



Figure 1: Bioretention/Rain Garden at Alexandria and Third Street, Lakeview Neighbourhood, Mississauga

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A shift has occurred in storm water management. Rather than piping water directly into urban streams innovative approaches focus “on rainwater management, infiltration of rainfall on site, and detention of runoff during large storm events” (Marsalek & Schreier, 2009, p.v). Improvements beautify and contribute to a healthier environment.

Low Impact Development (LID)

LID is a stormwater management design philosophy.

The 2012 Ontario LID Discussion Paper identified five key LID principles:

- 1) Small scale decentralized solutions focus first on the site, then on the neighbourhood, and finally on the watershed
- 2) Runoff prevention through engineered techniques
- 3) Treat stormwater as close to the source area as possible
- 4) Create multifunctional landscapes
- 5) Raise awareness of LID

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Many Canadian jurisdictions implement LID including British Columbia, Alberta, and Ontario. There are also many American jurisdictions who implement it. Internationally, Germany, Australia and the United Kingdom practice LID (ICF Marbek, 2012, p. 19).

Case Studies

It is important to take into account climate considerations when considered engineered techniques because the “range of options, differ from city to city depending on the topographic, geological, climatic, land use, and environment conditions” (Marsalek & Schreier, 2009, p. ix). Bert van Duin states that each municipalities needs to consider monthly precipitation averages, snow depths, maximum daily temperature averages, and annual runoff depths (van Duin; 2012).



Photo Credit: Wordle
Figure 2: LID is known by many names.

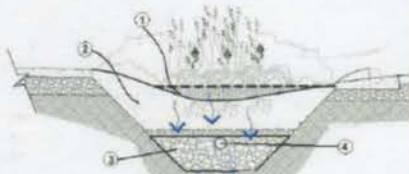


Photo Credit: City of Edmonton

Figure 3: Bioretention areas utilize engineered soils and vegetation to capture and treat rainwater. May have four layers including: (1) plantings and aged mulch, (2) topsoil, (3) gravel drainage layer and (4) under drain with cleanouts (City of Edmonton, 2011, p. 39).



Photo Credit: Kerr Wood Leidal

Figure 4: Bioswales are composed of grass and other vegetation, enhanced topsoil and an underlying infiltration system (City of Edmonton, 2011, p. 40).

The City of Edmonton has adapted seven low impact engineered techniques that are suited to its cold weather, they are Bioretention/Rain Gardens, Bioswales, Green Roofs, Permeable Pavement, Box Planters, Naturalized Drainage Ways, Rainwater Harvesting for Re-use (City of Edmonton, 2011). Of these seven techniques I believe the following two infiltration systems are suited to a rural context: bioretention/rain garden and bioswales. Perhaps naturalized drainage ways could also be considered.

In 2011, the Assiniboine Watershed Stewardship Association and the Saskatchewan Watershed Authority (SWA) hosted a Saskatchewan Low Impact Development (LID) Conference. The presenters were the leading Canadian practitioners of LID. Through evaluation survey's a rural representative expressed that *"the conference did not really apply to situations they're facing"* (Nielsen, Low Impact Development (LID) Conference Recap, n.d. However, The United States Environmental Protection Agency does encourage rural communities to *"improve stormwater management by using green infrastructure like swales, rain gardens, or pervious pavement, during redevelopment for both new and rebuilt streets and parking lots"* (United States Environmental Protection Agency, 2012, p. 24).

Rural LID Case Study

In 2012 an EQuilibrium Communities InSight was published which focuses on Green Infrastructure and Low-Impact Development. It highlights The Ty-Histanis Neighbourhood Development on Vancouver Island. This was a rural development that used a combination of LID and conventional stormwater approaches. The LID techniques used were rain gardens and planted swales. The swales separate the road and sidewalks.



Photo Credit: Canada Mortgage and Housing Corporation

Bioswales retrofit in residential road allowance

The Lakeview Green Street Project is the "first of it's kind" in Canada. The project retrofitted the ditch drainage system with bioswales. See front cover.

"Bioretention practices should be designed as attractive landscape amenities" (Equilibrium Communities, 2012, p. 2)

Figure 5: Swale in the Ty-Histanis Neighbourhood Development. The vegetated swales *"infiltrate and convey stormwater and enhance safety for pedestrians/cyclists"* (Canadian Mortgage and Housing Corporation, 2013, p. 4).

Figure 6:
Grass Swale
and Perforated
Pipe Drainage
in Ottawa
(20 years).



Photo Credit: ICF Marbek



Figure 7:
Bioretention at
York University
(10 Years)

Photo Credit: ICF Marbek

Age Friendly Outdoor Space

Quality outdoor space is important to seniors and is included in the age friendly checklist. Carman and Fox state that *"there is a great need for older adults to maintain a connection with nature and world around them"* (Carman&Fox, 2008, p. 164-165). LID is a stormwater management design philosophy that enhances green space along public right-of-ways. This aesthetic design has a *"positive effect on the lifestyle of residents"* (ICF Marbek, 2012, p. 18).

**Aesthetic
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MARBK, 2012,
p 18)**

Looking at Bioswales and Bioretention/Rain Gardens that were constructed ten to twenty years ago (see photos above) we see that sidewalks are missing. The new bioswales that were put into and the Ty-Histanis Neighbourhood Development and the Lakeview Green Street Project incorporate sidewalks into their design. In fact they separate the sidewalk from the road increasing the safety of pedestrians and cyclists.

In the City of Mississauga Freeman Associates conducted market research on homeowners of single-detached homes and found that *"residents preferred LID landscapes designs to the traditional grassed lawns when colourful plants and aesthetic designs were considered"* (ICF Marbek, 2012, p. 25).

Final Thoughts

LID techniques beautify and contribute to a healthier environment. Rural representatives have expressed concern that they do not translate to the rural context. However, there is rural example in British Columbia. While the Lakeview Green Street Project took place in the city of Mississauga the project took a ditch drainage system and transformed it into an aesthetically pleasing and functional green space.

"The imperative to adopt LID techniques is ever increasing due to multiple pressures including: municipal infrastructure affordability; stormwater impacts on water quality and quantity; impacts of erosion on property values and declining aquatic biodiversity. (ICF Marbek, 2012, p. 1)"

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