



JULY 24, 2009 WEST-END FLOODING INVESTIGATION

ACTION PLAN

Presentation to Insurance Companies

19 January 2012

Topics of Discussion

- **Investigation**
- **Levels of Service**
- **Cause of Flooding**
- **Analysis Undertaken**
- **Solutions**
- **Implementation Plan**
- **Questions**

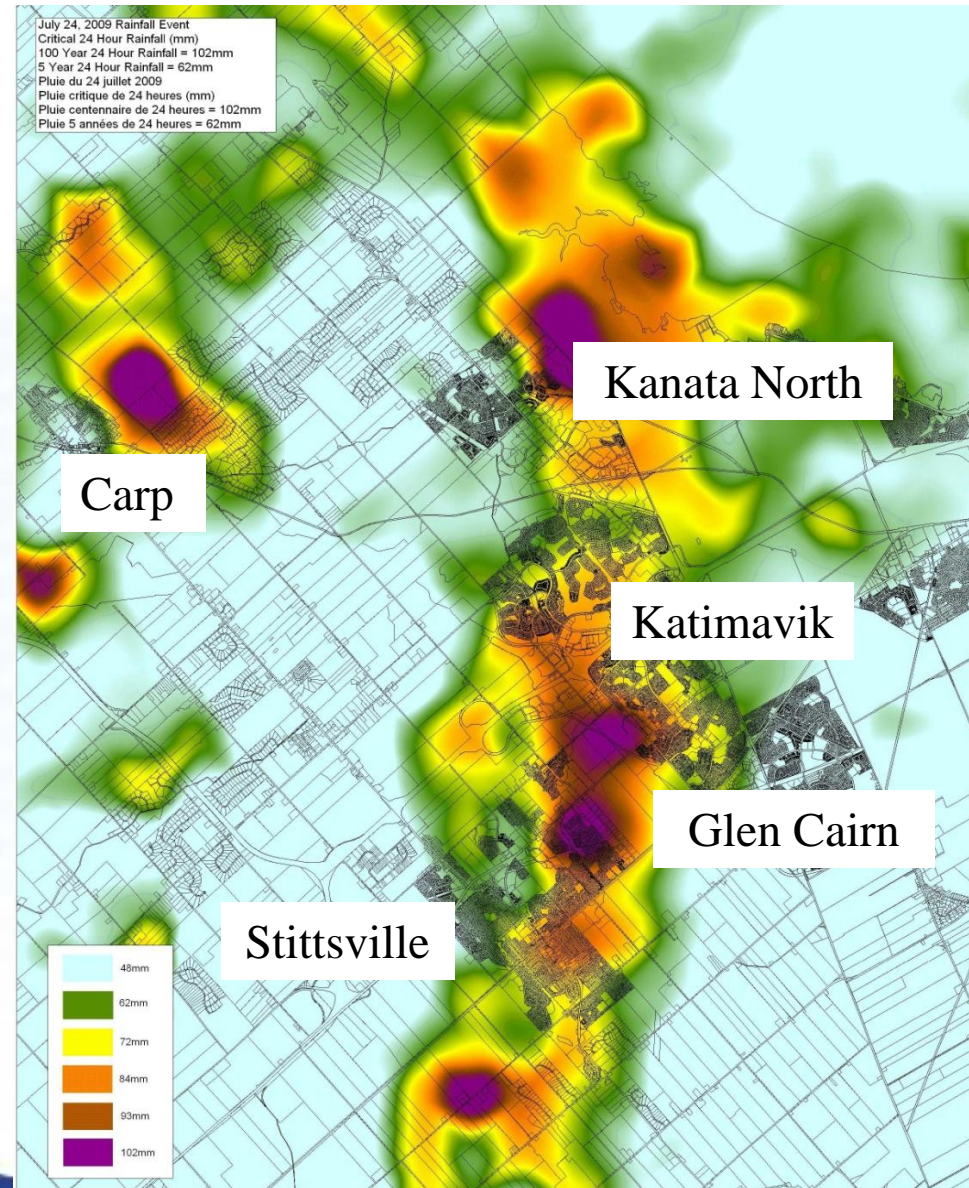
West End Flooding Investigation

On July 24, 2009, parts of the City of Ottawa experienced a significant rainstorm (over 100 mm of rain in a 24-hour period in some areas) resulting in nearly 1,500 flooded basements.

An investigation was carried out in five phases:

1. Background data collection
2. Assessment and problem definition
3. Identification and evaluation of alternative solutions
4. Development and approval of action plan
5. Implementation of approved action plan

The investigation was subject to a Value Engineering assessment (Glen Cairn) and a Peer Review.

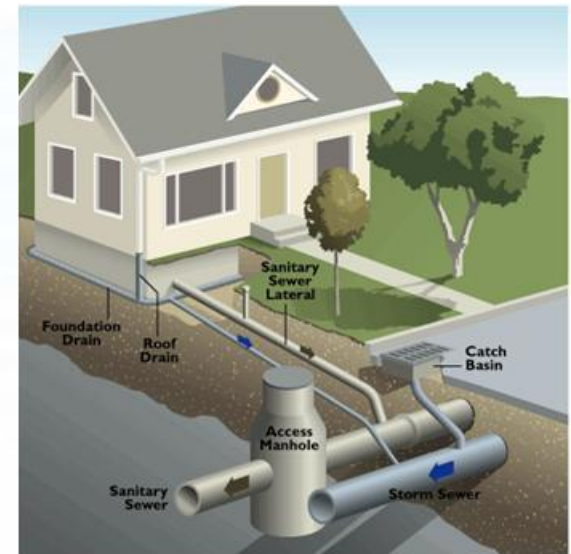


Public Consultation

- **Extensive public consultation has occurred as part of the overall flooding investigation process.**
- **A total of 12 Public Meetings have taken place since the July 24, 2009 flooding event.**
- **A Public Advisory Committee was established for the Kanata South area.**

Level of Service

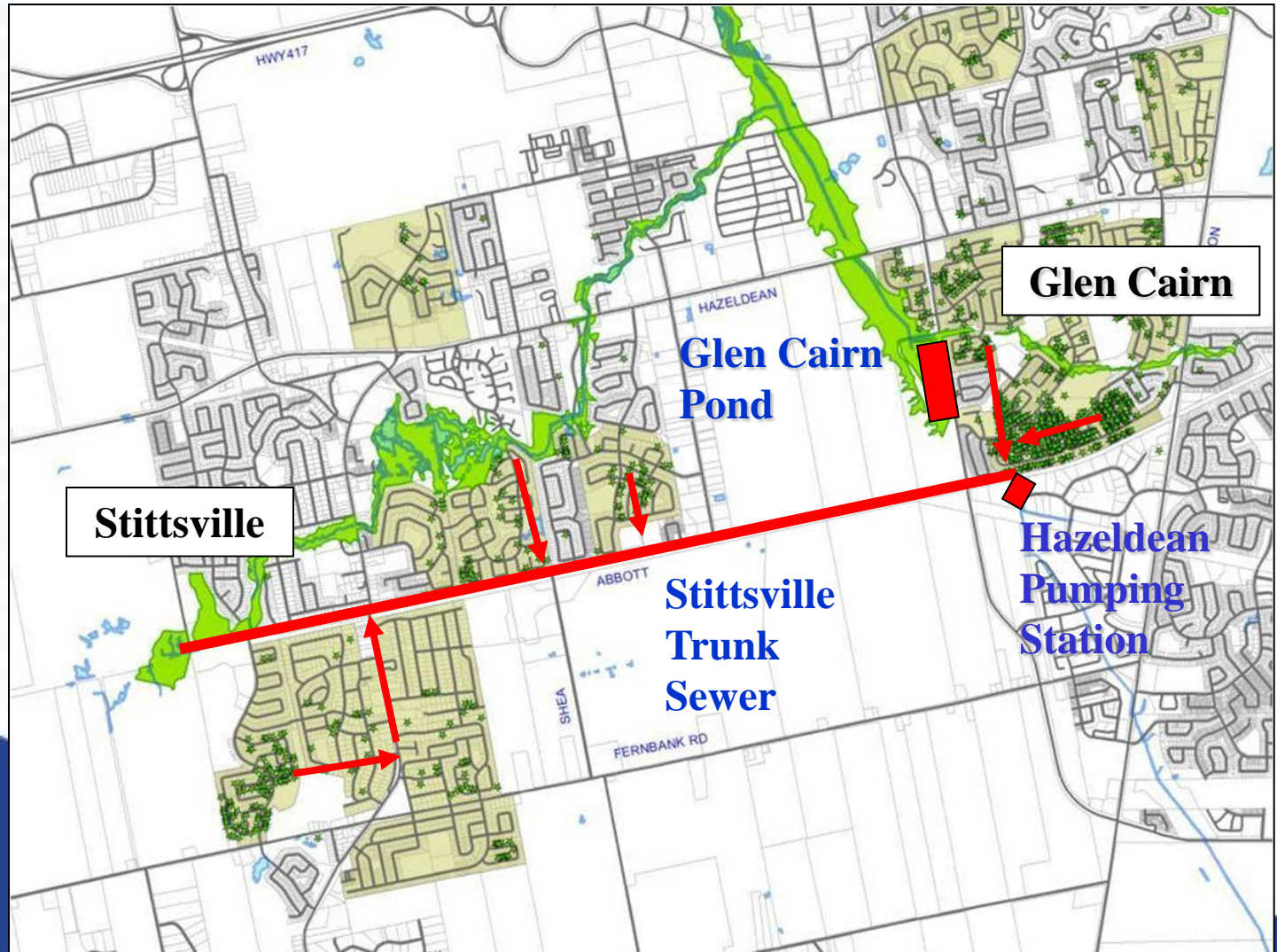
- **For existing west-end communities, the current levels of service are based on the standards of when they were built.**
- **When evaluating these existing communities as part of the investigation process, the objective is to achieve the same level of protection that is provided in new developments built to current standards.**



Definitions

- **Storm Sewer:** Sewer pipe that carried storm water runoff.
- **Sanitary Sewer:** Sewer pipe that carried sanitary/domestic waste.
- **Surface Ponding vs Surface Flooding:**
 - Ponding is when water accumulates but does not threaten buildings.
 - Flooding is when buildings are at risk.
- **Sewer Backup:** flooding of the basement through with sanitary water coming out through the floor drain or other plumbing fixtures.
- **Capacity of pipe:** the maximum flow the pipe can take without being under pressure.
- **Surcharge:** when the pipe is under pressure and water levels build up to push water through the pipe.
- **Storm Return Frequencies:**
 - 100-year storm = 1% chance of occurrence in any given year
 - 5-year storm = 20% chance of occurrence in any given year
- **ICD:** Inlet Control Device- object placed at the outlet of a storm catchbasin that reduces flow into the storm sewer pipes.

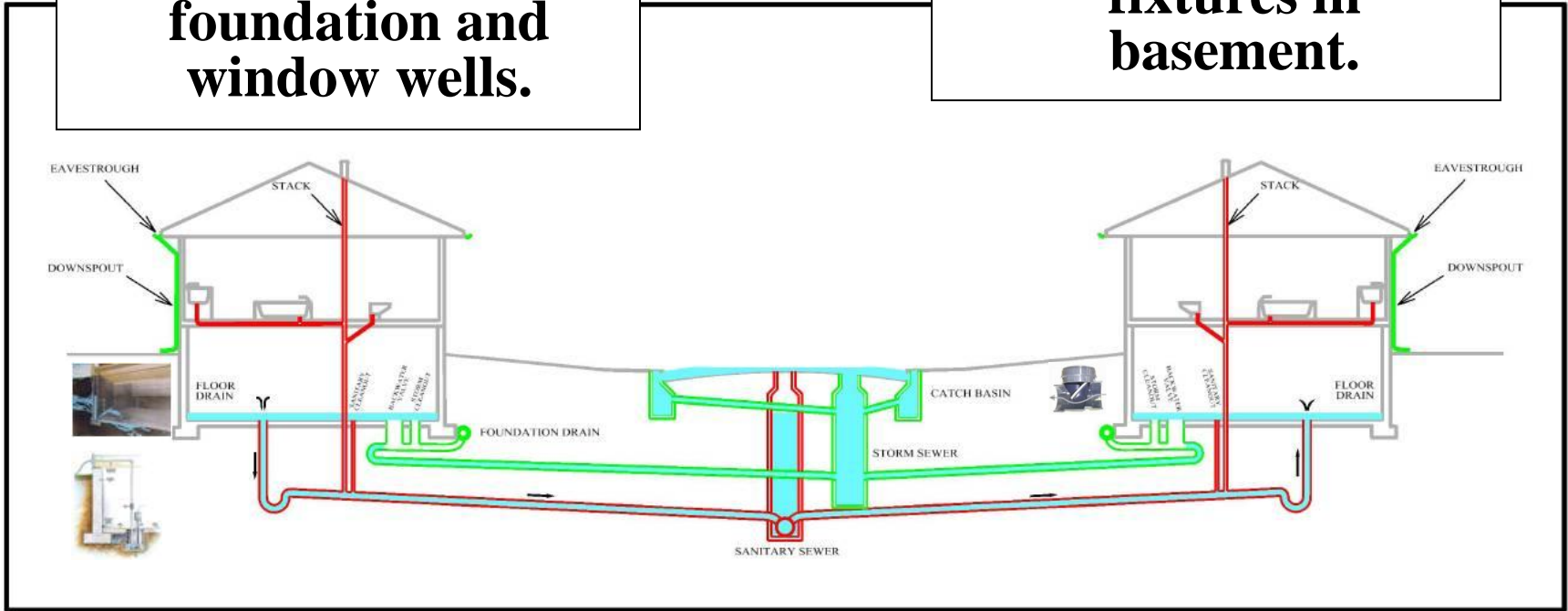
Context



Sources of basement flooding

Storm water flooding through backwater valves, cleanout caps, sump pits, cracks in foundation and window wells.

Sanitary flooding through floor drain and plumbing fixtures in basement.



Main causes of flooding and sewer backups

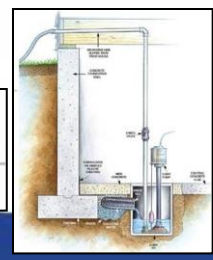
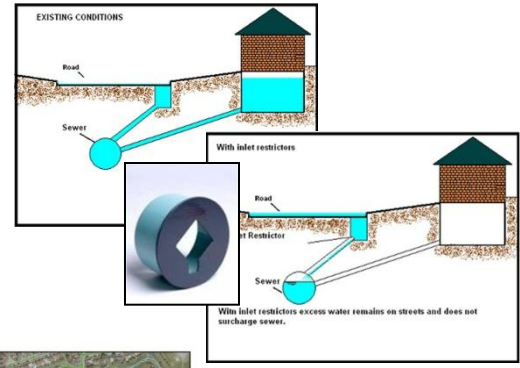
- **Storm:**
 - Surcharge of storm sewers,
 - Surface flooding due to lack of continuous major overland drainage system or modifications to roadside ditches
 - Back-up from the Carp River and Glen Cairn Pond into the storm sewer system
- **Sanitary:**
 - Surcharge of sanitary sewers caused by excess inflow of stormwater
 - Back-up from the Hazeldean Pumping Station into the sanitary sewer system

Analysis

- ✓ Detailed analysis of sewer systems using hydrologic and hydraulic computer models.
- ✓ Detailed analysis of overland flow using digital elevation and computer models.
- ✓ Field investigations.
 - ✓ Fog testing of sanitary sewers.
 - ✓ CCTV inspection of sewers.
 - ✓ Manhole cover inventory.
- ✓ Value Engineering sessions with expert consultants from Canada and the U.S. to review and refine solutions in Glen Cairn.

Recommended remedial measures - storm

- Provide ICDs in catch basins to reduce storm sewer surcharge to below basement elevation.
- Reduce impact from high water levels in the Carp River and Glen Cairn Pond from backing up into house storm drains.
- Improve overland drainage by re-grading some street sections and providing surface and sub-surface storage.
- Promote installation of protective plumbing devices.



Backwater valve and sump pump for storm line

Recommended remedial measures - sanitary

- Reduce storm water inflow entering the sanitary sewer system (replace sewer covers).
- Improve the Hazeldean pumping station (overflow and pumping capacity).
- Correct deficiencies identified through fog testing and CCTV inspections.
- Promote installation of protective plumbing devices.



Backwater valve for sanitary line

Stittsville

Recommended Solution:

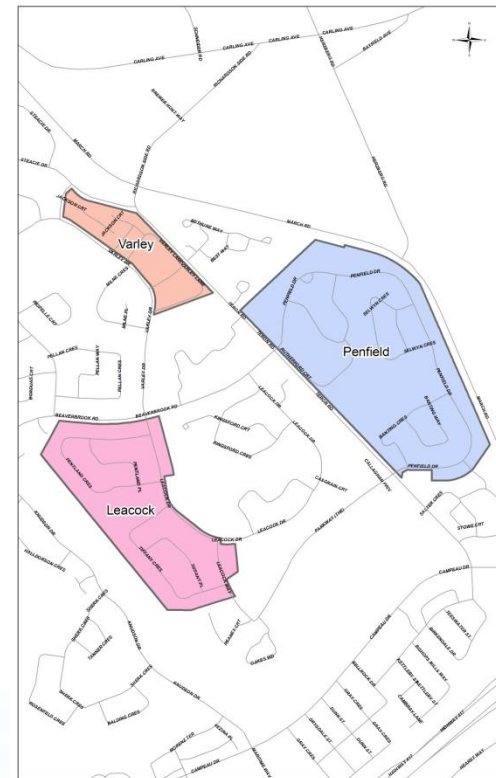
- **install inlet control devices (ICDs) in the storm catch basins,**
- **improve overland flow,**
- **retrofit some of the stormwater ponds,**
- **replace sanitary manhole covers with solid covers (i.e. no pick holes).**



Kanata North

Recommended Solution:

- install sealed covers on all sanitary MH,
- repair sewer deficiencies identified in the fog testing inspection,
- construct a new pipe along Beaverbrook to replace the existing pipe in the easement,
- install protective plumbing in affected homes on Penfield Dr.



Kanata South (north of Hazeldean)

Recommended Solution (Vanstone):

- **ditches need to be cleaned and those filled need to be re-opened,**
- **some driveway culverts need to be upgraded,**
- **SWM storage measures to be provided within Hewitt Park,**
- **better storm outlets at the end of Belleview and Vanstone are required,**
- **replace all sanitary MH covers with solid covers,**
- **correct all deficiencies identified through fog testing, and**
- **inform the public on flood reduction measures.**



Kanata South (north of Hazeldean)

Recommended Solution:

- **For the Naismith area, replace all sanitary MH covers with solid covers and correct all deficiencies identified through fog testing.**
- **For the Peary area, construct a berm along the back of the existing properties to increase the level of protection.**



Kanata South (Glen Cairn)

Recommended Solution:

- **install inlet control devices in all storm sewer catch basins,**
- **replace all sanitary MH covers with solid covers,**
- **correct deficiencies identified through fog testing,**
- **construct a pumping station at the Glen Cairn storm water management facility to maintain low water levels in the pond during extreme events,**
- **install backwater valves and sumps pumps in homes in areas where sewers are influenced by high water levels in the Carp River.**



Kanata South (Glen Cairn)

Recommended Solution (cont'd):

- **provide storage in pipes, in parks and other open areas to help manage overland flow,**
- **re-grade some roads and paths to improve drainage,**
- **upgrade some sanitary and storm sewer pipes,**
- **construct a new emergency overflow at the Hazeldean Pumping Station, and**
- **increase the capacity of the Hazeldean Pumping station.**



Outcome of the recommended measures

- **Increased level of protection by reducing the risk of flooding and sewer backups.**
- **Reduced risk of having the sanitary sewer system be surcharged.**
- **Storm sewer surcharge will be controlled, and in areas where it will occur, houses will be protected by backwater prevention.**
- **Overland flow depth will be maintained within the street right-of-way.**

Will this work and what about climate change?



- Developments built using current design standards have not experienced flooding. Developments built to these standards are more resilient to large/infrequent events.
- Modifications being implemented in other communities that also experienced widespread flooding:
 - Preston Street area
 - Sandy Hill
 - Orleans

Implementation Plan (as of December 31, 2011)

Recommended Measure	2010	2011	2012	Total	Status
Replace MH covers and install ICDs (Kanata, Stittsville and Carp)	\$1,300,000			\$1,300,000	Completed
Correct fog testing deficiencies (Kanata and Stittsville)	\$650,000			\$650,000	Completed
Glen Cairn Storm Pumping Station, incl pond cleaning and expansion as required		\$500,000	\$3,100,000	\$3,600,000	Ongoing, construction in 2012 /2013
Glen Cairn B/W valves and Sump pumps in zones of influence		\$1,000,000	\$1,675,000	\$2,675,000	Ongoing
Glen Cairn Storm drainage system improvements		\$400,000	\$8,400,000	\$8,800,000	Ongoing, construction in 2012/2013
Hazeldean Sanitary Pumping Station improvements (surcharge control only)		\$400,000	\$4,200,000	\$4,600,000	Ongoing, construction in 2012/2013
Leacock sanitary sewer	\$300,000	\$4,200,000		\$4,500,000	Completed
Cattail creek drainage improvements		\$25,000		\$25,000	Ongoing, construction in 2012
Vanstone ditch and sewer upgrades		\$200,000	\$2,000,000	\$2,200,000	Ongoing, construction in 2012/2013
Stittsville overland flow improvements		\$75,000	\$400,000	\$475,000	Ongoing, construction in 2012
Misc and Contingency			\$3,300,000	\$3,300,000	
	\$2,250,000	\$6,800,000	\$23,075,000	\$32,125,000	

Status of Key Initiatives

- **Funding requirements identified as part of capital budgets.**
- **Improvements made to the City's emergency response procedures>**
- **Sewer system connection requirements in new developments modified to reduce the risk of increased flows in existing sewer systems until all protective measures have been installed.**
- **Removal of stormwater inflow sources to the sanitary sewer identified through fog testing is complete.**
- **Installation of inlet control devices is complete.**
- **Replacement of sanitary sewer covers is complete.**
- **Construction of new sanitary sewer outlet for the Leacock area (Kanata North) is substantially complete.**
- **Letters sent to all property owners within the areas identified for protective plumbing.**
- **Increased pumping capacity of Hazeldean Pumping Station;**
- **Initiated drainage improvements, such as localized road regarding, sewer replacement and overland drainage improvements in Stittsville and Glen Cairn;**
- **Focusing on detailed design and contract preparation for more complex initiatives, such as the Hazeldean Pumping Station overflow, surface storage in Glen Cairn, new pumping station and pond modifications at the Glen Cairn pond.**

The City encourages residents to help:

- Call 311 if you experience basement flooding or if you see anything that may hinder drainage such as:
 - Debris covering inlet grates.
 - Debris in water courses.
 - Ponding on streets that may impact buildings.
 - Ponding on streets that remains several hours after end of storm events.
- Downspouts should never be imbedded in the ground, or connected to the sewer system or footing drains.
- Slope ground away from the foundation to allow rainwater to flow away from the home.
- Never open a manhole cover to drain a street or yard.
- Enroll in the Residential Protective Plumbing Program (RPPP).

http://www.ottawa.ca/residents/funding/protective_plumbing_en.html

QUESTIONS?