

# Implementing Green Infrastructure: Building a Community of Practice

## **LID Obstacles, Solutions and Examples**

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# OBSTACLES & CONCERNS

- Municipal objection and concern over long term maintenance and operation costs
  - Lack of consistent cost database
  - Variation in design standards
  - Unknown monitoring and operation standards



# OBSTACLES & CONCERNS

- High Value of Land:
  - High land values now more than ever require efficient land use to be a primary consideration when planning LID
  - Can't increase size of ROW to accommodate LID
  - Can't utilize separate LID blocks
  - Can't give up parking spaces



# OBSTACLES & CONCERNS

- Reluctance to allow dual land use for LIDs:
  - Parks (with park credit)
  - Buffers (aside from LSRCA)
  - Right-of-ways
  - Schools



# OBSTACLES & CONCERNS

- MOECC ECA requirements for private lot LID discourage private level LID's
  - Registering the ECA on title an issue for developers with regard to home sales
  - Current ECA conditions are impossible to achieve (Register the Certificate of Requirements on title for each private lot within 70 days of the ECA approval)



# OBSTACLES & CONCERNS

- Monitoring Every LID:
  - → Inefficient use of Data
  - → Cost
  - → Time



# OBSTACLES & CONCERNS

- Not Always Recognized for Quantity or Erosion Control Attributes
  - → double counting storage = inefficient land use & higher cost
  - → Some CA's do recognize erosion control volume in LID



# OBSTACLES & CONCERNS

- Challenging Erosion and Sediment Control Measures
  - Often no SWM pond to use as an ESC pond
  - Must protect or delay LID construction until the site is restored
  - May require site area to be temporarily utilized to provide temporary erosion and sediment control area





# OBSTACLES & CONCERNS

- Rapidly Evolving Science With Dynamic Standards
  - Expectations vary in every municipality and Conservation Authority
  - Designers are not all working at the same knowledge level yet



- Share Success Stories
  - Accessible database (i.e. STEP Program)
  - Include detailed information
  - Also share issues



- Share Actual Maintenance Timelines and Costs
  - → Sorted by LID type
  - → Detailed parameters required



- Share successful implementation/construction methods that minimize long term maintenance costs
  - Pre-treatment options
  - Inspection methods
  - ESC protection in construction



- Collaborative approach with municipalities and CAs
  - Municipal standards consistent with CA expectations and MOECC policy
  - Rainscaping (LSRCA)
  - Consistent approach



- Focused monitoring program, not every one.
  - → Do not monitor approved and proven approaches, inspect and certify only
  - → Focus on new LID approach
  - → Pilot projects



- Allow more dual usage (Parks, buffers, schools, valley, ROW, Private)



- Prepare an early facility fit design for parks to confirm remnant space for LIDs
  - → Municipality to participate





- Acknowledge quantity control attributes



- Design to minimize future maintenance and reconstruction costs



- Build in monitoring/inspection ability infrastructure



- Consider alternate ESC measures
  - → sewer bulkheads
  - → separate sediment traps
  - → defer construction of LID
  - → Ponds
  - → block all LIDs
  - → Timing with good weather



## IBM Facility for Software Development, City of Markham, TRCA

Parking Lot  
Bioswale

End-of-pipe Wet  
Quality/Erosion  
Pond

Infiltration Gallery  
for Rooftop  
Drainage



## IBM Facility for Software Development, City of Markham, TRCA



## IBM Facility for Software Development, City of Markham, TRCA

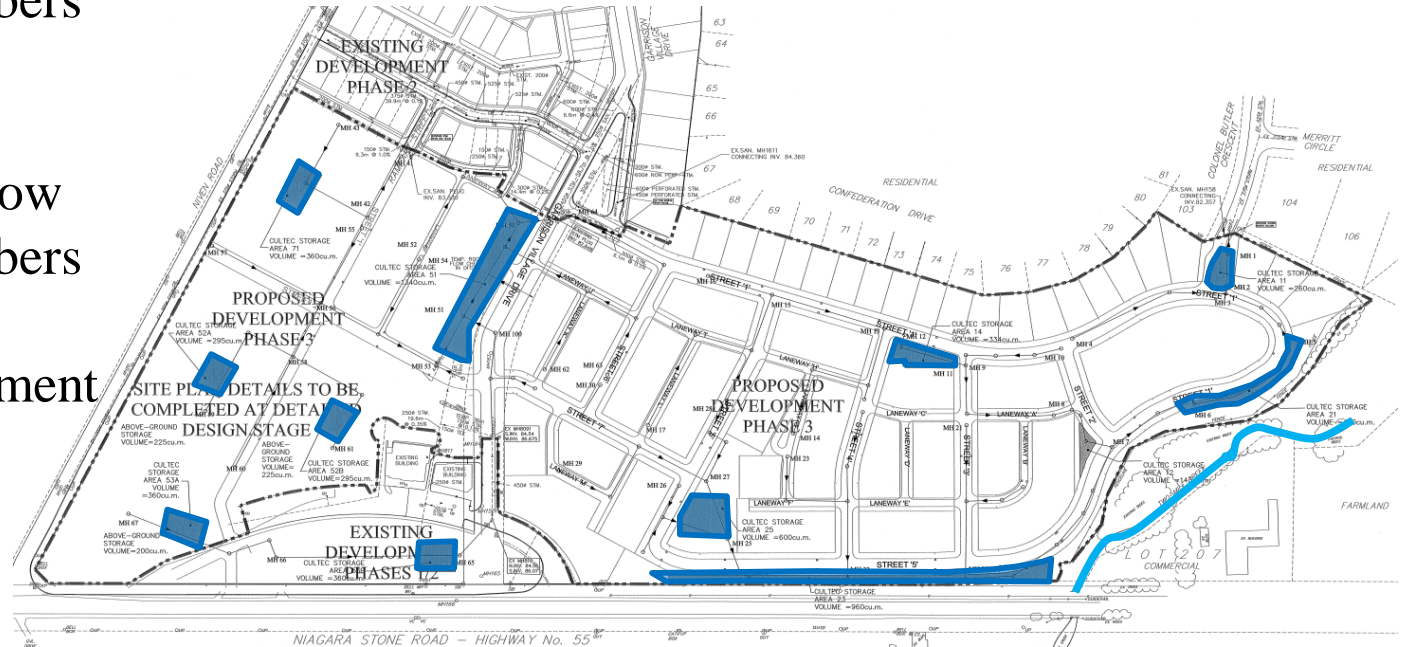


## Brookfield Residential, Niagara-on-the-Lake, NPCA

Underground  
Storage Chambers  
under parks

Infiltration below  
Storage Chambers

OGS pre-treatment





## Brookfield Residential, Niagara-on-the-Lake, NPCA



09/21/2012

## Brookfield Residential, Niagara-on-the-Lake, NPCA



## Times Group Corporation, City of Markham, TRCA



## Times Group Corporation, City of Markham, TRCA



## Times Group Corporation, City of Markham, TRCA

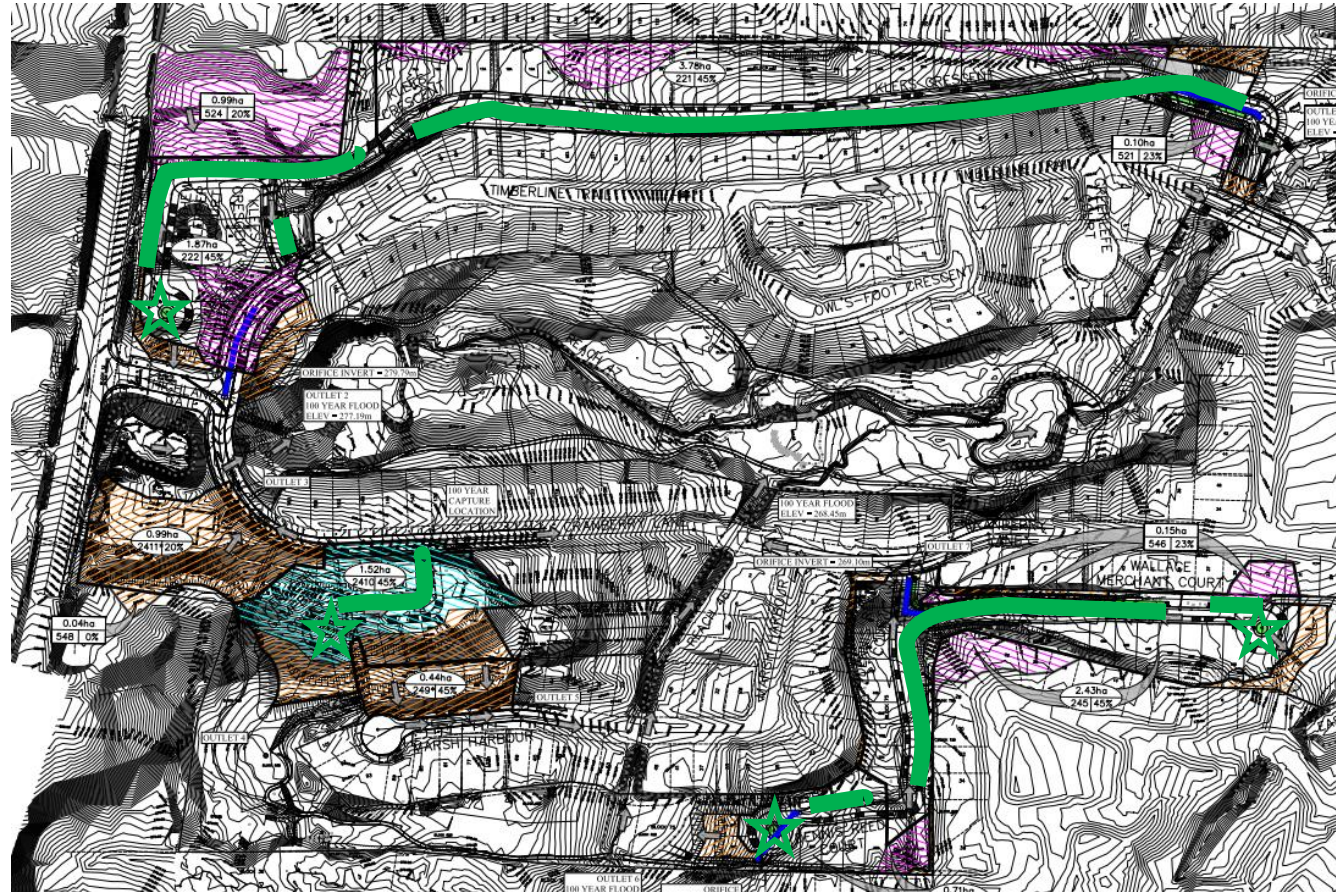


## Highland Gate, Geranium Corporation, Town of Aurora, LSRCA

Roadside  
Bioretention Filters  
(mostly lined)

Underground SWM  
Detention Facility  
(i.e., Super Pipe)

Bio-retention in cul-  
de-sacs



## Highland Gate, Geranium Corporation, Town of Aurora, LSRCA



## Highland Gate, Geranium Corporation, Town of Aurora, LSRCA





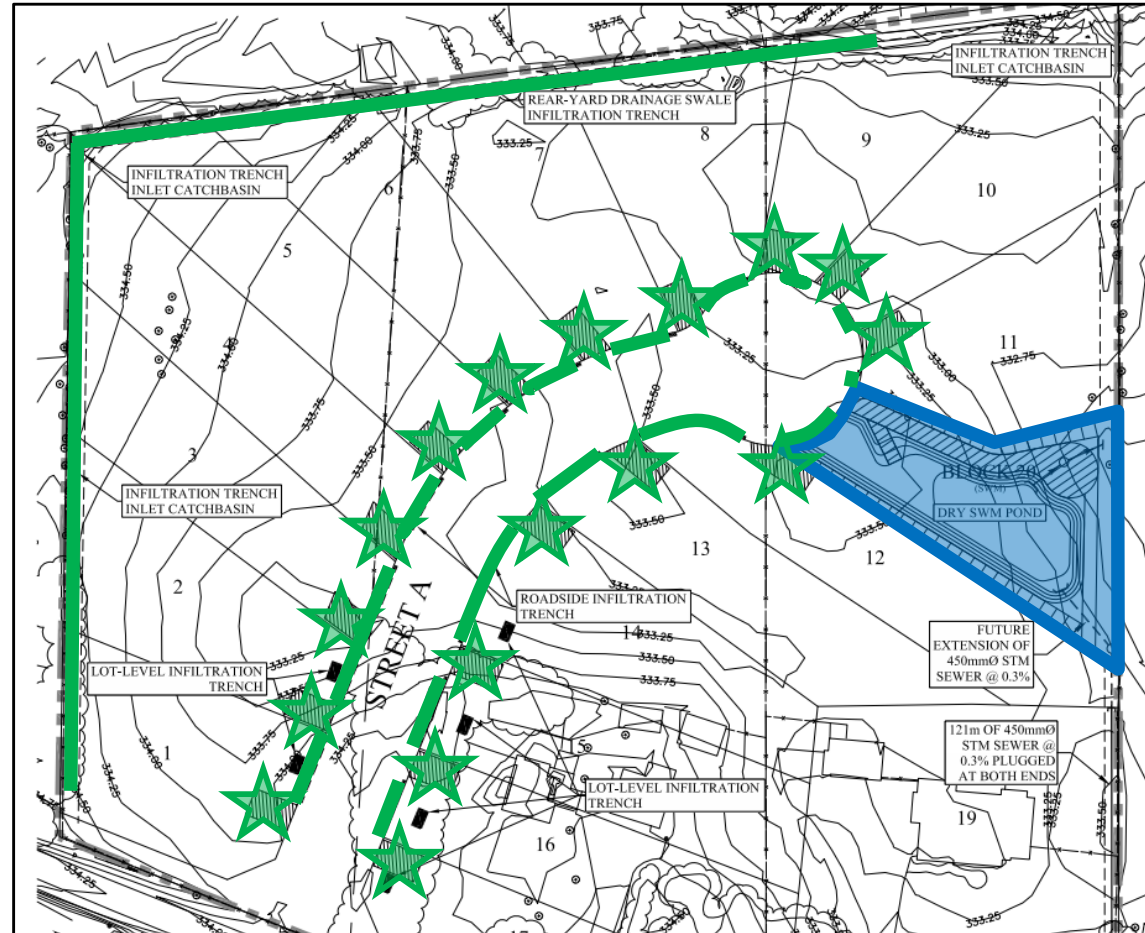
## Geranium Corporation, Town of Whitchurch-Stouffville, LSRCA

Roadside bioswales

Rear-Yard Drainage Swale + Infiltration Trenches

Front-Yard Soakaway Pits for Roof Drainage

Dry Quantity Pond



## Geranium Corporation, Town of Whitchurch-Stouffville, LSRCA



# FINAL DESIGN THOUGHTS

- Maximize dual land use wherever possible
- MUST protect any infiltration material until the ENTIRE catchment area is restored
- Ensure the unique materials are well specified and compatible with each other to facilitate construction
- Provide sufficient inspection infrastructure
- Ensure sufficient site ESC while protection LIDs
- Consider safe working conditions in Type 3 soils (trench box may be required)
- PVC liners are difficult to seal in cold conditions – use bentonite
- Provide extensive training and instruction to the contractor



**THE END**

**Thank you**

