Recent large loss events

- Mississauga, Brampton, Toronto, 2013: >$850 million
- Thunder Bay, Montréal, Ottawa, Hamilton, Toronto, Steinbach, 2012: >$350 million
- Hamilton, 2009: $100-150 million
- Southern Ontario, 2005: >$500 million
- Peterborough, 2004: $87 million
- Edmonton, 2004: $166 million
- MANY OTHERS!

IBC, 2012: $1.7 billion average insured water damages per year in Canada
A 2012 CNT survey of 48 Great Lakes municipalities have received homeowner complaints about flooding.

100% have received homeowner complaints about flooding.

Source: Center for Neighbourhood Technology, 2012
# Water damage claims

<table>
<thead>
<tr>
<th>Province</th>
<th>Increase: 2002-2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Columbia</td>
<td>154%</td>
</tr>
<tr>
<td>Ontario</td>
<td>136%</td>
</tr>
<tr>
<td>Alberta</td>
<td>109%</td>
</tr>
<tr>
<td>NFLD/Labrador</td>
<td>107%</td>
</tr>
<tr>
<td>Quebec</td>
<td>84%</td>
</tr>
<tr>
<td>Nova Scotia</td>
<td>61%</td>
</tr>
<tr>
<td>New Brunswick</td>
<td>50%</td>
</tr>
<tr>
<td><strong>National average</strong></td>
<td><strong>117%</strong></td>
</tr>
</tbody>
</table>

- 2002 average: $7,192
- 2012 average: $15,500
- Use of basements as living spaces

Urban flooding & risk factors
Overland flooding
Infiltration flooding
Sewer backup
Riverine floodplain areas relatively well defined in Canada

Urban flood risk areas not as well defined

Adapted from: UMA. 2005. City of Peterborough Flood Reduction Master Plan. UMA: Mississauga
A range of infrastructure

- Storm Sewer Era: ~1880-1970
  - Rapid removal of stormwater through storm sewer networks
  - 2-10 yr design standards

  - Major (100 yr) & Minor (2-10 yr) system

- Best Management Practice Era: ~1990-
  - Stormwater quality and quantity

D’Andrea et al., 2004; Watt et al, 2003
Extreme rainfall, unpredictable impacts
Inflow and Infiltration (I/I)

- Roof Drain Connection
- Uncapped Cleanout
- Storm Cross-Connection
- Connected Foundation Drain
- Broken House Lateral
- Faulty Lateral Connection
- Faulty Manhole Cover or Frame
- Root Intrusion into Lateral
- Root Intrusion into Lateral
- Cracked or Broken Pipe
- Deteriorated Manhole
- Sanitary Sewer Main
- Storm Sewer

INFLOW SOURCES (black text)

INfiltration SOURCES (white text)
Climate change

Regionalized changes in precipitation regimes—more intense extreme rainfall events

- Bruce, 2011:
  - By 2050, 1 in 20 → 1 in 10 yr events, S. Ont.

- SENES, 2012:
  - 46% increase in intensity of max 1-hr precipitation events by 2040-2049, Pearson Airport

- Prodanovic & Simonovic, 2007:
  - 2 hr rainfall events: 1 in 100 → 1 in 30 yr under “wet” scenario in London, Ontario

Bruce, 2011; Cheng, 2011; Prodonovic & Simonovic, 2007; SENES, 2012
Adaptation priorities

~500 global local gov't responses: 298 US, 26 Canadian

- Increased SW runoff: 65%
- SWM demand changes: 61%
- Electricity demand changes: 41%
- Drought: 35%
- Coastal erosion: 34%
- Urban Heat Island: 30%

Insurers

- Water now major source of homeowner claims – surpassed fire

- Financial measures
  - Limit financial exposure through:
    - Caps, availability

- Mitigation measures
  - Education materials
  - Incentives
    - Caps, availability, premiums
    - Backwater valves, sumps
Homeowners, residents

- The most affected stakeholders
- Understanding insurance coverage
- Considerable role in risk reduction
  - Reducing contributions to municipal sewer system
  - Reducing risk of water/sewage entering home

More than just cost and inconvenience
- Irreplaceable items
- Damage to structure
- Mould, potential health risks
- Stress about property value loss
- Vulnerable basement apartment residents

“I can’t sleep when it rains…”
Additional key players

- Codes & new buildings
  - NRC, provincial authorities, local inspectors, builders

- Contractors, plumbers, restoration specialists
  - Homeowners look to these professionals as experts
Code development and implementation

- NPC, 2010 2.4.6.4.(3)

- “...where a building drain or branch **may** be subject to backflow...a backwater valve shall be installed...”

- Additional code opportunities:
  - Lot grading & backfill
  - Sump capacity and backup
  - Other opportunities

<table>
<thead>
<tr>
<th>Province</th>
<th>Most/All</th>
<th>Rare/None</th>
<th>DK/NR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alberta</td>
<td>81%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>86%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manitoba</td>
<td>72%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ontario</td>
<td>26%</td>
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</tbody>
</table>
Today’s topics

- Causes and impacts of urban flood events

- Mitigating the risk
  - Lot-level and municipal-side risk reduction
  - Builders, code issues

- Issues related to long-term risk reduction
  - Low Impact Development, SWM financing and incentives, climate change

- Discussion panel
  - How to move forward on reducing risk in new and existing subdivisions?
New ICLR resources

Best practices for reducing the risk of future damage to homes from riverine and urban flooding
A report on recovery and rebuilding in southern Alberta
By Paul Kowal and Dan Sandrit
September 2013

Lot-side urban flood risk reduction
February 2013

Urban flooding in Canada
Lot-side risk reduction through voluntary retrofit programs, code interpretation and by-laws
By Dan Sandrit
February 2013

www.iclr.org
Have fun!