implications	<ul style="list-style-type: none"> <li>DC's</li> <li>Reallocation of funds (existing)</li> <li>Stormwater rates</li> </ul>
Financial – Capital costs	<ul style="list-style-type: none"> <li>Case studies that demonstrate a business case for investing in GSI</li> <li>Provide public incentives (reduce development change levy and similar programs, designed charrettes to 'fast track' permitting process, reducing permit fees for projects using LID's)</li> <li>Funding from feds (i.e. gas tax)</li> </ul>
Lack of incentive	<ul style="list-style-type: none"> <li>Implement credit or compensation program, break on development charges etc.</li> <li>Provide life-cycle costing comparison</li> <li>Downsize end-of-pipe SWM system to get volume reduction credits for LID's (MOECC)</li> </ul>
Incomplete picture of capital and operating costs and benefits to compare business as usual to green infrastructure.	<ul style="list-style-type: none"> <li>Link maintenance and operations costs to costs of potential risk</li> <li>Develop a detailed and comprehensive funding model</li> <li>Need to fund with additional O&amp;M costs</li> <li>\$/m</li> </ul>
High life cycle costs <ul style="list-style-type: none"> <li>Capital</li> <li>Operation and Maintenance</li> <li>Replacement</li> </ul>	<ul style="list-style-type: none"> <li>Design to meet existing maintenance</li> <li>Work with your capital works budget</li> <li>Have SWM utility</li> <li>R&amp;D better products</li> <li>Reuse materials</li> </ul>
	<h2 style="color: #4F81BD;">Design</h2>
Barrier	Solution
Redundancy in SWM system is a liability (i.e. SWM pond is overdesigned and will not function as designed)	<ul style="list-style-type: none"> <li>Multi-faceted</li> <li>Change in policy</li> <li>Give credits</li> </ul>
Utilities	<ul style="list-style-type: none"> <li>Relocation – too costly</li> <li>Construct around i.e. silva cell modular system</li> <li>New developments – joint use trench. One corridor – 'utilidoor'</li> </ul>
Choosing the right design based on site constraints (i.e. soils, utilities, snow removal, salting, load and haul excess, compaction, vehicles hitting trees). Why can't tree's grow?	<ul style="list-style-type: none"> <li>Staff training, expertise of consulting industry</li> <li>Develop detailed design standards and specification for road allowance               <ul style="list-style-type: none"> <li>Minimum soil volumes and widths</li> <li>Species selection</li> <li>Required topsoil depth</li> </ul> </li> <li>Operations and maintenance manual</li> </ul>







	<h2>Policy, Regulations and Standards</h2>	
Barrier	Solution	
# of regulatory authority that need to be satisfied (i.e. new MNR policies)	Have a workshop with consultants and municipalities to discuss how policy has been implemented. There needs to be a feedback loop	
Policy and standards <ul style="list-style-type: none"> <li>• Mandate</li> <li>• Change of council</li> <li>• Major system</li> <li>• Champions</li> <li>• No manuals</li> <li>• Loose policy standards</li> <li>• What is LID</li> <li>• No standards, make it a standard</li> <li>• Lawyers, risk – basements, creates problems, litigious</li> </ul>	<ul style="list-style-type: none"> <li>• Buy in from home builders association</li> <li>• Education</li> <li>• Case studies – port land quantifiable</li> <li>• Realistic cost, environment</li> <li>• Carbon credits, stormwater rates</li> </ul>	
Responsibility/lack of policy	<ul style="list-style-type: none"> <li>• Develop policy to mandate responsibility</li> <li>• Internal workshops/groups to develop solutions, share barriers</li> <li>• Develop a process/direction framework</li> </ul>	
Technical Issues <ul style="list-style-type: none"> <li>• Lack of consistent guidelines or standards (standards applicable to varying communities, flexible)</li> <li>• Site conditions (existing infrastructure, soils, environmental)</li> <li>• Access to toolkits</li> </ul>	Need clearer direction from top down to establish clearer and consistent guidance. May need to be a legislated requirement. Need incentives or requirements to do it	
Policy – lack of direction <ul style="list-style-type: none"> <li>• Lack performance results/reliability</li> <li>• Knowledge amongst consultants, contractors, resources, expertise, public</li> <li>• Communications – internal between departments</li> <li>• Changing mindset – change is frustrating, guidelines are vague</li> </ul>	<ul style="list-style-type: none"> <li>• Educating decision makers and all the way down the line</li> <li>• Educate to public/interactive – parks (get public to influence policy, educate thought school)</li> <li>• Make is a requirement</li> <li>• Delegate a champion for LIDs</li> <li>• Shine spotlight on development that chooses LID's</li> </ul>	
Bylaws/polices <ul style="list-style-type: none"> <li>• i.e mowing height, developer constraints and requirements</li> <li>• pre-approval of LID products</li> </ul>	<ul style="list-style-type: none"> <li>• Policy makers directly inform policy</li> <li>• Researched systems – trusted info</li> <li>• MOECC bulletin and guidelines to trump/guide local</li> <li>• Cities get funding from province, feds for incentives</li> <li>• Living documents to promote flexibility</li> <li>• Alignment of policies within city and province</li> </ul>	

## TABLE DISCUSSION NOTES – ROADS AND RUNOFF

	<ul style="list-style-type: none"> <li>Amendment process for LID measures</li> </ul>
Coordination of Guidelines, regulations and standards	<ul style="list-style-type: none"> <li>Standard BMP's across guidelines</li> <li>Cross-departmental input – building better communities</li> <li>Knowledge sharing between municipalities, regions etc. (what was in that RFP's?)</li> </ul>
Policy	<ul style="list-style-type: none"> <li>All levels of government work together (MOE/regional governments)</li> <li>Needs to be top down – makes it easier on municipalities</li> <li>Need political will – ties into emotional</li> <li>Standardization of policy</li> <li>Make official plan – guidelines not enough for needs enforcement</li> <li>Communication</li> <li>Public education</li> <li>Federal government gives credits for hopes with LID like the energy update program</li> <li>Provide grants for LID projects</li> </ul>
Lack of champion, authority, mandate	<ul style="list-style-type: none"> <li>MOECC update 2003 manual</li> <li>Mandatory legislative vs voluntary</li> <li>Criteria for permit</li> <li>Watershed</li> </ul>
Lack of legislation, with no provincial requirement for watershed planning then development is piece-meal. No regulatory requirement for LID. Missing competence at municipal level so LID is overlooked for fear of risk	<ul style="list-style-type: none"> <li>Make LID a critical component of ECA approval</li> <li>Need MOE LID guidelines</li> <li>Include in provincial plans, and therefore required in municipal plans</li> <li>MOECC needs to ensure that ECA approval staff is very well training in LID.</li> <li>In absence of legislation need more flexible, knowledgeable staff to approve LID projects. Support staff with time for education of existing or hire new staff that is qualified.</li> </ul>
Approval process <ul style="list-style-type: none"> <li>Custom LID vs Conventional LID</li> </ul>	<ul style="list-style-type: none"> <li>design standards need to change</li> <li>defined specifications and main lot level controls</li> </ul>
	<h2 style="margin: 0;">Operations and Maintenance</h2>
Barrier	Solution
Maintenance and monitoring (steep learning curve)	<ul style="list-style-type: none"> <li>Training/education</li> <li>Creation of performance standards</li> </ul>
Impacts of salt and de-icing	<ul style="list-style-type: none"> <li>Permeable paving</li> <li>Cattails, reg along strips</li> <li>Research dissemination for the general public               <ul style="list-style-type: none"> <li>is salt even a problem?</li> </ul> </li> </ul>

## TABLE DISCUSSION NOTES – ROADS AND RUNOFF

	<ul style="list-style-type: none"> <li>• Treatment does not remove anyways</li> <li>• chloride added because of germs</li> <li>• Saline solution instead of grit salt – parmesan grind</li> <li>• Smart about Salt</li> </ul>
Maintenance	<ul style="list-style-type: none"> <li>• Money – specialized staff, economies of scale when you build, more qualified contractors</li> <li>• Improve design aspects</li> <li>• Get residents involved (i.e. competitions)</li> <li>• Make sure residents involved are going to buy in – education</li> <li>• Educate on O&amp;M before hand - make sure they know the what and why</li> <li>• Skill sharing/community volunteers</li> </ul>
Who is responsible for O&M of ROW projects –who maintains and ensures performance over time?	<ul style="list-style-type: none"> <li>• Need revenue stream (reallocation/priority)</li> <li>• Earmarked</li> <li>• Developer fund</li> <li>• Capitalize maintenance</li> <li>• Lifecycle – design for low maintenance</li> <li>• Cost/benefit</li> </ul>
	<b>Performance</b>
<b>Barrier</b>	<b>Solution</b>
Lack of performance target on a watershed	<ul style="list-style-type: none"> <li>• Target no problem for new build</li> <li>• Set achievable target on a watershed basis</li> <li>• Need municipalities to be the lead on implementation</li> </ul>
Inability to give credit to LID BMP's due to lack of quantitative tools beyond infiltration rates (how recognize evapotranspiration plant uptake etc.) only relying on storage and infiltration.	<ul style="list-style-type: none"> <li>• Recognition of importance of monitoring data</li> <li>• MOECC guideline should incorporate this data</li> <li>• MOECC should conduct testing/monitoring for LID as they did for storm ponds</li> </ul>
Impact on the assumption process	<ul style="list-style-type: none"> <li>• Monitoring period vs assumption period – assumption needs to take place after monitoring has shown the practice is working.</li> </ul>
	<b>Communication</b>
<b>Barrier</b>	<b>Solution</b>
Communication within an organization/group for the implementation of LID, even if interest is there	<ul style="list-style-type: none"> <li>• Central database to identify projects (road, urban, forestry etc. and prioritize needs)</li> <li>• Internal workshops/groups to develop solutions, share barriers</li> </ul>

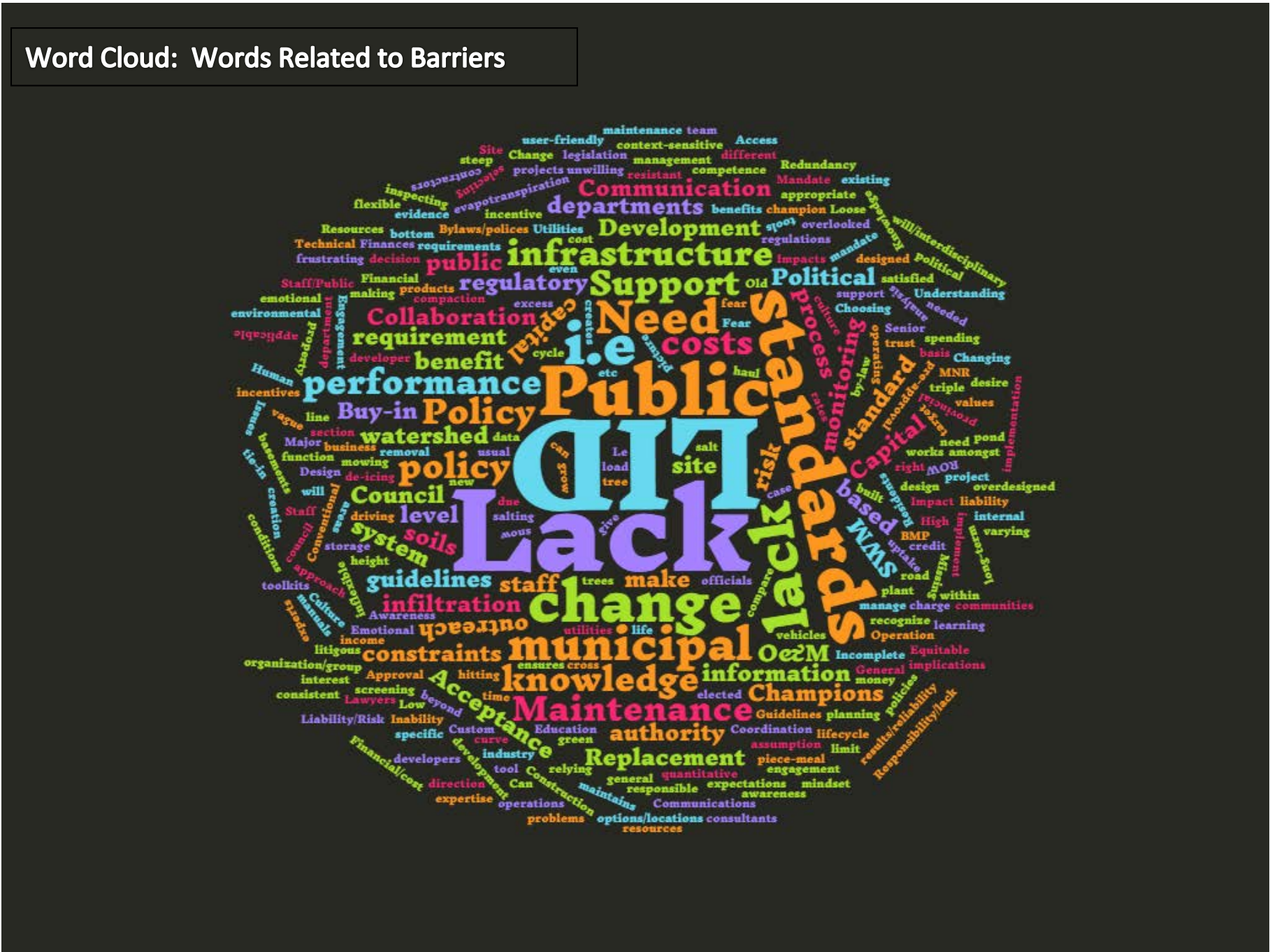
	<b>Marketing and Promotion</b>	
Barrier	Solution	
Need for user-friendly, evidence based information for outreach and engagement (to make the case for LID)	This is where partners from universities can help. A partner or group (province) should take the lead in collating and distilling technical info on an ongoing basis and should be put in to a usable format	
	<b>Tools, Training, and Guidance</b>	
Barrier	Solution	
Need for a context-sensitive decision making screening tool for selecting appropriate LID options/locations on a site specific basis	This speaks to user friendly computer tools that can help short-list potential LID options. This needs to be developed and used by interdisciplinary teams so that the tool is as effective as possible. This will help screen LID options using the triple bottom line approach	
Resources <ul style="list-style-type: none"> <li>• Human: experts and knowledge</li> <li>• Can limit policy creation</li> </ul>	<ul style="list-style-type: none"> <li>• Database</li> <li>• Share resources</li> <li>• Gain council support</li> <li>• Get community involved, stewardship programs</li> <li>• “Package” with solution for residents</li> </ul>	
Lack of knowledge <ul style="list-style-type: none"> <li>• Design</li> <li>• Construction</li> <li>• O&amp;M</li> <li>• Replacement</li> <li>• Public Engagement</li> </ul>	<ul style="list-style-type: none"> <li>• Engage youth</li> <li>• Training</li> <li>• Partnerships</li> </ul>	

## Word Cloud: All Discussion Words

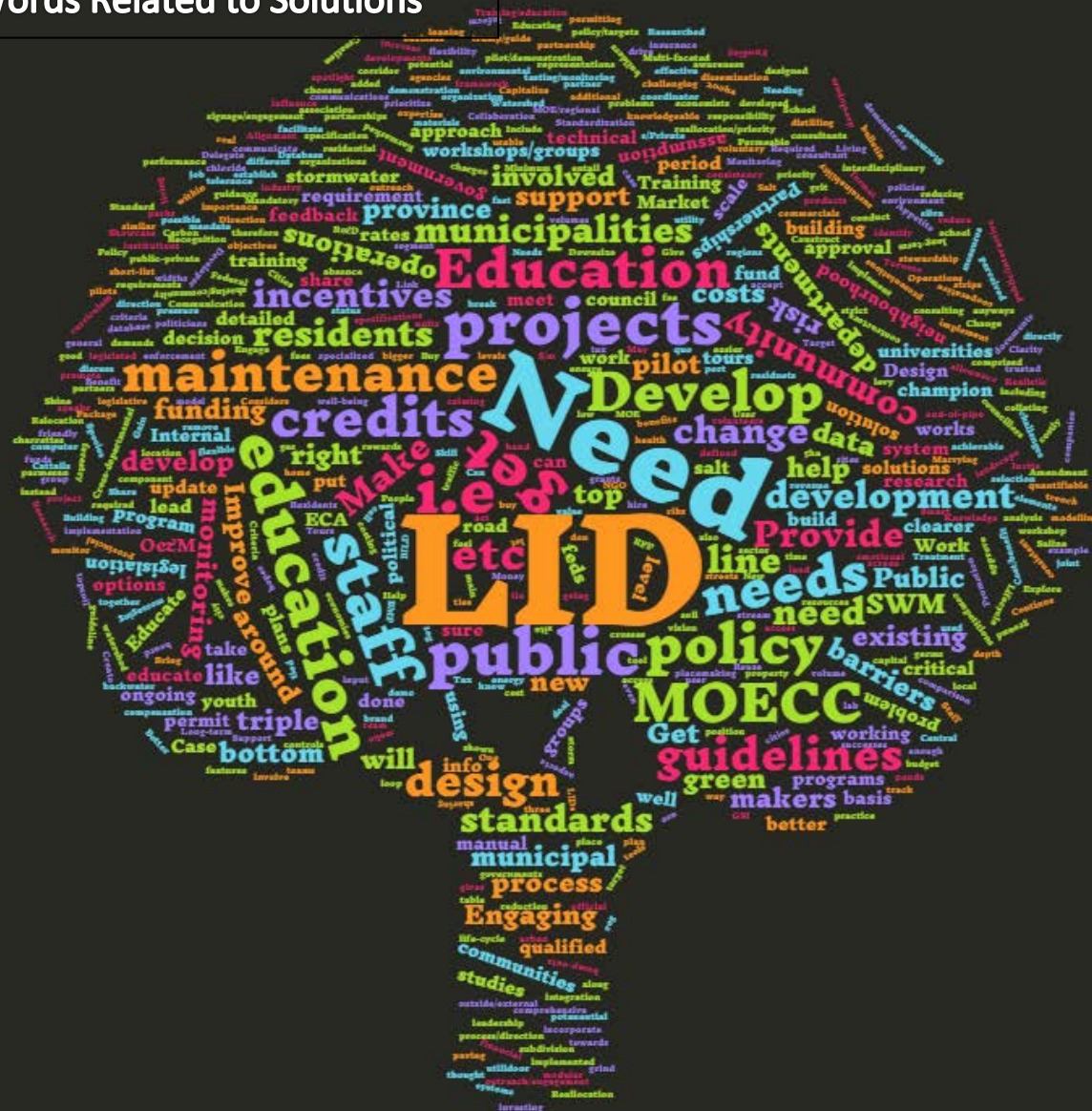




### Word Cloud: Words Related to Barriers



### Word Cloud: Words Related to Solutions



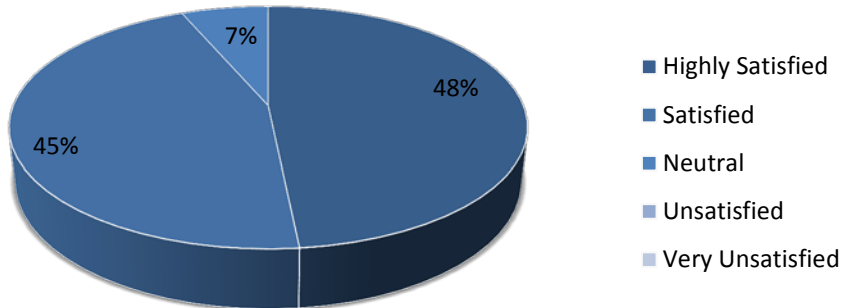
**Roads and Runoff: Implementing Green Streets in the Greater Golden Horseshoe**  
**March 1, 2016**  
**Port Credit, Ontario**

**Workshop Feedback**

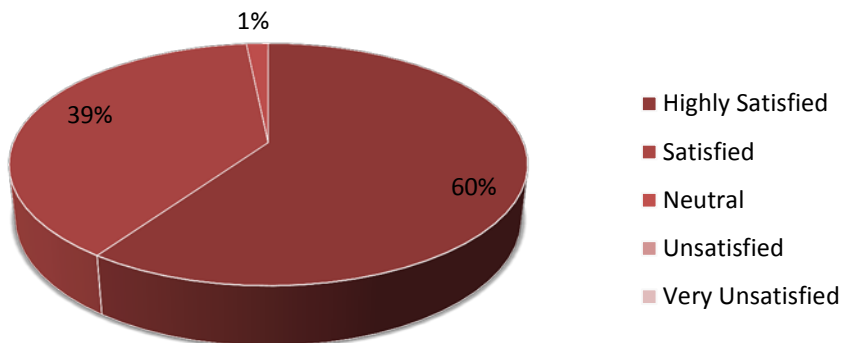
**Total number of attendees: 120**

**1. Level of Satisfaction with the event**

**Rate your satisfaction with the  
keynote speaker**

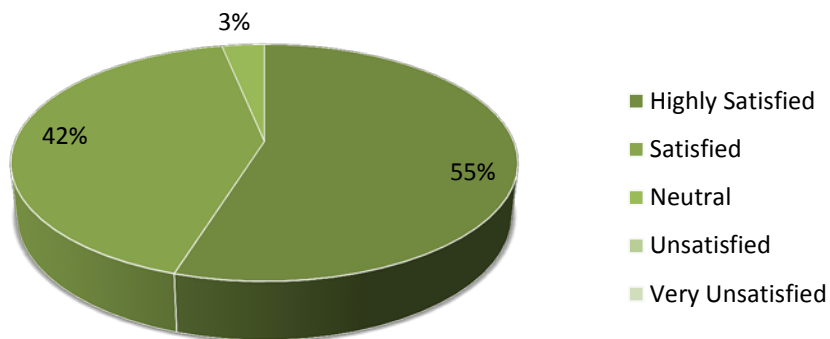


**Rate your satisfaction with the  
presentations**

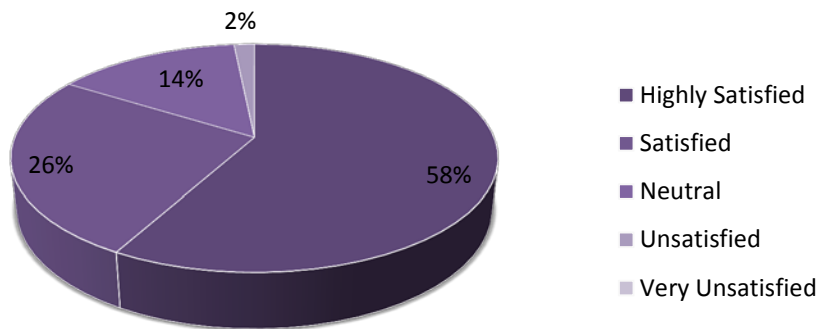




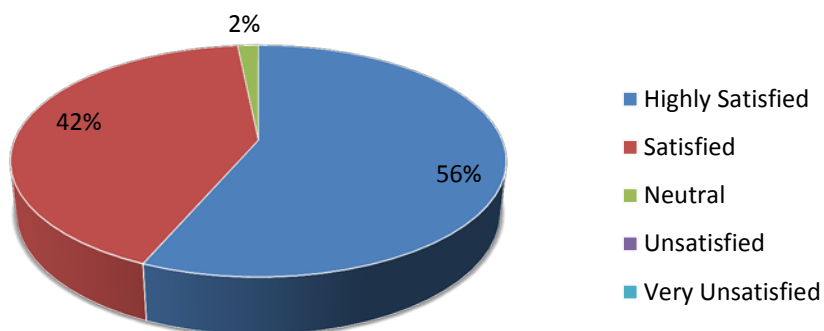
### Rate your satisfaction with the break-out session



### Rate your satisfaction with the venue



### Rate your overall satisfaction with the event

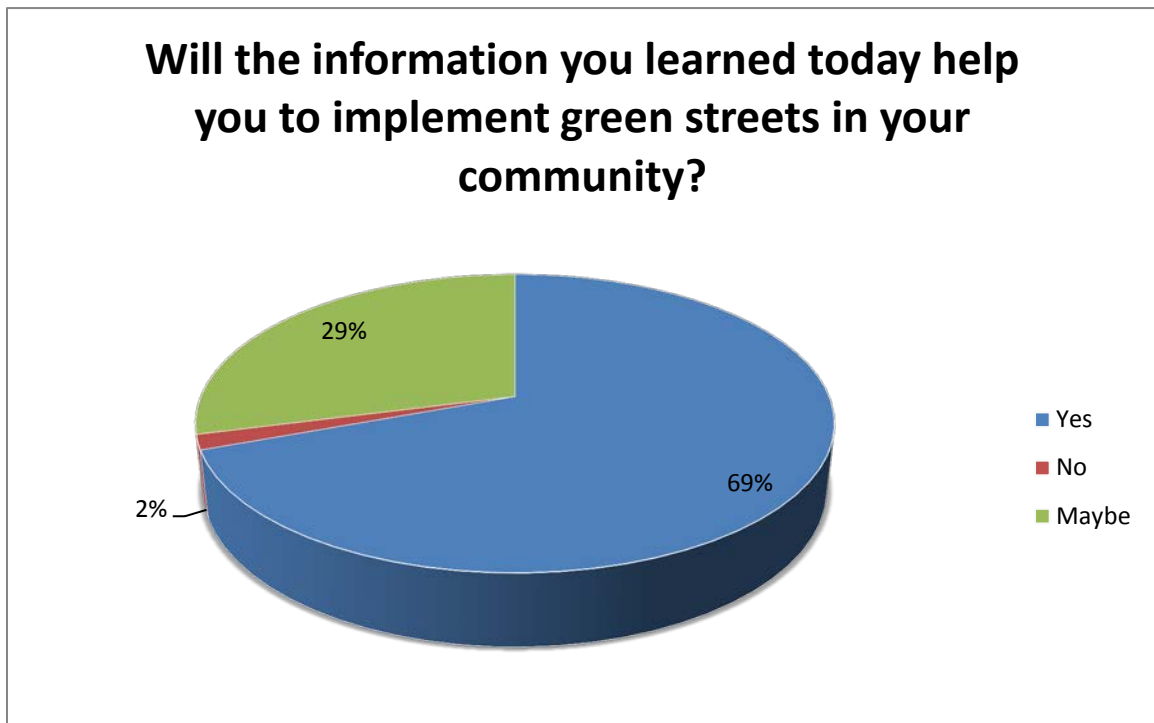


## **2. What was the most beneficial part of the workshop?**

- Good mix of theory and applied examples. Solid mix of disciplines, range of presenter backgrounds
- LID system
- variety of speakers, projects and disciplines presented and applied
- The discussion session was excellent. Presentations were perfect length with green perspectives covered
- Breakout groups and networking opportunities
- Specific examples of lessons learned and processes that worked
- hearing about LID implementation from various perspectives
- diversity of opinion
- I really found value in and enjoyed the networking lunch and the breakout session. However the morning presentations gave us the material to discuss and make reference to
- Diversity of the group - lots of different perspectives
- group discussion
- Seeing what other municipalities are doing and the problems they have
- Exposure to various people involved at all levels of LID implementation (elected officials, engineers, conservation authorities)
- The initial keynote was very valuable, his knowledge was enlightening and I look forward to learning more from his work
- To hear about success stories of LID being implemented. Ability to brainstorm and provide input during breakout session
- breakout discussion
- caliber of expertise of presenters, variety of organizations presenting slightly different approaches/ levels of commitment
- Break-out sessions provided great discussion
- I enjoyed hearing specific examples and seeing photos
- Opportunities to talk to people from multiple disciplines and backgrounds
- keynote presentation, case study (Halton Hills subdivision), discussion at table
- Discussions (based on presenters) and displays - very informative
- Glen Williams example and presentation. CA's and engineering working together is very important
- Showing examples and current projects
- exchange of information, experiences, pilots
- It was less technical and more based on how to start implementing these projects
- Meeting with others in the industry to share ideas etc.
- excellent presentations about leaving the point of view of municipal staff
- Listening to Robert Goo - well worth! Networking
- Presentations and break-out sessions with different people at the table
- examples from other jurisdictions
- breakout session
- learning best practices, other jurisdictions like us, being able to talk beyond roads and runoff
- learning experiences and best practices from peer municipalities

- break-out sessions, sharing ideas and coming up with solutions
- Question session, presentation was beneficial, basically expanding the dialogue
- Connecting with industry people to share knowledge/experience/info
- interactive problem solving
- case studies that overcome the challenges of technical funding and political issues
- Contributions from Mississauga, Halton hills and Peel regions on their experiences implementing LID
- application of LID and GI in the ROW
- The presentations and the breakout sessions were really helpful for me. Also the keynote was inspiring
- Discussions and networking - having the opportunity to talk through barriers and generate solutions across disciplines
- educating myself on LID
- break-out session
- discussion between different agency staff about several LID applications and policies adopted by different agencies
- Case studies of green infrastructure implemented in cities. Networking with others in a similar field
- Meeting different practitioners of LID and hearing their views
- ten step process of regional road design, incorporating LID
- Being able to hear about LID lessons learned and expectations
- networking and amount of info available
- the presentations were very informative and relevant
- LID ideas and experience on already built projects
- 3 presentations to learn. Break out session to meet everyone and learn their challenges too
- specific examples on how it works from a planning, funding and maintenance perspective
- break-out sessions
- good discussion, very practical
- broad spectrum of opinion
- getting perspectives from experts and the champions

3.



**4. What Topics would you like to see covered in the future?**

- processes involved in getting approvals - who does what, how system works to get things eventually in the ground
- Examples or projects in GTA with LID techniques
- More info on the long-term benefits/analysis/ costs of LID implementation
- Implementation of green infrastructure in subdivision development including public green space
- Discussing SWM fee/rate structures. How to engage communities in the adoption of lot level LID's
- Actual performance of products and systems. Let's hear the research on each feature
- Criteria, evaluation process
- financial support discussion
- design, construction, methodology, how to's what worked in their design and what didn't
- How to measure performance (quality and quantity) to gain trust in LID products and design. And also facilitate approvals of SWM design
- I would like to see more technical aspects of LID. Really a field walk exploring features, their construction and maintenance would be great
- Operational and maintenance challenges and solutions. Lifecycle costs/case studies re: cost/benefit analysis
- Public involvement in the LID implementation. Political good will to implement LID's

- Presenting results of specific projects which have succeeded/failed. Examples of overcoming specific common challenges
- international perspective perhaps
- concentrate on data and research
- monitoring of pilot projects and data to inform future projects
- Discussion of funding, maintenance of green streets. Placing a uniform policy throughout Ontario (or for south Ontario)
- LID implementation on private land
- more details on monitoring and maintenance and how to budget for that
- show more issues encountered in pilot projects and how they have or can be rectified/improved
- Life cycle cost -are these sustainable?
- Maintenance of LID implemented measures
- Specific info on timing (logistics) of installing LID within new developments - is LID installed at the beginning (part of servicing) or are they installed once more lots have been stabilized? How are maintenance periods if installed towards end of project (assumptive)?
- cost, maintenance of LID
- Current legislation - provincial- what needs to change
- Cost benefit analysis of LIDs including how to encourage better integration of all the benefits of LID (e.g. health, traffic calming, SWM etc.), long term considerations. Converting monitoring into new analysis/calculation tools
- operations and maintenance implications and costs
- financial impact of green infrastructure
- creating a permanent community of practice for knowledge sharing, relationship building, and telling success stories
- The tie in between green streets and how it will affect urban forestry. Change in planting?
- detailed permeable pavement/paving time
- Maintenance cost model. Challenges - soil, tree survivability, tree specs
- more tree replacing issues/opportunities
- Hard data on the impact of salt in solution on trees and vegetation's. That proves salt is not a huge issues. Greater it in to place making
- More local experiences. Panel discussion between elected municipal and provincial stakeholders and reps from insurance industry, real-estate
- operation, maintenance and monitoring of LID and GI
- I'm very new to this so for me it was all great. I would like to hear more about the implementation process of some projects. Also a project that makes a community level partnership would be interesting to hear about
- community-level solutions - it would be great to head from GCC and its local offices how programs like Depave and Rain can help generate public support and political buy-in for GI

- Why we should care about environmental conservation, research perspective - biology, enviro sci. Plant ecology/sustainability/hydrology, changing public perceptions
- instillation of residential LID, community buy-in
- specific LID design - any
- salt and contamination, operations and maintenance
- Display of concrete results of the policy and function of the LID infrastructure. How much stuff is getting removed (contaminants)?
- more exact examples of LID on roads
- policy implementation
- Policy and gaps with provincial direction. Conflicting standards
- Gathering players to streamline maintenance consistency between jurisdiction. Funding models aka SWM tax, oversight, DC etc.
- dealing with 100 year storms
- more about legislative advances at the municipal level
- tangible benefits for implementation as an alternative to contemporary infrastructure costs assessment
- quantitative benefits of implementing LID, case studies on comparing conventional stormwater management with LID/Green infrastructure

## 5. Other Comments

- Awesome food! Well organized, green venue and location
- very good seminar. Well organized and represented
- well done
- I would love an additional workshop focusing on residential lot level LID's. I think the key to changing the SWM status quo is citizens demanding to see this change in their communities/municipalities
- wonderful, thank you
- Need more practical application. Venue was cold
- the presentation and workshop are too short (may be two days)
- More politicians should come as well as other policy makers
- Lovely touch having sustainable catering
- It would be great to see a walk-through of a policy creation - highlighting what the average person may miss. Otherwise a great learning experience
- Food was excellent. Lack of parking close by was a negative. Good cross-section of attendees (municipal staff, CA staff, consultants, planners, engineers, landscape architects)
- Follow-up report (information) should be distributed to the participants via email
- 1. Great presentations, great lunch.
- 2. Facilitator for group discussion kept things on track.
- 3. Thank you for considering the weather and shortening the day accordingly
- excellent workshop
- thought it was well ran - good variety and interesting group of speakers

- Thank you. Provide materials online if possible - prior or after the event
- Gave a good indication on where LID implementation stands - pilot projects and increasing awareness. A long way to go before LID is business as usual. Thank you
- Good variety of speakers. Excellent lunch
- Lunch was well done. Vital, interesting, engaged crowd - great, discussions, energy
- I would love to see how the LID implemented projects are functioning after 5 years of service to see if they are effective long-term
- great venue and plenty of info
- Very good. May want to do a workshop focused at operational staff
- Well run. Could have used more time for discussion groups. Please run more sessions in the future.
- Some presentations rushed. Maybe could have less time for breaks
- great workshop, thanks
- Well done!
- Presenters very knowledgeable and interesting motivators. Kept my attention. Thanks
- Fantastic networking - big thanks. Want a fall session
- great caterer
- Great food. Great topic that needs more support and understanding
- The breakout session was really helpful to hear the real stories and challenges that a diversity of folks experience (not in a nice packed up way). We could have used more time for the breakout session. Also having the panel presentation as an actual panel would've broken up the routine presentation format. Overall a great event, thank you
- The presentations would have benefits from a more panel discussion approach with the opportunity to hear the speakers engage with one another and the audience more. Q&A was great!
- Great event to bring together like-minded individuals and share ideas. Gaining inspiration for green infrastructure. Could bring in a few more diverse areas: research, landscaper, scientist, urban design, artist, creative ways to engage the public on environmental issues and green infrastructure. Very valuable experience and i think there should be more events like this. Thank you!
- Public education and community engagement are the backbone of LID.
- well done and managed considering timelines and agenda
- Great workshop. Great pace, very relevant presentations with local presenters. Price was very reasonable and the food was excellent
- good value overall
- We seem to be arriving at the same barriers and ask of our councillors, staff, the public etc. I challenge the CVC and Green Communities to put resources and time into workshops where people don't repeat the same challenges - we know this already. Focus on evidenced, informed decision making and how it could lead to better and more intentional planning, policies and programs. Also, let's begin to fund research and implementation relationships between universities and colleges, and municipalities. Take advantage of institution living labs (i.e U of T transportation Tomorrow Survey, U of Guelph agriculture and sustainability, McMaster U flooding and LID infrastructure resiliency, Queen's U Municipal infrastructure and SWM, Fleming College GIS, urban forestry and landscaping)

- great with organizing, communicating and keeping on task
- Keep up the good work
- excellent