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IMPROVEMENTS IN STORMWATER MANAGEMENT SPURRED BY LOW IMPACT DEVELOPMENT TECHNIQUES

By **Barry Walker**

Evidence of Low Impact Development (LID), a concept first advanced in 1990, can now be seen across North America. Like many infrastructure transformations, this growth in LID design has benefitted from regulatory changes, as compliance versus cost remains an important motivator in any commercial venture. Through their efforts, LID pioneers have demonstrated a range of social and aesthetic benefits that have complemented the economics of this approach.

Municipalities across Canada are leading the charge, following such initiatives as the *1985 Canada Water Act*, the follow-up *Canadian Clean Drinking Water Act*, and the *2006 B.C. Clean Water Act*.

From these, creative visions like Vancouver's Greenest City Action Plan have grown. Developers are being asked to manage stormwater in new ways on-site to help minimize the effect old practices were having on our waterways and the sustainability of the surrounding environment. As well, local infrastructure is rarely designed to tackle the larger volumes encountered with modern developments. Guidelines have become mandates and design standards, trying to achieve an end result of better environmental management.

With these regulations and guidelines in place, developers are mandated to control stormwater as close as possible to its source. This helps mimic the natural movement of water and improve the management of local and global ecosystems, with a goal of better sustainability. Keeping water on site long enough to allow for evapotranspiration is crucial to protecting the receiving waterbodies. Results include a reduction in runoff volume, increased time of concentration, reduced peak flow and peak flow duration, as well as improved water quality.

Population growth leads to development and development creates hard surfaces where porous soil once existed. LID techniques, such as the use of permeable surfaces that allow stormwater to infiltrate the ground, green roofs and infiltration bioswales/rain gardens help address these issues.

Underground stormwater detention systems can eliminate the need for on-site stormwater ponds.

GREEN ROOFS

Green roofs mimic preconstruction tree canopies, grasslands and natural vegetation. Slowing stormwater runoff at the roof surface allows for evaporation and transpiration, mimicking the hydrologic characteristics that more closely match open space than impervious surfaces. Toronto's Green Roof Bylaw emphasizes the value in this approach. Many other municipalities, such as Vancouver and Richmond, British Columbia, are following with similar bylaws and policies and changes to their integrated stormwater management plans to include green roofs.

Direct runoff from traditional roofs is a key contributor to pollutant release. By contrast, vegetated roof covers can significantly reduce this source of pollution, while improving energy efficiency (reducing heating and cooling costs), reducing urban heat island effects, generating oxygen and clean air, as well as creating greenspace for passive recreation or aesthetic enjoyment. Nilex has worked with multiple landscape architects and designers, most frequently in Vancouver, to find solutions unique to each site and each property developer.

INFILTRATION DETENTION AND RAIN GARDEN BIOSWALES

Rain garden bioswales allow stormwater to infiltrate back into the ground as it would through natural processes. This recharges groundwater tables and aquifers, keeps base flows to adjacent waterways consistent, and provides filtration to remove metals and pollutants.

Large retailers (with large parking lots) have worked with Nilex to install these systems, and the trend looks to continue as they strive to do their part to manage stormwater. Large retailers Costco and Lowe's have pursued on-site detention systems on both sides of the

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border, eliminating the need for an on-site stormwater retention pond.

This technique aligns with guidelines developed within the Alberta Low Impact Development Partnership in both Calgary and Edmonton. Nilex incorporated this LID technique during the construction of its head office in Edmonton, while lifestyle retailer Mountain Equipment Co-Op took it one step further by installing a system for its North Vancouver location. This eliminated the need for connection to the municipal stormwater system and qualified them for LEED Gold status.

PERMEABLE SURFACES

Another practical technique is to effectively allow stormwater to permeate into the ground where it falls on hard surfaces. A permeable surface reduces the volume collected by municipal stormwater infrastructure by allowing water to infiltrate back into the ground. This also recharges groundwater and protects adjacent waterways.

From an environmental perspective, the key to successful permeable surfaces is to remove stormwater from the surface quickly, at its source, and let it infiltrate naturally. From a practical perspective, these surfaces must achieve this while still being capable of traffic loading without unnecessary ponding. Nilex has enjoyed success in Ontario with recent installations of these permeable surfaces, using PaveDrain, for the Lake Simcoe Region Conservation Authority parking lot and an extensive stretch of pavement along Townsend Avenue in Burlington.

CONCLUSION

The most important outcome of Low Impact Development techniques is the huge reduction in negative impacts on the environment, returning stormwater runoff and effective baseflow to positively manage not only the quantity of natural water, but the quality as well. This will help sustain the natural habitats attached to aquifers, streams, creeks, rivers, lakes and oceans the way nature intended. ■

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MAPLETON WATER AND WASTEWATER PROJECT

The Township of Mapleton, Ontario is set to receive up to $20 million from the Canada Infrastructure Bank (CIB) for water and wastewater infrastructure. Located approximately 150 km west of Toronto, Mapleton is an agricultural and rural township with approximately 11,000 residents.

According to the CIB, Mapleton is seeking a consortium to "design, build, finance, operate and maintain the municipality's new and existing water and wastewater infrastructure for up to 20 years." Mapleton will continue to be the owner of all new and existing infrastructure and will lead the procurement process.

The water and wastewater project will include: building a new water tower; reducing non-revenue water (leakage); upgrades to existing water pumping station; expanding capacity of the wastewater treatment plant; and a gravity sewer collection system.

EDMONTON SEWER ODOUR CONTROL PLAN

A City of Edmonton utility committee has approved a $217.3-million odour and corrosion control project for its sewer system that could start this year and end by 2026. The proposed strategy zeroes in on preventing the formation of hydrogen sulfide with chemical treatment, controlling the release of air, and adapting the use of real-time monitoring to reduce community odour impacts and lengthen the life of the sewer network, according to a presentation to the City of Edmonton by EPCOR Water Services Inc. (EWSI).

"The feedback we received indicated a significant impact on residents affected by sewer odour, but it was more concentrated than previously anticipated," Richard Brown, director of draining, planning and engineering at EPCOR, told the city's utility committee.

EWSI surveyed 1,600 local residents about odour impact. Half of the residents in odour hot spot communities noted that sewer odour negatively impacts their quality of life compared to 21% of respondents in the rest of Edmonton.