



Report to: General Committee

Date Report Authored: January 21, 2016

SUBJECT: Citywide Multi-phase Sanitary System Downspout Disconnection Program – Annual Progress Update and Phase 4 Details

PREPARED BY: Gord Miokovic, Manager-System Engineering (Waterworks)
John Lau, System Engineer (Waterworks)

RECOMMENDATION:

- 1) That the report entitled “Citywide Multi-phase Sanitary System Downspout Disconnection Program – Annual Progress Update and Phase 4 Details” be received; and
- 2) That Council approve the Phase 4 program area covering 2,305 properties as follows:
 - i. Area bounded by Highglen Avenue to the north, Fonda Road & Mindy Crescent to the east, Denison Street to the south, and Middlefield Road to the west;
 - ii. Area bounded by Fairtree Pond to the north, Morningside Creek to the east, Steeles Avenue to the south, and Markham Road to the west;
 - iii. Area bounded by Armstrong Park & Senator Reesor’s Dr to the north, Ninth Line to the east, Highway 407 to the south, and Rouge River to the west;
 - iv. Area bounded by Oak Lea Circle to the north, Ninth Line to the east, Highway 7 to the south, and Rose Way & Reginald Crescent to the west; and
- 3) That the project be funded in the amount of \$300,000 from the 2016 capital project #16238 Sanitary System Downspout Disconnection Program – Phase 4 of 5; and
- 4) That the amount of \$533,084 from the 2014 Capital Project #14313 Sanitary System Downspout Disconnection Program – Phase 2 of 5 and \$197,778 from the 2015 Capital Project #15294 Sanitary System Downspout Disconnection Program – Phase 3 of 5 be returned to original funding source; and
- 5) That Staff be authorized and directed to do all things necessary to give effect to this resolution.

PURPOSE:

The purpose of this report is to:

- i. Provide a status update on Phase 1, 2 & 3 of the Citywide Multi-phase Sanitary System Downspout Disconnection Program (DDP);
- ii. Provide Council proposed Phase 4 area details;
- iii. Obtain authorization from Council to proceed with the areas chosen for Phase 4 of the program; and
- iv. Identify other areas for future phase.

EXECUTIVE SUMMARY:**Phase 1:**

Phase 1 of the program covered part of Thornhill Area (see **Attachment A**). All testing and downspout disconnection works was completed in October 2015. Through the testing of 2,256 properties, 2,131 properties passed the tests and did not have any I-I concerns. The tests identified the following:

- 21 properties were identified as having downspouts directly connected to the sanitary sewers
- 39 private properties + 9 additional public locations were identified as being inflow/infiltration (I-I) sources.
(These other sources included: uncapped lateral cleanouts; damaged sanitary manholes; street catch basins, or driveway and stairwell drains connected to the sanitary sewer; etc.)
- 65 properties were identified as having lateral interactions between the storm and sanitary systems, which indicated that there may be cracks or cross-connections at the service lateral.

Out of the 21 affected properties, only one did not comply with the disconnection and did not respond to the “Order to Comply Disconnection” issued by By-law Department. The case with the subject property had moved on to legal action.

For the 48 other I-I source locations (both public & private), the 9 public side I-I sources have been checked and resolved by City Operation and Maintenance (O&M) staff. Regarding the 39 private side I-I sources, the list will be consolidated after completion of the Program and discussion with Legal & By-law Department will be carried out to determine how to resolve. **Table 3** on page 7 details the findings and status of these issues.

For the 65 properties with reported lateral interaction, they have been inspected under the Sanitary Lateral Inspection Program. The condition of the service lateral was evaluated and any identified defects will be fixed accordingly.

Post flow monitoring for the Phase 1 area will commence in Spring 2016 for a period of 12 months. The works will be performed under the Asset Management Department 12 Month Flow Monitoring Project (#14300).

The total amount spent under Phase 1 (Capital Project #11328 Roof Downspout Disconnection Program) was \$130,925. See **Attachment G** for an outline of costs related to all phases of the DDP.

Phase 2:

Phase 2 of the program also covered part of Thornhill Area (see **Attachment B**). All testing was completed in November 2014. Through the testing of 2,827 properties, 2,544 properties passed the tests and did not have any I-I concerns. The tests identified the following (Note some properties may have had more than one issue):

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- 70 properties were identified as having downspouts directly connected to the sanitary sewers.
 - 7 private properties + 30 additional public locations were identified as being inflow/infiltration (I/I) sources.
 - 215 properties were identified to have lateral interactions which indicate there may be cracks or cross-connections at the service lateral.

Phase 2 is currently under the disconnection stage. “Notice of Disconnection” had been sent out to the 70 affected homeowners by registered mail in June 2015 along with the City subsidiary package. A twelve month period was provided for the homeowners to carry out the disconnection works.

For the 37 other I-I source locations (both public & private), the 30 public side I-I sources have been checked and resolved by City Operation and Maintenance (O&M) staff. Regarding the 7 private side I-I sources, the list will be consolidated after completion of the Program, and discussion with Legal & By-law Department will be carried out to determine how to resolve. **Table 4** on page 8 details the findings and status of these issues.

For the 215 properties with reported lateral interaction, they have been inspected under the Sanitary Lateral Inspection Program. The condition of the service lateral was evaluated and any identified defects will be fixed accordingly.

Post flow monitoring for the Phase 2 area will commence in Spring 2017 after the completion of the downspouts disconnections works.

The approved budget for Phase 2 (Capital Project #14313, Sanitary System Downspout Disconnection Program - Ph 2 of 5) was \$799,928. The amount spent to date is \$136,591. Based on the elimination of water testing in the test approach (started in Phase 2) and the actual number of properties requiring downspout disconnections was less than original estimates, therefore an amount of \$533,084 will be returned to source. The remaining funds of \$130,253 are committed for the Financial Assistant Plan at an estimated amount of \$45,500 (70 properties x \$650 maximum reimbursement) and the Flow Monitoring work at \$84,753 which will be carried out in 2016-2017.

Phase 3:

Phase 3 of the program covered the Thornhill Area, the Milliken Area, and the Unionville Area (see **Attachment C**). The testing work was completed in November 2015. The disconnection stage is expected to start in June 2016. Through the testing of 3,690 properties, 3,668 properties passed the tests and did not have any I-I concerns. The tests identified the following:

- 5 properties were identified as having downspouts directly connected to the sanitary sewers.
[Notice of Disconnection will be sent out to the affected homeowners in June 2016.]
- 11 private properties + 10 additional public locations were identified as being inflow/infiltration (I/I) sources.

[City O&M staff will investigate and fix the identified 10 public side I-I sources in 2016. Regarding the 11 private side I-I sources, the list will be consolidated after completion of the Program. Discussion with Legal & By-law Department will be carried out to determine how to resolve. **Table 5** on page 8 details the proposed actions for these issues.]

- 6 properties were identified to have lateral interactions which indicate there may be cracks or cross-connections at the service lateral.

[The sanitary service lateral of the identified properties with lateral interaction will be inspected in 2016 under the annual Sanitary Lateral Inspection Program.]

The approved budget for Phase 3 (Capital Project #15294, Sanitary System Downspout Disconnection Prog - Ph 3 of 5) was \$361,700 and the amount spent/committed to date is \$76,670. Based on the test result, the actual number of properties requiring downspout disconnections was less than original estimates, therefore an amount of \$197,778 will be returned to source. The remaining funds of \$87,252 are committed for the Financial Assistant Plan at an estimated amount of \$3,250 (5 properties x \$650 maximum reimbursement) and the Flow Monitoring work at \$84,002 which will be carried out in 2016-2018.

For a detail summary comparison on the Phase 1 to Phase 3 findings, please see **Attachment H**.

Phase 4:

Phase 4 of the program is being proposed to cover the Markham Area (see **Attachment D**). Phase 4 will run from 2016-2020 at a total estimated cost of \$300,000 under Capital Project #16238, Sanitary System Downspout Disconnection Program Phase 4 of 5.

Phase 5:

Phase 5 of the program is expected to run from 2017-2021 with a total estimated cost of \$264,930.

At this time, the program has a total of 5 phases proposed with funding for future phases to be considered as part of the annual budget process. Funding for Phase 5 will be requested as part of the 2017 capital budget process.

The DDP is just one of the programs/initiatives to mitigate sanitary system inflow/infiltration (I-I) issues. The other initiatives include sewer and lateral inspection & lining, plugging and sealing manholes, design standard changes, etc.

BACKGROUND:

The DDP is an extension of the Pilot DDP completed in 2012. The goal of the program is to:

- Reduce the risk of wastewater based basement flooding;
- Reduce the flow in the sanitary sewer system by reducing extraneous inflow;
- Enforce the City of Markham Sewer By-Law #2014-71 which does not permit storm water entering the wastewater collection system.

The identification of higher risk areas within the City and the phasing of the program were determined by taking into account wastewater flow modeling, wastewater flow monitoring, past flooding incidents reported to the City and all other on-going programs/initiatives within Markham. These identified higher risk areas are shown on **Attachment E**.

Under the pilot program, smoke testing and water testing had been used to identify the direct connections of downspouts into the sanitary sewer system. Based on the Phase 1 test results, it was noticed that smoke testing proved to be a more efficient and cost effective process in finding sources of I-I contribution than water testing. In order to improve the cost effectiveness of future phases of the DDP, Council had approved the elimination of water testing in the program under report “Citywide Multi-phase Sanitary System Downspout Disconnection Program – Phase 1 Progress Update and Phase 2 Details” dated March 14, 2014. With this change, a larger area was covered under each phase of the program while reducing overall program cost.

Each phase of the DDP now involves the following elements:

- i. Modeling and evaluation of the existing flow monitoring data to assess the extent of extraneous flows in an area;
- ii. Public Communication and Education Plan;
- iii. Multi-step Site Investigation Approach:
 1. Lot survey identifying all downspouts connected to the underground system;
 2. Sanitary and storm sewer smoke testing of all downspouts connected to the underground system;
- iv. Resident notification for follow-up action required along with Financial Assistant Plan (FAP) information;
- v. A 12 months timeframe is given to the homeowners to carry out the downspout disconnection works;
- vi. Follow-up corrective action inspection;
- vii. Progressive By-law Enforcement for non-compliance with required corrections;
- viii. Flow Monitoring of area after identified corrective action completed.

DISCUSSION:**1. Phase 1 to 3 Progress**

Phase 1 covered the Thornhill area (see **Attachment A**) and commenced in May 2013. All testing had been completed by April 2014 and the disconnection works had been completed in October 2015.

Phase 2 covered the Thornhill Area (see **Attachment B**) and commenced in May 2014. All testing had been completed in November 2014 and is currently under the disconnection stage.

Phase 3 covered the Thornhill Area, the Milliken Area, and the Unionville Area (see **Attachment C**) and commenced in May 2015. All testing had been completed in November 2015.

Table 1 summarized the final test result for Phase 1 & 2 and the preliminary test result for Phase 3:

Table 1: Test Result

	Total no. of Properties	No. of properties identified with Downspout directly connected to sanitary system	No. of other I-I contribution items identified	No. of lateral interaction identified
Phase 1	2,256	21	48	65
Phase 2	2,827	70	37	215
Phase 3	3,690	5	21	6
Total	8,773	96	106	286

1.1 Direct connection of downspouts to the sanitary sewer system

Phase 1 has a total of 21 properties identified as having downspouts directly connected to the sanitary sewer system. Out of the 21 properties only one property has not complied with the requirement and the City is now pursuing legal action.

Phase 2 has a total of 70 properties identified to have downspouts directly connected to the sanitary sewer system. “Notice of Disconnection” were mailed to the property owners by registered mail in June 2015. A 12 month period was provided to the homeowners to complete the disconnection works.

Phase 3 identified a total of 5 properties as having downspouts directly connected to the sanitary sewer system. “Notice of Disconnection” will be mailed to the homeowners by registered mail in June 2016 along with the Financial Assistant Plan (FAP) information. The homeowners will be given a 12 month timeframe to secure contractors or undertake the work themselves. Along with being available on the City web site, literature on how to properly and effectively disconnect the downspout will also be provided to the affected homeowners. Following the disconnection of downspouts and the FAP forms being submitted, the work will be inspected by City staff and rebates will be provided. Post disconnection flow monitoring is expected to commence in the Spring of 2018 for a 12 month period.

Table 2 summarized the up-to-date disconnection status.

Table 2: Downspouts Disconnection Status

	No. of properties identified with Downspout connect to Sanitary System	No. of properties completed disconnection	No. of properties outstanding
Phase 1	21	20	1 (Pursuing legal action)
Phase 2	70	13	57 (Due by June 2016)
Phase 3	5	-	5 (Disconnection commence in June 2016)
Total	96	33	63

1.2 Other public/private side I-I contribution sources

During smoke testing, apart from downspouts connections to sanitary sewer, other I-I sources were also identified. These sources were located within both public and private properties. **Table 3 to 5** summarizes the different I-I sources and the action taken to date.

Table 3: Phase 1 Other I-I Sources

Public/Private Side	Other I-I Sources	No. Identified	Actions Taken
Public	Potential catchbasin connected to sanitary sewer	4	City O&M staff performed CCTV investigation and no cross-connections or defects requiring repairs were identified
Public	Sanitary Manholes Defects (cracks, hole, wrong cover lid)	5	City O&M staff repaired all the defects
Private	Uncapped Lateral clean out	17	City O&M staff capped all the lateral cleanouts
Private	Sanitary Manhole in parking lot with open grid cover	1	City O&M staff replaced the manhole lid
Private	Disconnected downspouts not properly capped	2	Letter send to property owners and the issues have been fixed with follow-up inspection
Private	Driveway drains, private CB, side drain, stairwell drain, and rear drain connections	13	Consolidate to a complete list after Program completion. Discuss with Legal & By-law Department to determine how to resolve the private side issue and whether some type of Council Approved Assistance Program will be required.
Private	Potential sump pump connection	2	
Private	Weeping tile connection	2	
Private	Old oil sump connection	1	
Private	Unknow cement structure connection	1	
	Total	48	

Table 4: Phase 2 Other I-I Sources

Public/Private Side	Other I-I Sources	No. Identified	Actions Taken
Public	Potential catchbasin connected to sanitary sewer	21	City O&M staff performed CCTV investigation and no cross-connections or defects requiring repairs were identified
Public	Sanitary Manholes Defects (cracks, hole, wrong cover lid)	9	City O&M staff repaired all the defects
Private	Driveway drains, private CB, side drain, stairwell drain, and rear drain connections	6	Consolidate to a complete list after Program completion. Discuss with Legal & By-law Department to determine how to resolve the private side issue and whether some type of Council Approved Assistance Program will be required.
Private	Potential sump pump connection	1	
	Total	37	

Table 5: Phase 3 Other I-I Sources

Public/Private Side	Other I-I Sources	No. Identified	Actions to be Taken
Public	Potential catchbasin connected to sanitary sewer	1	City O&M staff will performed CCTV investigation in 2016
Public	Sanitary Manholes Defects (cracks, hole, wrong cover lid)	9	City O&M staff will repair all the defects in 2016
Private	Uncapped Lateral clean out	5	City O&M staff will cap all the lateral cleanouts in 2016
Private	Driveway drains, private CB, side drain, stairwell drain, and rear drain connections	3	Consolidate to a complete list after Program completion. Discuss with Legal & By-law Department to determine how to resolve the private side issue and whether some type of Council Approved Assistance Program will be required.
Private	Weeping tile connection	3	
	Total	21	

1.3 Lateral interaction between sanitary and storm sewer

Lateral interaction is identified when smoke comes out from the downspouts under both storm and sanitary sewer smoke testing. Since the two systems are fully separate, the smoke identified at the downspouts indicated that there may be cracks at the lateral pipe or some cross-connection which allows the migration of smoke during the testing. The properties identified to have lateral interaction have been added to the Annual Sanitary Lateral Inspection program. This Program inspects and evaluates the condition of the sanitary service laterals, with any defects identified to be fixed accordingly. **Table 6** summarized the scheduled lateral inspection time frame for each phase.

Table 6: Sanitary Service Lateral Inspection Status

	No. of properties with Lateral Interaction	Scheduled Inspection Period
Phase 1	65	Completed in 2014-2015
Phase 2	215	Completed in 2015
Phase 3	6	To be carried out in 2016
Total	286	

From the lateral inspection CCTV results, the consultant will indicate any structural defects that warrant repair works and any blockage of lateral which require flushing. The repair and flushing operations will be performed by City O&M staff under their maintenance schedule.

1.4 Post Flow Monitoring

Post flow monitoring will be undertaken after the required repair works have been completed under each phase. The post flow monitoring will be performed for a 12 months period in order to capture relevant rainfall and flow data. Base on this flow monitoring data, City staff will evaluate the impact the work has had in reducing I-I levels and determine if any further actions are required.

For Phase 1, all the remediation works had been completed and the post flow monitoring works will commence in Spring 2016.

2. Phase 4 Sanitary System Downspout Disconnection Program

The following Markham areas are being recommended for Phase 4 of the DDP (see **Attachment D**):

- i. Area bounded by Highglen Avenue to the north, Fonda Road & Mindy Crescent to the east, Denison Street to the south, and Middlefield Road to the west;
- ii. Area bounded by Fairtree Pond to the north, Morningside Creek to the east, Steeles Avenue to the south, and Markham Road to the west;
- iii. Area bounded by Armstrong Park & Senator Reesor's Dr to the north, Ninth Line to the east, Highway 407 to the south, and Rouge River to the west;
- iv. Area bounded by Oak Lea Circle to the north, Ninth Line to the east, Highway 7 to the south, and Rose Way & Reginald Crescent to the west; and

These areas cover a total of 2,305 properties. The proposed schedule for Phase 4 is summarized in **Table 7**:

Table 7: Phase 4 Schedule

i. Public Communication and Education Plan – (Overview of the Public Communication and Education Plan is enclosed in Attachment F)	Started in January 2016
ii. Lot Survey	August 2015 & May 2016 to August 2016
iii. Smoke Testing & Report	May 2016 to May 2017
iv. Resident notification for follow-up action required along with FAP information	June 2017 to May 2018
v. Follow-up corrective action inspection	June 2017 to June 2018
vi. Progressive By-law Enforcement for Non-compliance with required corrections	June 2018 to January 2019
vii. Flow Monitoring of area after identified corrective action completed	April 2019 to April 2020

Annual reports will continue to be presented to Council regarding the progress of the program and to confirm future phase areas.

3. Future Program Areas

The DDP currently has a total of 5 phases in order to cover the identified higher risk areas (see **Attachment E**). The potential Phase 5 program areas are within Thornhill and Unionville. Staffs are continuing to monitor wastewater flow in other areas of the City and will assess in 2016 if the program may need to be expanded beyond the 5 phases.

In order to enhance the efficiency of the program, lot surveys within the potential Phase 5 area (Thornhill & Unionville) will be performed during the Summer of 2016. By having the lot survey started in 2016, it will increase the flexibility of the smoke testing schedule and ensure good progress of Phase 5 of the program in 2017.

FINANCIAL CONSIDERATIONS:

The funding for Phase 4 Program was approved as part of the 2016 Capital Budget under Project #16238 for \$300,000. The following funding allocation breakdown (**Table 8**) is proposed for the program covering 2,305 properties:

Table 8: Phase 4 Budget Breakdown

Item	Total Budget
<i>Activities:</i>	
<i>Public Communication & Education</i>	\$28,260
<i>Site Investigation</i>	\$104,300
<i>Financial Assistance Plan: Downspout Disconnection & Rain Barrel</i>	\$60,450
<i>Flow Monitoring</i>	\$75,000
<i>Total</i>	\$268,010
<i>Contingency (10%)</i>	\$26,801
Overall Total	\$294,811
Overall Total + Tax	\$300,000

Note: The above budget assumes 4% of the total properties will require downspout disconnection and take advantage of the Financial Assistance Plan.

The Financial Assistance Package (FAP), was approved by Council on March 19, 2013 under report, “Citywide Multi-phase Sanitary System Downspout Disconnection Program – Financial Assistant Plan”, and covers:

- 80% of the cost of completing the downspout disconnection, to a maximum of \$500, and
- 100% of the cost of a rain barrel purchased by the home owner, to a maximum of \$150.

The overall program estimate for the remaining Phase 4 & 5 areas is \$564,930 (see **Attachment G**). The annual cost breakdown for each of the remaining phases is:

Phase 4 (2016)	\$300,000
Phase 5 (2017)	\$264,930
Total	\$564,930

Funding for future Phase 5 will be requested as part of the 2017 capital budget process.

Amount Return to Source:

Phase 1 account #11328 has been closed with \$140,071 returned to source. The amount return to source is because of the reduced number of properties required Water Testing.

Base on the elimination of water testing in the test approach (started in Phase 2) and the actual number of properties requiring downspout disconnection from the test result was less

than original estimates, an amount of \$533,084 from Phase 2 Capital Project #14313 and \$197,778 from Phase 3 Capital Project #15294 will be returned to source.

HUMAN RESOURCES CONSIDERATIONS

Resources are available within the Department.

ALIGNMENT WITH STRATEGIC PRIORITIES:

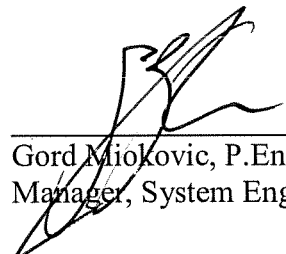
This project aligns with the Building Markham's Future Together Strategic Plan, improving the areas of Managing our Growth, Protecting our Environment and Excellence in Municipal Services. Disconnecting roof downspouts from the sanitary sewer system in accordance with City's By-law, has extensive and long-lasting environmental benefits which include reduced inflow/infiltration into the sanitary sewer system, reduced energy costs for sanitary sewer pumping and treatment, ground water recharge, water conservation, reduced probability of sanitary sewer backups into basements, and reduced sanitary sewer overflows to receiving waters.

BUSINESS UNITS CONSULTED AND AFFECTED:


The Business units which will be affected most by the Sanitary System Downspout Disconnection Program include Environmental Service – Waterworks, Asset Management, and By-law Enforcement.

RECOMMENDED

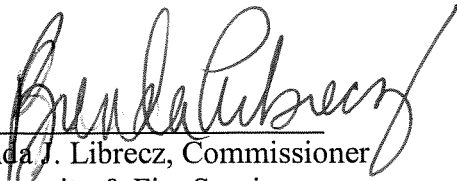
BY:



Gord Miokovic, P.Eng.
Manager, System Engineering



Peter Loukes, P.Eng.
Director, Environmental Services



Brenda J. Librecz, Commissioner
Community & Fire Services

ATTACHMENTS:

Attachment "A" – Phase 1 Area

Attachment "B" – Phase 2 Area

Attachment "C" – Phase 3 Area

Attachment "D" – Phase 4 Area

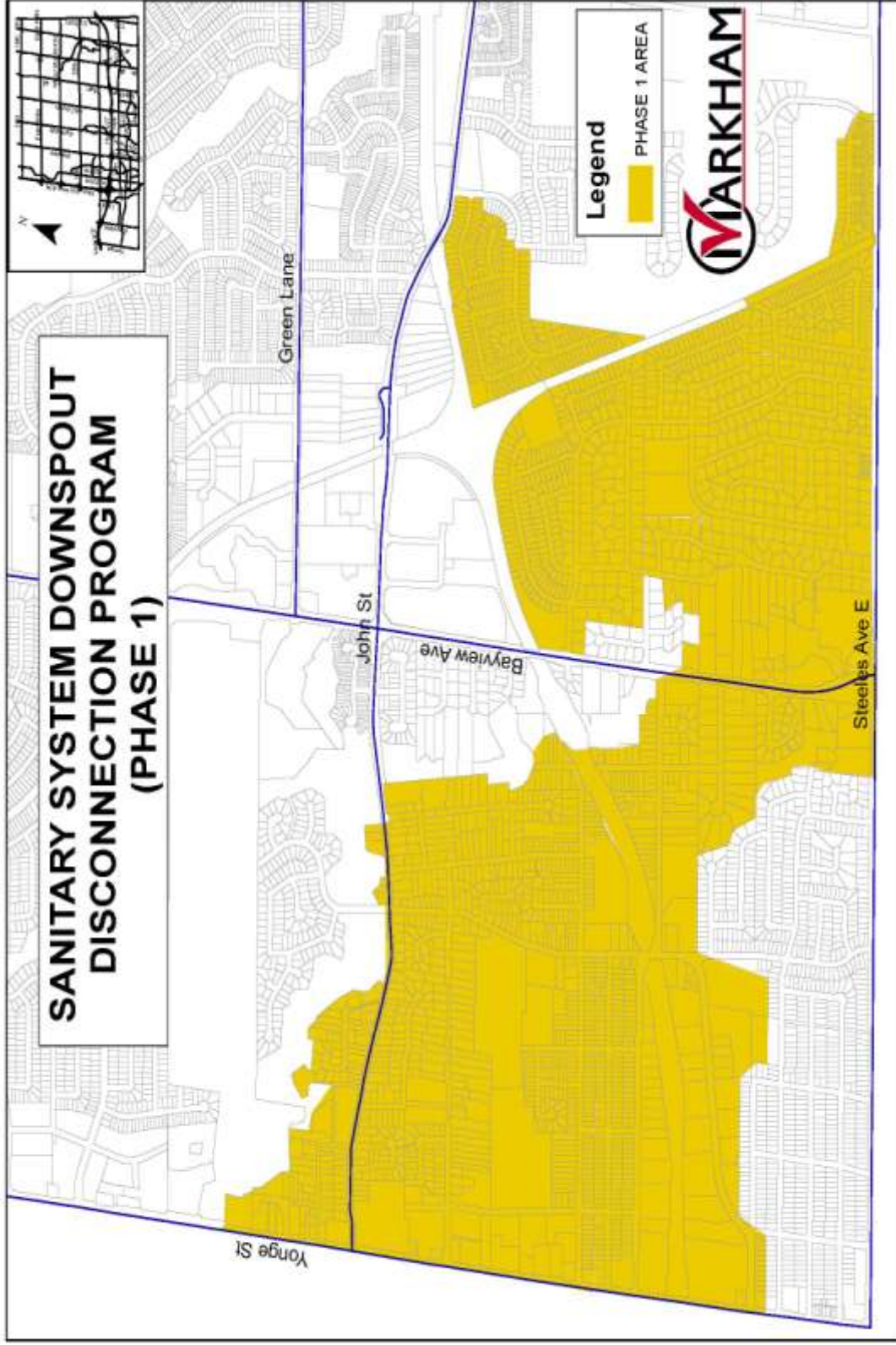
Attachment "E" – Citywide Multi-phase Sanitary System Downspout Disconnection Program

Attachment "F" – Downspout Disconnection Program Phase 4 Communication Strategy

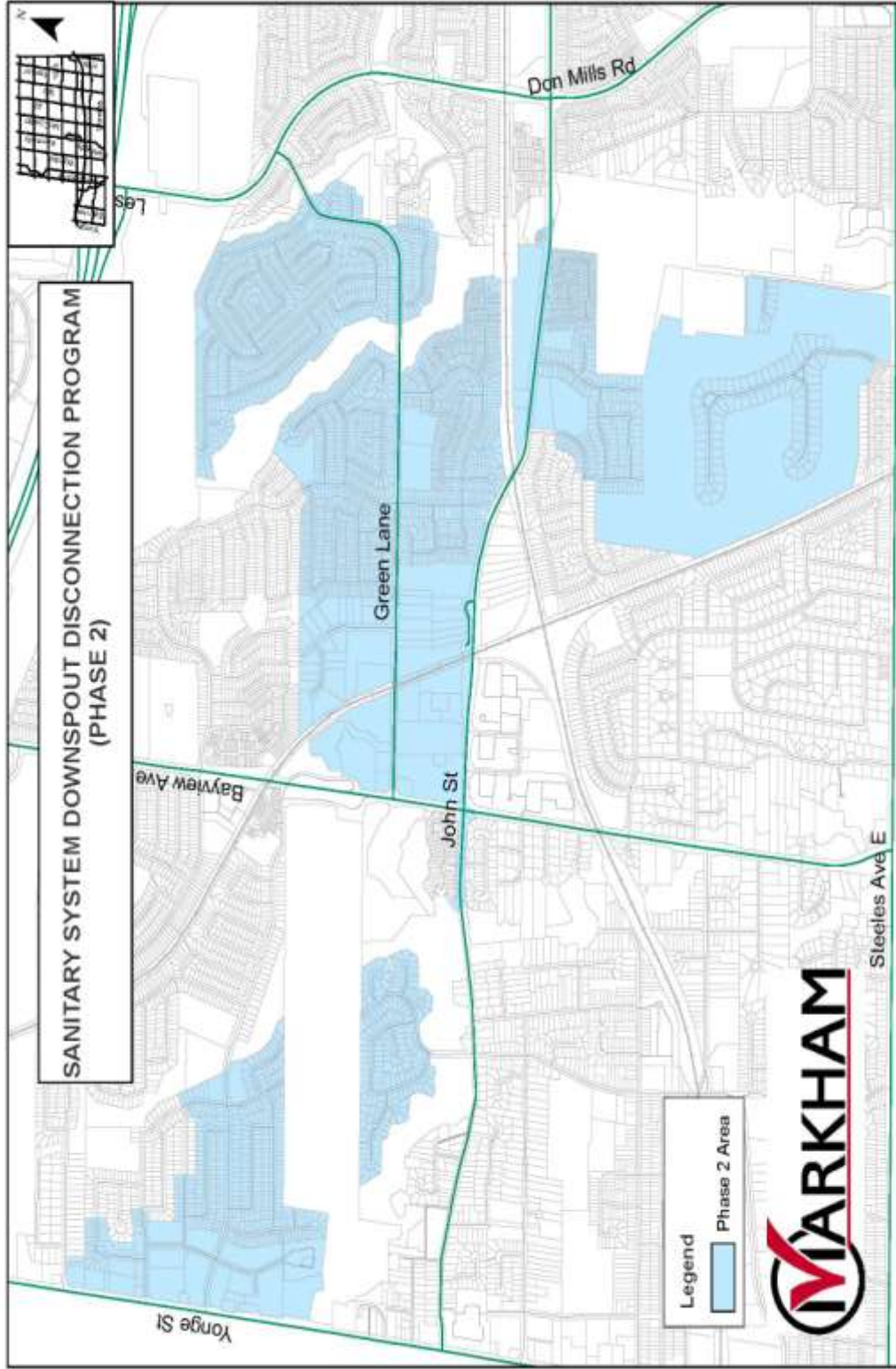
Attachment "G" – Cost Breakdown for the Future Identified Program Areas

Attachment "H" – Phase 1 to 3 Comparative Findings Summary

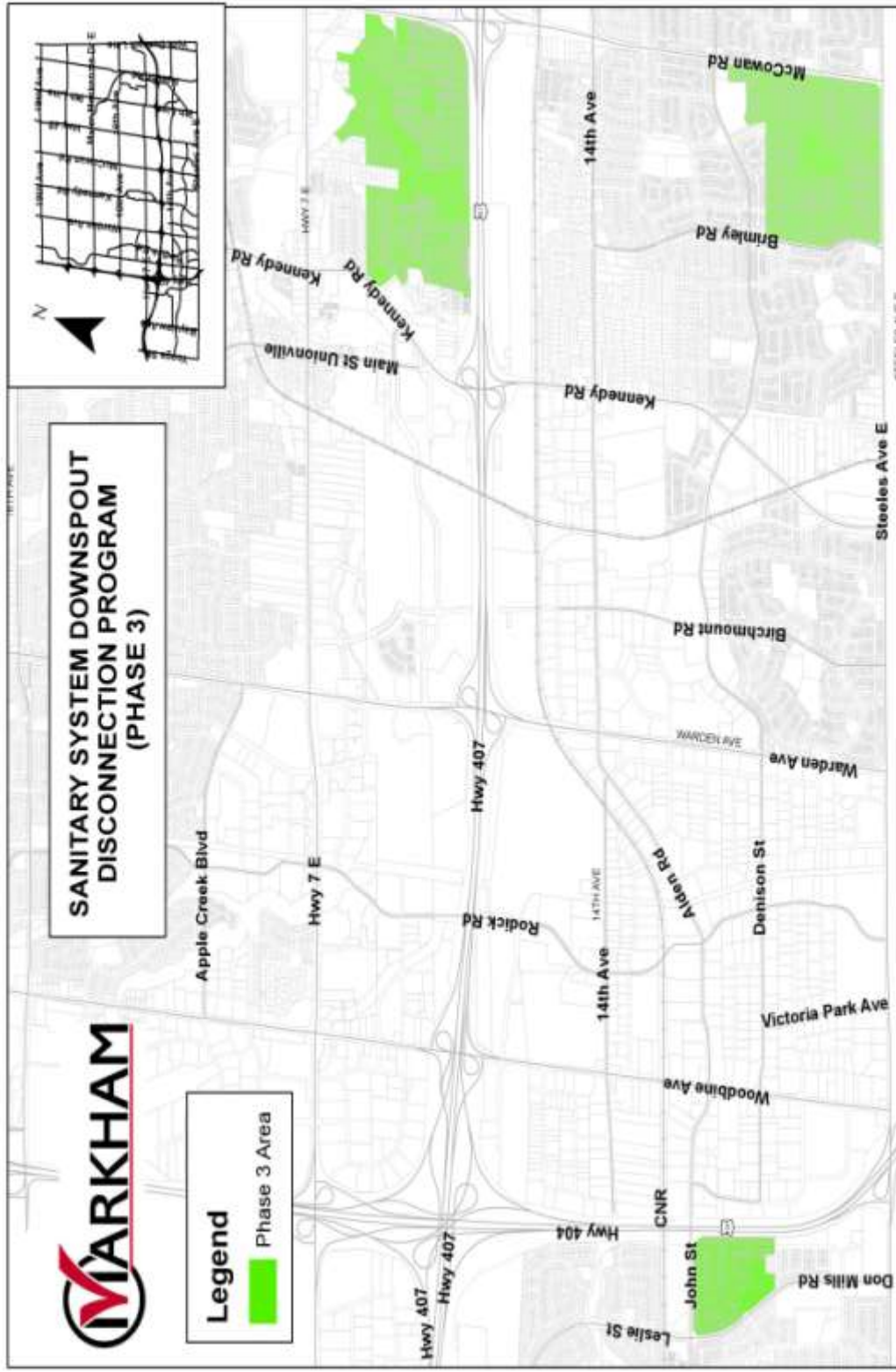
ATTACHMENT A



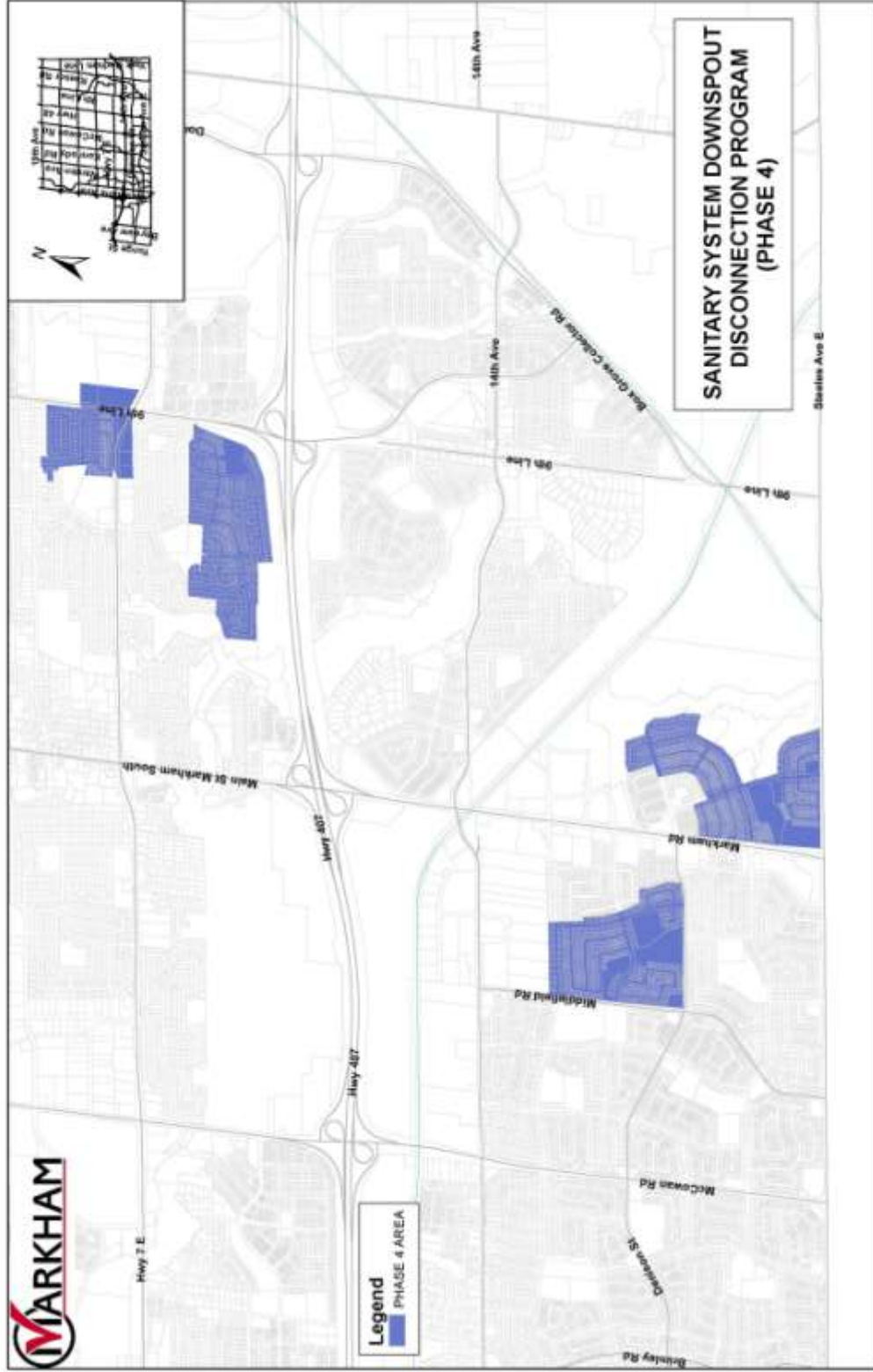
ATTACHMENT B



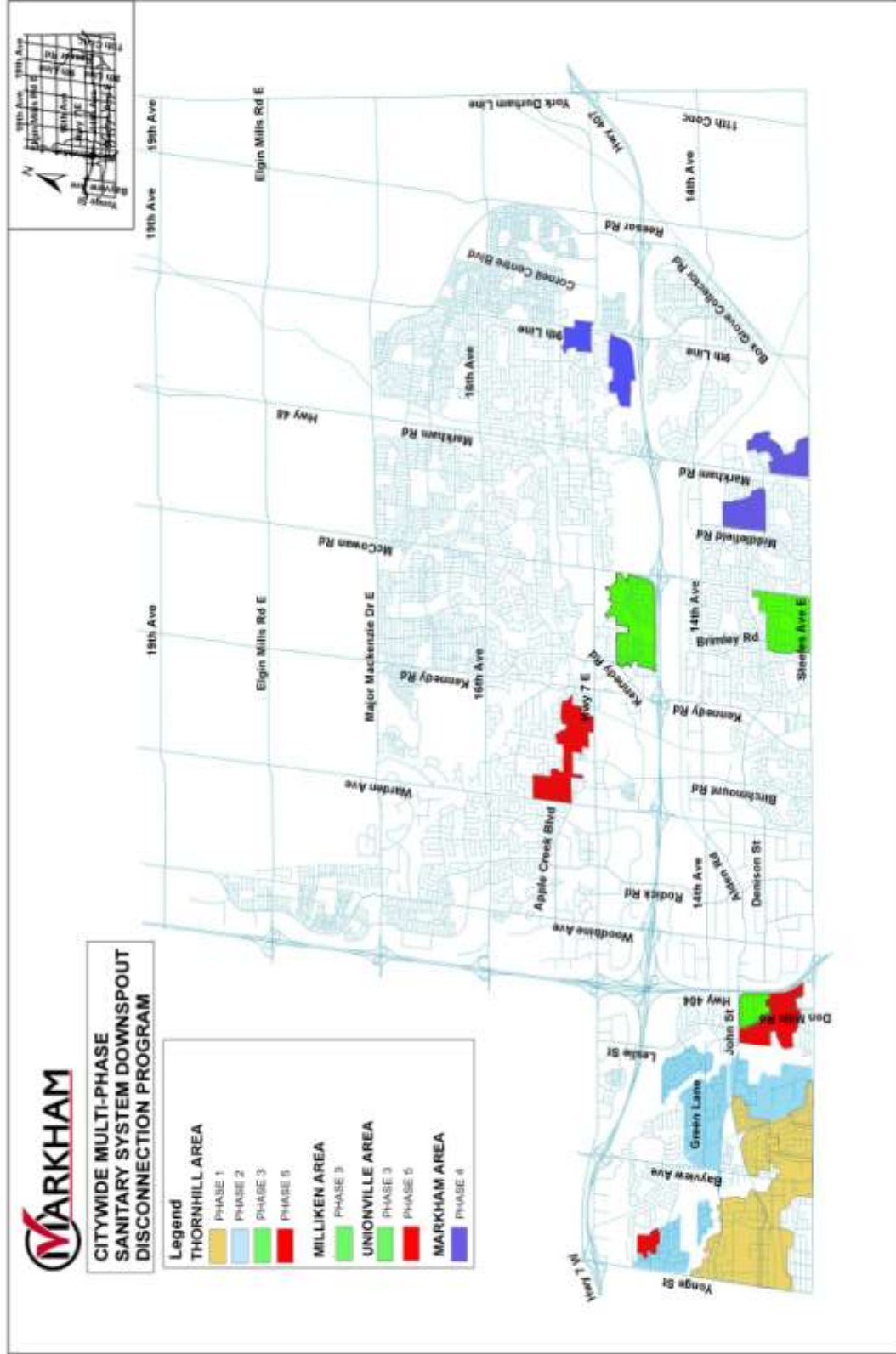
ATTACHMENT C



ATTACHMENT D



ATTACHMENT E



ATTACHMENT F

DOWNSPOUT DISCONNECTION PROGRAM – PHASE 4 COMMUNICATIONS STRATEGY:

The Communications Strategy will make available a number of resources for the public to assist in addressing questions they may have regarding the City's Multi-phase Downspout Disconnection Program, the potential impact to homeowners and details of the financial assistance program, particularly in the Phase 4 areas.

The Communications Strategy will, among other things, provide the Mayor, Council and Markham Residents with regular updates program progress and promote increased awareness of what all residents living in areas of Markham identified for participation in this program;

- **Provide residents with resources that explain:**
 - What the Multi-phase Downspout Disconnection Program is all about
 - What is going to happen, why and when
 - Financial assistance to homeowners
 - Who may be impacted
 - Area designated for Phase 4
 - Importance of protecting the City's sanitary sewer system
 - Benefits of disconnecting or redirecting downspouts to
 - Lawn
 - Garden
 - Rain barrel
 - How-to information to assist residents in the downspout disconnection process
- **Advise residents of what Markham is currently doing**
 - Pilot project undertaken and related results
 - Investigation/testing steps taken by the City
 - Lot survey
 - Smoke test
 - Program progress
- **Targeted contact with impacted homeowners** – letters/newsletters/ brochures for distribution to homeowners with downspouts connected to the City sanitary sewer system – what, how, why, when
- **Leverage portal to allow residents to:**
 - Obtain information/updates on the Program phases, current status, planned next steps and results.
 - Find resources to assist with downspout disconnection and rain barrel acquisition.
 - Apply for Downspout Disconnection Program Financial Assistance.
 - Get answers to frequently asked questions
- **Social media** – Twitter, Facebook, YouTube to share information updates and drive residents to markham.ca for details - *ongoing*
- **Article(s) in Markham Life magazine that provide information and updates** – *ongoing*
- **Advertising on Markham city pages / other print media outlets** – inform & drive residents to markham.ca and social media sites for more information
- **EIBs**
- **Councillor newsletter articles(s)** – as required

ATTACHMENT G

Financial Breakdown for Identified Program Areas

Activities	Phase 1 (#11382)	Phase 2 (#14313)	Phase 3 (#15294)	Phase 4 (#16238)	Phase 5
	Thornhill Actual Expenditure (as per end of 2015)	Thornhill Actual Expenditure (as per end of 2015)	Thornhill, Unionville & Milliken Actual Expenditure (as per end of 2015)	Markham 2016 Approved Budget	Thornhill & Unionville 2017 Total Forecast
Public Communication and Education	\$824	\$1,881	\$845	\$28,260	\$18,380
Site investigation	\$130,101	\$125,778	\$75,825	\$104,300	\$96,500
Financial Assistant Plan: Downspout Disconnection & Rain Barrel	\$0 (Covered under Phase 2 Project Account #14313)	\$3,164 (Phase 1 Assistant - \$2,509; Phase 2 Assistant - \$655)	\$0 (Commence in 2016)	\$60,450	\$46,800
Flow Monitoring Program	\$0 (Perform under Sanitary Flow Monitoring Project #14300)	\$5,767	\$0 (Commence in 2018)	\$75,000	\$75,000
Total Project Spend	\$130,925	\$136,591	\$76,670		
Total				\$268,010	\$236,680
Contingency (10%)				\$26,801	\$23,368
Overall Total				\$294,811	\$260,348
Total Budget (incl. HST)	\$270,996	\$799,928	\$361,700	\$300,000	\$264,930
Total expenditure to date	\$130,925	\$136,591	\$76,670	Phase 4 & 5 Total = \$564,930	
Remaining Budget	#11328 Account Closed	\$130,253	\$87,252		
Amount to be returned / returned to source	\$140,071	\$533,084	\$197,778		

Note: Phase 1 to 4 above shows the approved budget. The remaining budgets under Phase 2 & 3 are for the Financial Assistant Plan & Flow Monitoring which will be carried out in 2016-2018. The Phase 5 forecast is determined based on industrial standards and estimated percentages of properties that will require disconnection. Phase 5 is expected to be carried

out in 2017, funding will be subject to Council approval of the 2017 budgets. The amount return to source is a result of reduced water testing properties under Phase 1, elimination of water testing in the testing approach starting in Phase 2, and the actual number of properties required disconnection base on the test result is less than the original estimates.

ATTACHMENT H

Phase 1 to 3 Comparative Findings Summary

Description	Phase 1		Phase 2		Phase 3	
	No. of Locations	% of Properties	No. of Locations	% of Properties	No. of Locations	% of Properties
Total Properties Tested	2,256	100%	2,827	100%	3,690	100%
Properties Passing I-I Test	2,131	94%	2,544	90%	3,668	99.4%
Identified Problems (Private-side)						
i. Downspouts direct connection to sanitary system	21	1%	70	3%	5	0.14%
ii. Other I-I sources (<i>driveway drains, stairwell drains, weeping tiles, sump pump, and etc connected to the sanitary system.</i>)	39	2%	7 *1,3	0.3%	11	0.3%
iii. Lateral interactions between storm and sanitary systems	65	3%	215 *2,3	8%	6	0.16%
Identified Problems (Public-side)						
i. Other I-I sources (<i>uncapped lateral cleanouts, damaged sanitary manholes, street catch basins, and etc.</i>)	9	-	30	-	10	-

*Note:

1. Within the 7 properties with "Other I-I sources", 2 properties also have downspouts connected to the sanitary system.
2. Within the 215 properties with "Lateral interactions", 7 properties also have downspouts connected to the sanitary system.
3. The "% of Properties" under "Properties Passing I-I Test" and "Identified Problems (Private-side)" does not add up to 100% because some properties have has more than one problem as indicated in Note 1 & 2.