

City of Markham

Wastewater Based Basement Flooding Risk Reduction Initiative

Date: April 7, 2014 By: Peter Loukes

Environmental Service Department

Background

- Program focus on wastewater system flooding risk reduction:
 - sources of water on municipal land entering collection system;
 - sources of water from private property entering collection system e.g. Downspouts connect to sanitary system;

Sources of Water to Sanitary System – Municipal Land

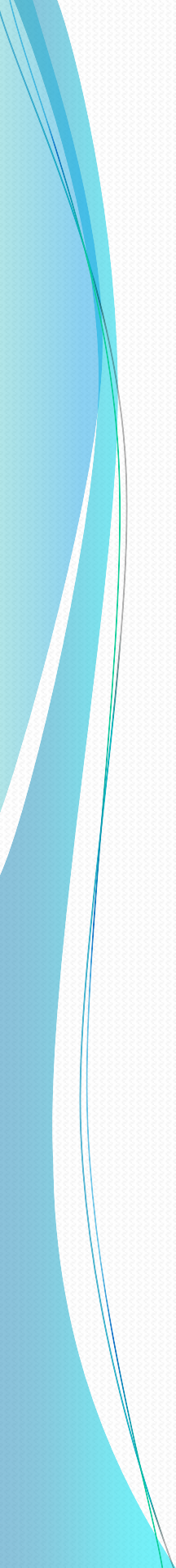
Element	component	Strategy & Status
Sanitary Manholes	Roads	Seal manholes & design standards (ongoing & changed)
	Rear yard easements	Surveying for needed repairs (ongoing)
	Water courses and valley lands	Surveying for needed repairs (ongoing)
	Areas on road prone to water ponding	Install manhole plugs in lid or install dishes / tubs under manhole lid (changed)
Cracks in Sewer or lateral	Main Line & Laterals	TV camera work and spot repairs (ongoing)

Sources of Water to Sanitary System – Private Property

Element	Strategy & Status
Commercial areas parking lots	Change in design standards (changed) Seal manholes (changed)
Lateral connections and leaks	TV work and repairs (ongoing , requires customer participation) e.g. Grandview area pilot lateral lining
Other Connections to laterals: Downspouts	Smoke and water testing confirmation • <u>Sanitary System Downspouts Disconnection Program</u>
Driveway catch basins	• <u>may require disconnection by Property Owner</u>
Sump pumps	• <u>May require redirecting by Property Owner</u>

City of Markham *Sanitary System Downspout Disconnection Program*

Environmental Service Department



Downspout Disconnection Program Overview

- Background
- Pilot Sanitary System Downspout Disconnection Program Findings
- City-wide Sanitary System Downspout Disconnection Program
- Phase 1 Program update
- I/I Initiatives/Programs Recap
- Preventive Measures for Future Development
- Conclusion
- Questions

Background

- Older areas within City (built before 1980's) may have home roof downspouts incorrectly connected to sanitary sewer system.
- Problems with these direct connections:
 - Increase the risk of basement flooding;
 - Major source of extraneous sanitary inflow;
 - Currently illegal (Prohibited under By-Law).
- To resolve the issues, City of Markham approved Pilot Sanitary System Downspout Disconnection Program in Grandview Area of Thornhill, April 29, 2008. The program was completed in 2012 including one year of post flow monitoring.

Background con't

- **Goals** of the Sanitary System Downspout Disconnection Program:
 - **Reduce risk** of wastewater based basement flooding.
 - Protect sanitary sewer system by **reducing extraneous inflows.**
 - **Enforce existing** City of Markham Sewer **By-Law #436-86**

Pilot Program - Results

- 766 homes.
- 45 homes (6%) identified with downspouts connected to sanitary sewer system.
- *achieved 100% disconnection compliance.*
- 40-50% reduction in peak inflow & infiltration (I/I) rates (pre to post disconnection) within local sanitary sewers.

City-wide Program

- Base on pilot findings & success, **City-wide Sanitary System** Downspout Disconnection **Program** approved by Council **Mar 19, 2013**.
- City-wide Program **focusing on risk reduction** in areas with elevated risk of wastewater based basement flooding. (based on **modelling**)
- Multi-phases [Estimated to have **seven phases implemented over ten year period (2013-2023)**]

City-wide Program con't

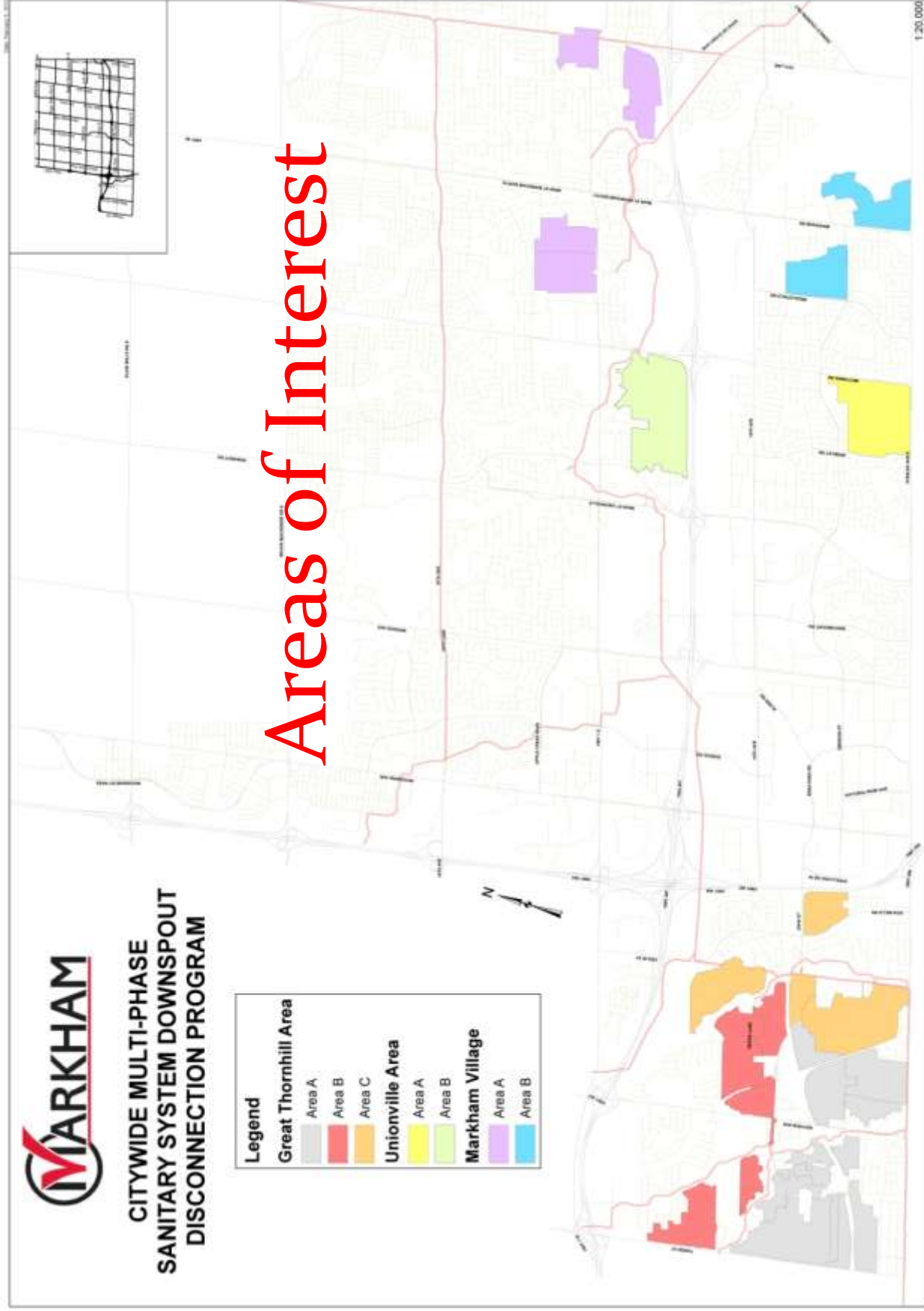
- Phasing & priority base on :
 - Flow modelling data
 - Flow monitoring data
 - Past flooding records
 - All on-going programs/**initiatives** within Markham
- Overall **program** implementation **timing** subject to **change** based on annual risk evaluation & annual Council Reports.

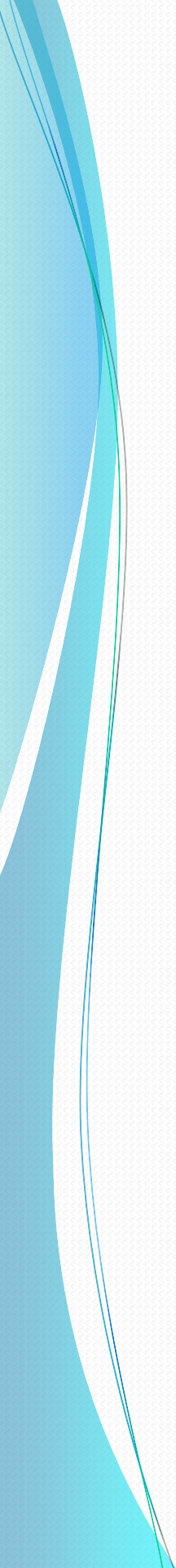


**CITYWIDE MULTI-PHASE
SANITARY SYSTEM DOWNSPOUT
DISCONNECTION PROGRAM**

Legend	
Great Thornhill Area	
Area A	
Area B	
Area C	
Unionville Area	
Area A	
Area B	
Markham Village	
Area A	
Area B	

Areas of Interest





City-wide Program Components

- I. Public Communication
- II. Site Investigation
- III. Disconnection of identified downspouts
- IV. Financial Assistant Package
- V. Post Flow monitoring & Reduction Verification

I. Public Communication

- [City of Markham web page](#)



- Testing Stage:
 - Notification Letter
 - Brochure on investigation & testing works
- Disconnection Stage:
 - Notice of Disconnection letter to affected residence
 - Brochure detailing methods of disconnecting the downspout & Financial Assistant Package.
 - Additional website information on how to disconnect the downspout

II. Site Investigation

- Preliminary Property Investigation (Lot Survey)
- Smoke Testing
(Sanitary and Storm Sewer System)



II. Site Investigation

- Water Testing (Inconclusive downspouts from smoke testing)

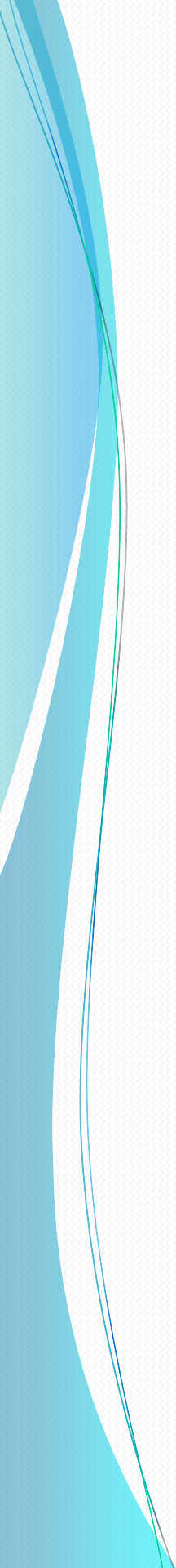


III. Disconnection of Identified Downspouts

- Notifications mailed to specific properties advising of disconnection needs
- Brochure will be distributed to affected residents detailing disconnection methods
- Financial Assistant Package (FAP) will be provided.

IV. Financial Assistant Package (FAP)

- City will reimburse 80% of cost for completing downspout disconnection where connected to Sanitary Sewer System, up to a maximum of \$500;
- The City will reimburse 100% of cost for a rain barrel purchased by home owners who are asked to disconnect, up to a maximum of \$150.

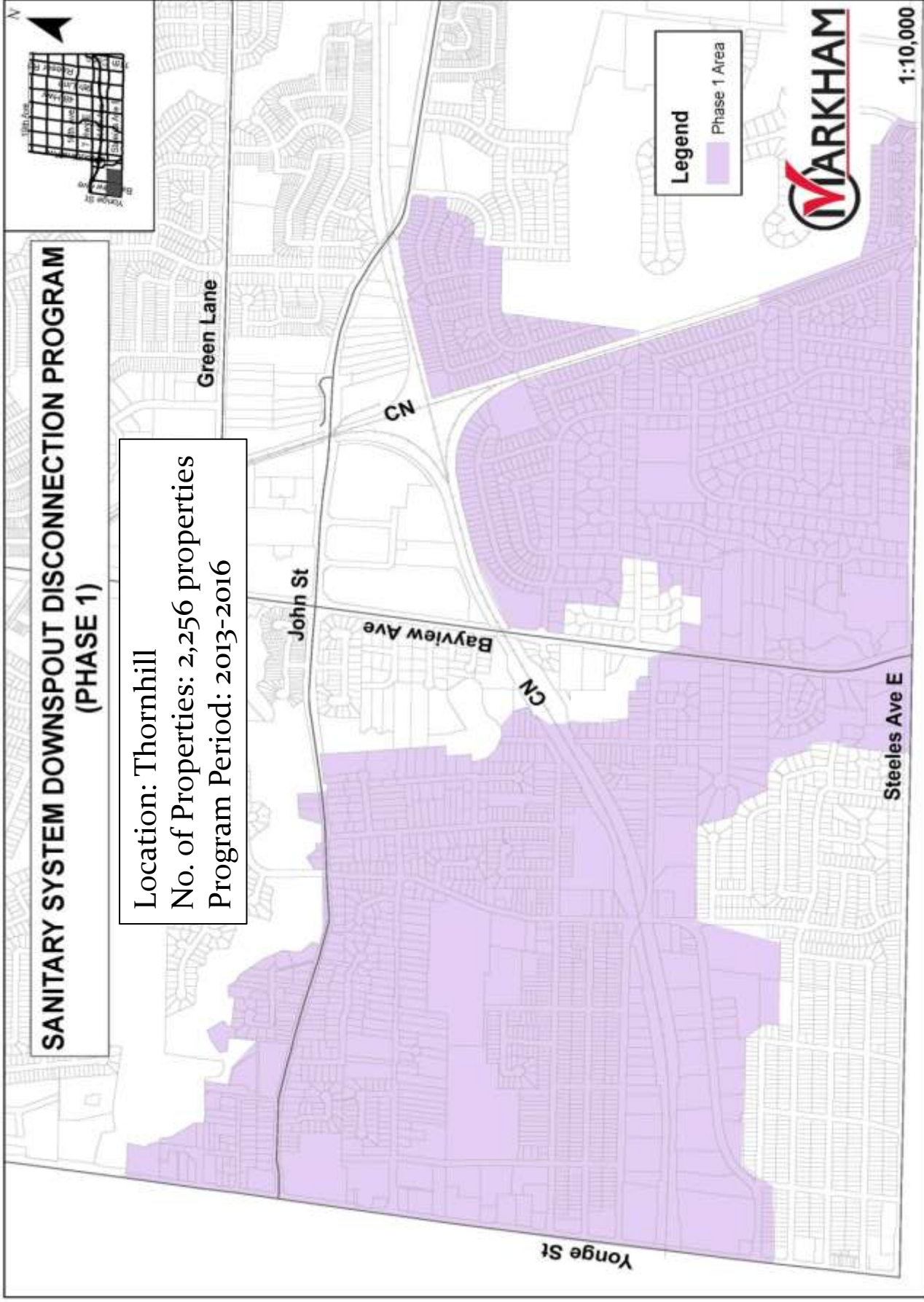


V. Post Flow Monitoring

- Flow monitoring for one year period
- Evaluate the effectiveness of disconnection program.
- Basis for risk analysis to identify & prioritize future initiatives for that area.

SANITARY SYSTEM DOWNSPOUT DISCONNECTION PROGRAM (PHASE 1)

Location: Thornhill
No. of Properties: 2,256 properties
Program Period: 2013-2016



Phase 1 Program –Investigation Findings

- 16 homes with downspouts connected to Sanitary Sewer System
- 51 other sources of extraneous flow found

1. Road CB connect to sanitary sewer	4
2. Sanitary MH Defects (cracks, hole, improper cover lid)	5
3. Uncapped lateral clean out	17
4. Driveway drains, private CB, side drains, stairwell drains, and rear drains connection to sanitary sewer	13
5. Potential sump pump connections	3
6. Weeping tile connections	2
7. Disconnected DS not properly capped	2
8. Others	5

Phase 1 results

- Water testing provided minimal benefits for locations found inconclusive with smoke testing
- Based on results we are looking at removing the water testing part of program.
- This will reduce the total program forecast by **\$0.38M from \$2.56M to \$2.18M**

Phase 1

\$0.81M

Future Phases

\$1.37M

Total Program Forecast **\$2.18M**

- Funding for future phases will be considered as part of the annual capital budget process

Phase 1 results (continued)

- This will permit larger areas to be tested each year
- Program will be reduced from **seven phases** to **five phases**
- **Now** implemented over eight year period (**2013-2020**) instead of ten year period (**2013-2023**)

I/I Initiatives/Programs Recap

I/I Risk Reduction Initiatives/Programs:

- i. Sanitary System Downspouts Disconnection Program
- ii. Pursue repairing any other sources of I/I public or private
- iii. Sanitary MH inspections
 - Focus on MH within valley, watercourse, backyard easement & road sag.
 - Evaluate condition & needs for plugging MH covers
- iv. Manhole sealing during roads reconstruction
- v. Service lateral lining and repair

Preventive Measures for Future Development

- **Design Standard** Update

- Locate private sanitary MH at high ground areas or islands.
- MH should locate outside Regional Flood Plain or elevated to min. 100 yr water level within flood plain.
- Seal MH cover at low point of R.O.W.
- Bituminous seal tape around MH rings & section joints
- Clay/collar plug in bedding of sewers below groundwater table.
- Rubber apron to grip pipe & MH interface.

- Areas undergoing reconstruction:

- Follow updated Design Standard
- Fix existing defects

Conclusion

- Sanitary System Downspout Disconnection Program is part of Basement Flooding Risk Reduction Strategy
- Looking at removing I/I sources that provide the biggest benefit for least cost
- Trying to reduce relative risk of wastewater based flooding throughout City
- Area phasing to reduce level of perceived risk based on flow modeling & flow monitoring results

Thank you for your attention.

Any Questions

