FACTS ON STORMWATER

Part I: STORMWATER MANAGEMENT OVERVIEW

Rain and snowmelt that runs off greenhouse roofs and other hard surfaces is referred to as storm water, and, in some municipalities, needs to be collected and managed so that it does not negatively impact surrounding water bodies.

Total covered area of flower and vegetable greenhouse operations including specialized fruits, vegetables, flowers and plants in Canada in 2016 was 4,615 hectares (1,2), and that does not include hard surfaces such as loading docks, parking areas and driveways. Ontario vegetable (peppers, tomatoes, cucumbers) and flower greenhouses covered 1,410 hectares (3), ... and that is a lot of water when you consider some of the storm events that have taken place in the last 5 years. For example, a 24 hour 1 in 100 year 98 mm rainfall event would generate 1.25 million m3 of runoff from greenhouse roofs, which is equivalent to the water consumption of 3.6 million Canadians or 89,285 Canadian households (4), and that is just one big storm.

Not all that water is clean. Some of it may be contaminated with zinc leaching from the greenhouse structure, or oil and grit from parking areas, or perhaps other sources. Both the volume and quality of that runoff water can affect the health of receiving water bodies such as local streams or lakes.

The Ministry of the Environment and Climate Change (MOECC) is the regulatory body that oversees the protection of Ontario's water resources and requires that greenhouse operations have in place approved Storm Water Management (SWM) plans.

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1 Statistics Canada. Table 001-0046 - Estimates of Greenhouse Total Area and Months of Operation, Annual, CANSIM (database). (accessed: May 16, 2017) http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=0010046&pattern=greenhouse+area&tabMode=dataTable&srchLan=-1&p1=1&p2=-1

2 Statistics Canada. Table 001-0047 - Estimates of specialized greenhouse operations, greenhouse area, and months of operation, annual, CANSIM (database). (accessed: May 16, 2017) http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=0010047&pattern=Ontario+greenhouse+area&tabMode=dataTable&srchLan=-1&p1=1&p2=-1

3 Personal communication with Ontario Greenhouse Vegetable Growers, May 16, 2017.

4 Personal communication with E. del Rosso, Enviro-Stewards, Inc., May 25, 2017, citing statistics for average water consumption of 350 litres/person/day or 1,400 litres/household in Canada.

Objective of Storm Water Management

The objective of SWM is to protect the environment by effectively mitigating the negative effects associated with runoff and decreased infiltration of rain and snowmelt. This objective is accomplished by planning, designing and implementing low impact practices towards preserving natural areas.

Storm Water Management Plan - Design Principles

Constructing new SWM facilities, or retrofitting existing ones, requires the knowledge of principles associated with storm water management, including geotechnical considerations, hydrology, existing infrastructure, detention requirements, environmental approvals, etc. Consultation with pertinent agencies and qualified professionals is recommended during the planning stage.

Factors for Consideration

I. Site layout, design and existing infrastructure (roads; parking lots; buildings; contaminated areas/soils; waste storage areas; etc.);
II. Zoning setbacks or other land requirements. Site topographic contour; flood control requirements; highly vulnerable aquifer; extreme infiltration rates;
III. Local weather conditions;
IV. Site hydrology and geology;
V. Site flora and fauna; fish and wildlife habitat;
VI. Onsite water wells; septic systems; and process wastewater generation sources;
VII. Site and neighbouring areas; water and sub-watershed;
VIII. Site characterization as part of a larger SWM municipal master plan;
IX. Onsite and neighbouring activities;
X. Final receiver characteristics;
XI. Area development plans (current & future);
XII. Soil erosion master drainage plans and master environmental servicing plans;
XIII. Natural heritage features.

LID & LLTTA Emerging Concepts in Storm Water Management Plans and ECA Applications

Pertinent regulatory agencies, including the MOECC, prefer that storm water management plans are developed reflecting the findings of watershed, sub-watershed, and environmental management plans, and employ Low Impact Development (LID) practices and the Lot Level Treatment Train Approach (LLTTA) concept. The overall consultation process is to be integral and to include other pertinent stakeholders such as Conservation Authorities and local Municipalities; Environment Canada; the Department of Natural Resources; Oceans and Fisheries Canada; Indian Affairs; etc.

Summary:

- Regulatory reviews of Storm Water Management plans and ECA applications would put the onus on identifying site conditions such as land use, soil types, groundwater conditions, source protection, topography, surface and ground water receiver types, etc., that support the use of LID practices and the LLTTA concept;
- LID source control practices, such as vegetative and structural best management practices and the LLTTA concept for Lot Level Control options should have precedence over end-of-pipe systems for volume control.
- Storm water management end-of-pipe systems such as final ponds for total suspended solids (TSS) control are to be considered as the last line of defence and applied only after all opportunities for exfiltration and/or infiltration of storm water have been considered.

Please refer to the leaflet entitled "New Storm Water Management System" for further information on the LID and LLTTA concepts.

Technical References

- Policy Review of Municipal Storm Water Management in Light of Climate Change – Summary Report (MOE, 2010)
- MOEE Hydrological Technical Information Requirements for Land Development Applications, 1995.
- MOECC Ontario Climate Change Strategy, 2015.
- Erosion and Sediment Control Guideline for Urban Construction (Conservation Authorities).
- Better Site Design Techniques (MOE March 2003 SWM Design Manual & 2016 SWM Manual - Minnesota Pollution Control Agency (MPCA)).
- Ontario Regulation 179/06 (Floodplain; erosion; wetland).
- Storm Water Management Planning and Design Manual, MOECC 2003. The Storm Sewer Design Course TM31 from Ontario Good Roads Association 2016-2017. Storm Water Management Interpretation Bulleting, MOECC, Feb., 2015.
- Additional references:
    - ◊ MOECC local district office;
    - ◊ Qualified consulting firm.

Water Smart Farming Project

Enviro-Stewards Engineers & Scientists

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