York Region

Clause 10 in Report No. 4 of Committee of the Whole was adopted, without amendment, by the Council of The Regional Municipality of York at its meeting held on March 24, 2016.

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## Inflow and Infiltration Reduction Strategy Update

Committee of the Whole recommends adoption of the following recommendations contained in the report dated February 10, 2016 from the Commissioner of Environmental Services:

1. Council endorse the Inflow and Infiltration Reduction Strategy as part of the five year update to the February 17, 2011 Council endorsed strategy; and for the Clerk to forward a copy of this report to the Ministry of the Environment and Climate Change.

2. The Clerk circulate this report to the Clerks of the local municipalities.

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Report dated February 10, 2016 from the Commissioner of Environmental Services now follows:

## 1. Recommendations

It is recommended that:

1. Council endorse the Inflow and Infiltration Reduction Strategy as part of the five year update to the February 17, 2011 Council endorsed strategy; and for the Clerk to forward a copy of this report to the Ministry of the Environment and Climate Change.

2. The Clerk circulate this report to the Clerks of the local municipalities.

## 2. Purpose

The purpose of this report is to request Council endorsement of the five year Inflow and Infiltration Reduction Strategy Update. The Strategy Update is required to fulfill conditions of the Minister of the Environment and Climate

Change (MOECC) for approval of the Southeast Collector Trunk Sewer Individual Environmental Assessment in 2010.

## 3. Background

### Inflow and infiltration reduction is part of Region's servicing strategy and required to fulfill conditions of approval for Southeast Collector

Reducing inflow and infiltration has been an integral part of the Region's servicing strategy since the first Water and Wastewater Master Plan was developed in 1997. Inflow and infiltration reduction recovers capacity of the sanitary sewer system and enables optimal use of capital infrastructure. Since then, the Region has been progressively increasing investment in initiatives targeting inflow and infiltration reduction.

Inflow and infiltration reduction became a regulatory requirement for York Region in 2010, when the MOECC approved the Southeast Collector Individual Environmental Assessment, with conditions that York Region submit and implement an Inflow and Infiltration Reduction Strategy. The Strategy is to be updated every five years. On February 17, 2011, Council endorsed the first Inflow and Infiltration Reduction Strategy for submission to MOECC.

### Region and local municipalities work collaboratively on Steering Committee to implement the Strategy

Throughout development of the Strategy, York Region and its local municipalities have worked collaboratively to identify various activities and roles of their respective organizations to support program implementation. A Water and Wastewater Steering Committee was formed in April 2010 with representatives from the Region and all nine local municipalities to guide development and implementation of the Strategy. Today, the Water and Wastewater Steering Committee continues to guide implementation of the Inflow and Infiltration Reduction Strategy including the Strategy Update.

The continued commitment of local municipalities in working with the Region to reduce inflow and infiltration is essential to achieve the reduction target committed under the Inflow and Infiltration Reduction Strategy. The total length of the wastewater collection system in the York Durham Sewage System (YDSS) service area is approximately 7,000 kilometers. Of this total, approximately 300 kilometers is owned by the Region, 3,090 kilometers is owned by local

municipalities, and 3,800 kilometers is owned privately. Work is needed to reduce inflow and infiltration on both the Regional and local systems in order to achieve the required goals.

### Strategy Update reviews best-in-class practices and past achievements to set future direction

In compliance with the Minister's conditions, the Strategy requires an update every five years. The first update is due on March 31, 2016. Based on input from the MOECC, the following steps have been taken to update the Strategy:

- Review and update best-in-class inflow and infiltration reduction measures
- Update performance targets and timelines
- Consult stakeholders including local municipal partners, Ministry of the Environment and Climate Change and other municipal governments practicing inflow and infiltration reduction

In 2015, the Region embarked on the process to update the Inflow and Infiltration Reduction Strategy. Under the guidance of the Water and Wastewater Steering Committee, the updated strategy assessed successes and challenges over the past five years, industry best practices, new focused efforts and measures to be developed and implemented in the next five years. New targets, activities, timelines and milestones are recommended for future objectives and activities jointly developed by the Region and its local municipal partners to reduce inflow and infiltration.

The final draft Inflow and Infiltration Reduction Strategy Update Executive Summary, which includes all updated strategy enhancements is attached to this report (Attachment 1).

## 4. Analysis and Options

### Region achieved goals set in 2011 Inflow and Infiltration Reduction Strategy

The 2016 Inflow and Infiltration Reduction Strategy Update process commenced with a review of past achievements and best-in-class practices of leading jurisdictions in inflow and infiltration reduction.

Over the last five years, York Region in partnership with local municipalities have achieved goals set in 2011. Some of these major achievements are:

- The Region and local municipalities reduced inflow and infiltration by 9.6 million litres per day (MLD) in the YDSS, representing 24 per cent of the 2031 target reduction of 40 MLD, through completion of remedial works including downspout disconnections, sewer relining as well as spot and maintenance hole repairs.

- The Region completed its Sanitary Sewer System Inspection, Testing and Acceptance Guideline to standardize procedures across York Region.

- The Region installed a region wide flow monitoring system with over 240 flow meters and 41 rain gauges (in addition to access to rainfall data from 29 rain gauges owned by local Conservation Authorities and municipal partners) to monitor sewage flow by catchments with an average size of 150 ha. The main purpose of the flow monitoring is to identify priority areas with high inflow and infiltration.

- In partnership with local municipalities, the Region has undertaken pilot projects to gain experience with inflow and infiltration reduction works in the Towns of Aurora, East Gwillimbury, Georgina, Newmarket, Richmond Hill and Township of Whitchurch-Stouffville. Works completed included 11 km of full sewer length relining and 91 point repairs of mainline, 467 maintenance hole repairs and 46 lateral connection repairs.

- The Region developed two incentive programs to partner with local municipalities and development industry to reduce inflow and infiltration. These incentive programs are Inflow and Infiltration Reduction Pilot Project Program and Servicing Incentive Program. Both programs provide participating developers with additional servicing capacity in exchange for completing proven inflow and infiltration related remedial works and/or building new sewers with higher construction and inspection standards.

- The Region developed an all-pipes hydraulic model to provide a state-of-the-art tool to assist in the assessment of inflow and infiltration and in the decision making process for implementing remedial works.

## Best-in-class research identifies new focus areas for the Strategy Update

The best-in-class research and lessons learned from implementing the Inflow and Infiltration Reduction Strategy over the past five years led to the identification of the following key focus areas to enhance the existing strategy:

- Increase effort in reducing inflow and infiltration on private property. The current industry view is that private property sources of inflow and infiltration contribute 40 to 60 per cent of total system inflow and infiltration. In order for the 2031 reduction target to be achieved, the Strategy Update must address all sources including those on private property.

- Increase effort in minimizing inflow and infiltration in new developments. Inflow and infiltration control in new developments is most cost effective, as deficiencies can be fixed prior to assumption of sewers by municipalities. Enforcing and raising the construction standards including updating the Sanitary Sewer System Inspection, Testing and Acceptance Guideline in collaboration with municipal partners and undertaking flow monitoring in new developments are instrumental to continued improvement.

- Continue collaboration among all members of the Water and Wastewater Steering Committee. The Region will be taking the lead in identifying sources of inflow and infiltration through flow monitoring, data analysis and Sanitary Sewer Evaluation Surveys and local municipalities undertaking remedial works in local systems.

A summary of key enhancements recommended in the 2016 Strategy Update is provided in Table 1.

**Table 1**
**Key Enhancements Recommended in the 2016 Strategy Update**

| Program Enhancements | Description |
|---|---|
| Local Municipal Annual Reporting Template | Standardize reporting template for annual local municipal reporting on inflow and infiltration reduction activities and expenditures to the Region to feed into the Annual MOECC report. |
| Flow Monitoring | Expand flow monitoring to basins less than 100 ha in size (mini-basins) in high inflow and infiltration priority areas. |
| Data Management & Analysis | As flow monitoring system has been implemented, Regional data analysis will be a key component in the next five years. Improvement of data management and analysis process will be part of the planned enhancement. |
| Sanitary Sewer Evaluation Surveys | Region will take lead role to locate sources of inflow and infiltration through sanitary sewer evaluation surveys. |
| Private Property Programs | Region in partnership with local municipalities will explore and develop a private property program to pursue inflow and infiltration source detection and to implement remediation works in private properties including downspout disconnections. |
| Innovation Pilots | Piloting innovative technologies that can reduce inflow and infiltration in Regional and local systems more effectively. |
| Standardize Commissioning and Inspection Testing | Working with local municipalities on the enhancement and implementation of the Region's Inspection, Testing and Acceptance Guidelines and standardizing commissioning standards to reduce inflow and infiltration in new developments. |
| Provincial Regulation Enhancements | Continue to advocate the Province on regulation changes for new development practices and procedures to help reduce inflow and infiltration in new developments. |

## Achieving 2031 targeted reduction in peak flow at the Southeast Collector and Primary Trunk Sewer optimizes conveyance capacity to service future growth

In the 2011 Inflow and Infiltration Reduction Strategy, a 2031 inflow and infiltration reduction target of 40 MLD in the Southeast Collector was established. Measurement of the target is based on flow reduction over a 24-hour period under a 25-year storm event. A 40 MLD reduction of peak flow at the Southeast Collector and Primary Trunk Sewer will optimize the capacity in these two trunk sewers. This 40 MLD flow is equivalent to the domestic flow generated by approximately 60,000 residents.

Region has achieved a total reduction of inflow and infiltration of 9.6 MLD, which represents 24 per cent of the 2031 target. This achievement was realized two years ahead of the 2017 timeline for 25 per cent reduction.

Going forward, inflow and infiltration reduction will continue with the current approach, but will also put more emphasis on inflow and infiltration reduction in private properties and new developments. It is projected that the Region is on track to achieve its overall reduction target of 40 MLD by 2031. Through the implementation of the Strategy Update, an interim target of achieving 50 per cent of the 2031 goal (or 20 MLD) by the end of 2020 has been set. The required activities to achieve the interim and ultimate targets are shown in Table 2 below.

**Table 2**
**Reduction Targets and Required Activities Timelines**

| | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021-2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activities** | | | | | | | | | | | |
| Municipal Remediation Project Implementation | | | | | | | | | | | |
| Servicing Incentive Programs | | | | | | | | | | | |
| Continued Improvement in Construction Practices for New Developments | | | | | | | | | | | |
| Private Property Program Development & Implementation | | | | | | | | | | | |
| **Reduction Targets** | | | | | | | | | | | |
| Achieve Up to 25% of Target Reduction | | | | | | | | | | | |
| Achieve Up to 50% of Target Reduction | | | | | | | | | | | |
| Achieve 50-100% of Target Reduction | | | | | | | | | | | |

### Link to key Council-approved plans

The Region's 2015-2019 Strategic Plan includes strategic objectives to optimize critical infrastructure system capacity and practice stewardship of the Region's assets. Implementing inflow and infiltration reduction remedial works in the sanitary sewer system supports these objectives through recovering lost capacity and prolonging asset life.

The Region's Water and Wastewater Master Plan Update is currently underway, and has identified inflow and infiltration reduction as part of the recommended servicing alternative to service the Region's growth to 2041. Achieving the objectives set in the 2016 Strategy Update is essential to support the Region's growth plan.

## 5. Financial Implications

The 2016 capital plan includes a total expenditure of $21 million over the next ten years for the Inflow and Infiltration Reduction Program. A capital spending authority of $6.8 million was approved in the 2016 budget process.

Over the next decade inflow and infiltration reduction programming expenditures are planned for the following areas:

- Data Analysis and Modelling Program
- High Priority Area Investigations (including sanitary sewer evaluation surveys)
- Flow Monitoring Programs
- Program Administration
- Partnership/Innovation Projects

Forecast expenditures in the 2016 capital plan are in line with the program initiatives recommended in the Strategy Update. Funding requirements will be reviewed annually as part of the budget process.

Through flow monitoring and sanitary sewer evaluation survey activities, more information on the nature and severity of sewer deficiencies and the complexity of the associated remedial works will become available over time. This will assist in the assessment of funding requirements.

## 6. Local Municipal Impact

Through development and implementation of the Inflow and Infiltration Reduction Strategy, the Region and the local municipalities have demonstrated leadership in inflow and infiltration reduction in the water and wastewater industry.

Local municipal staff were involved in developing the Strategy Update through the Water and Wastewater Steering Committee. Through the Steering Committee, each local municipality will report annually on the inflow and infiltration achievements and expenditures in the preceding year to demonstrate continued partnership efforts towards achieving the goals set in the Strategy Update.

Going forward, the Region will continue to take the lead role in identifying high inflow and infiltration priority areas and locating sources of inflow and infiltration. The local municipalities will implement remedial projects to reduce inflow and infiltration in local systems as per the sources of inflow and infiltration identified by the Region.

## 7. Conclusion

York Region and local municipalities are continuing to take joint responsibility to implement the Strategy Update.

Lessons learned from the first five years of the Inflow and Infiltration Reduction Program provided valuable input to the Strategy Update. Best-in-class research provided new strategic direction on future focus.

Building on the significant progress made in the first five years of the program, where a flow monitoring system was implemented and standards developed, the next five years will move towards implementation of inflow and infiltration reduction projects. It is expected that 50 per cent of the overall 2031 inflow and infiltration reduction target can be achieved by 2020 as the program moves into full implementation.

For more information on this report, please contact Stephen Fung, Director Infrastructure Asset Management at ext. 73025.

The Senior Management Group has reviewed this report.

February 10, 2016

Attachment

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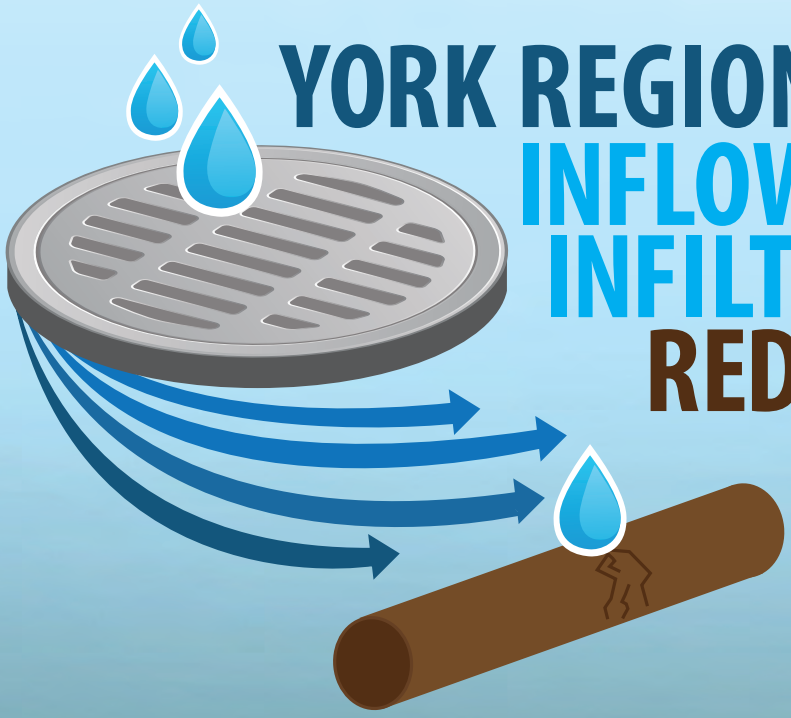
Accessible formats or communication supports are available upon request

York Region



# YORK REGION INFLOW & INFILTRATION REDUCTION STRATEGY

MARCH UPDATED 2016

# EXECUTIVE SUMMARY

AURORA · East Gwillimbury · GEORGINA · KING · MARKHAM · Newmarket · Richmond Hill · VAUGHAN · Town of Whitchurch-Stouffville

The Region and the local municipalities have an opportunity to demonstrate leadership in inflow and infiltration reduction within the water and wastewater industry.

## Inflow

Water from rainfall or snow melt that enters the sewage system through direct sources such as yard, roof and downspouts, cross connections with storm drains, foundation drains, and maintenance hole covers.

## Infiltration

Groundwater that enters through holes and cracks in maintenance holes, laterals, and sewer pipes.

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# York Region's Inflow and Infiltration Reduction Strategy Update

## EXECUTIVE SUMMARY

## 1.0 INTRODUCTION

The Regional Municipality of York (the Region) is one of six Regional municipalities in Ontario and includes nine local municipalities, the Towns of Aurora, East Gwillimbury, Georgina, Newmarket, Richmond Hill and Whitchurch-Stouffville, the Cities of Markham and Vaughan and the Township of King (see figure 1).

Wastewater servicing within the Region is multi-jurisdictional based on a two–tier municipal governance structure. The Region is responsible for major pumping stations, trunk sewers, and treatment plants while the local municipalities are responsible for local conveyance and local pumping stations. Private property owners are also an important part of the wastewater system and are responsible for service laterals and private sewers on their property.

In 2010, the Region received Approval for an Individual Environmental Assessment for construction of the Southeast Collector Trunk Sewer from the Ministry of the Environment (now the Ministry of the Environment and Climate Change). The approval was subject to a series of conditions that required the Region to develop, peer review, implement and track comprehensive Water Conservation and Inflow and Infiltration Reduction Strategies. In the past five years, the Region has met the requirements of Conditions 8.1 to 8.11 of the Approval and has been commended by the Ministry for exceeding expectations.

Condition 8.10, required the Region to update the Reduction Strategy once every five years. In 2015, the Region embarked on the first of these five year updates. The Strategy Update was developed in consultation with the Region's local municipal partners and considered successes achieved over the past five years, opportunities for improvement, and advances made in best-in-class programs to ensure long term target reductions are achieved.

The Region is adopting "One Water"; a holistic approach to integrate planning for water supply, wastewater and stormwater systems to best manage increasing demands on water and wastewater infrastructure while ensuring that all the Region's initiatives aim to simultaneously create environmental, social, and economic benefits and value. The Region's Inflow and Infiltration Reduction Program connects with and forms an important component of the Region's One Water Approach.

The One Water Approach addresses a wide variety of issues including climate change, technological change, financial sustainability and customer expectations through sound management practices and practical institutional arrangements.


**Figure 1 – The Regional Municipality of York and the Nine Local Municipalities**

The One Water Approach has many potential benefits. Figure 2 summarizes expected benefits of the One Water Approach to the Region and its communities.

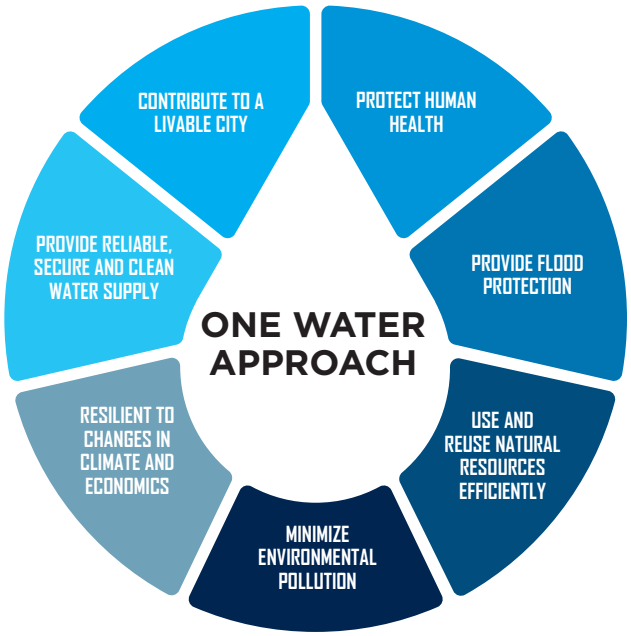



Figure 2 – One Water Benefits

## 2.0 BACKGROUND AND RATIONALE

Inflow and infiltration are surface and ground waters that enter the sanitary sewer system as shown in Figure 3.

**Inflow** occurs when rainwater enters the system through direct connections such as yard and roof drains, cross-connected storm sewers, foundation drains and maintenance hole covers. In the past, construction practices have resulted in sanitary sewer systems with some of these types of connections.

**Infiltration** occurs when rainwater and groundwater enters the sanitary sewer system through fractures and cracks in sanitary sewers, sanitary maintenance holes, and lateral sewers. As systems age, infrastructure deterioration increases the likelihood that infiltration will occur.

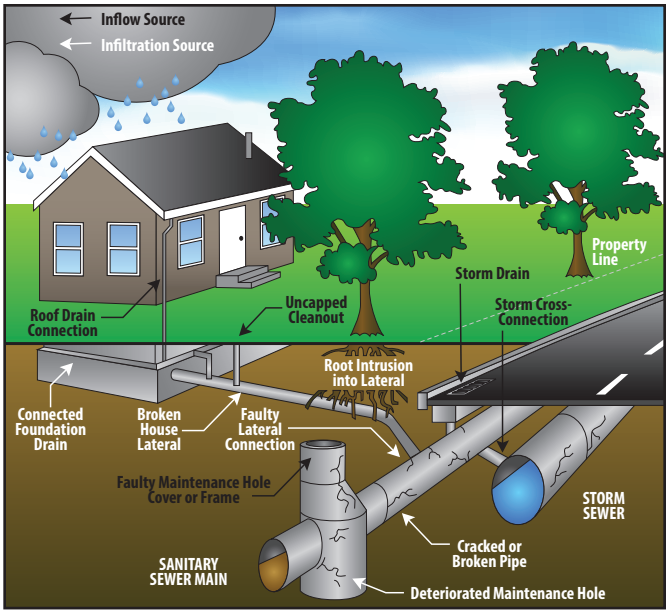



Figure 3 – Potential Sources of Inflow and Infiltration

Reducing inflow and infiltration has been an integral part of the Region's servicing considerations since 1997 when the Region prepared the first of its Water and Wastewater Master Plans. Subsequent Master Plan updates in 2001 and 2009 recognized the importance of inflow and infiltration reduction and carried forward projects to reduce inflow and infiltration. The Water and Wastewater Master Plan Update currently in progress identifies inflow and infiltration reduction as part of the recommended servicing alternative to service the Region's future growth.

In 2011, a 20-year funding requirement of $100M was estimated for the overall development and implementation of the Inflow and Infiltration Reduction Strategy for both Region and local municipalities. This corresponds to an estimated funding requirement of $50M from the Region over the next 20 years, or half of the overall funding requirement. The Region's 2016 ten year plan forecasted a total expenditure of $21M, which is in line with the 2011 funding estimate.

## 3.0 2011 INFLOW AND INFILTRATION REDUCTION STRATEGY

The 2011 Inflow and Infiltration Reduction Strategy was developed with Regional and local municipal staff working collaboratively. Development of the strategy considered existing programs, best-in-class programs in other jurisdictions, governance options and financing needs.

The Strategy was comprised of eight program areas including goals and targets, flow monitoring and analysis, investigation and mitigation, new construction and capital projects, financial management, communication, education and advocacy, reporting, and continuous improvement. Recognizing the need to work together, the Region and its local municipalities formed the Water and Wastewater Steering Committee in April 2010 to develop the Reduction Strategy and to later guide program implementation. Responsible agencies were assigned specific activities under each of the eight defined program areas.

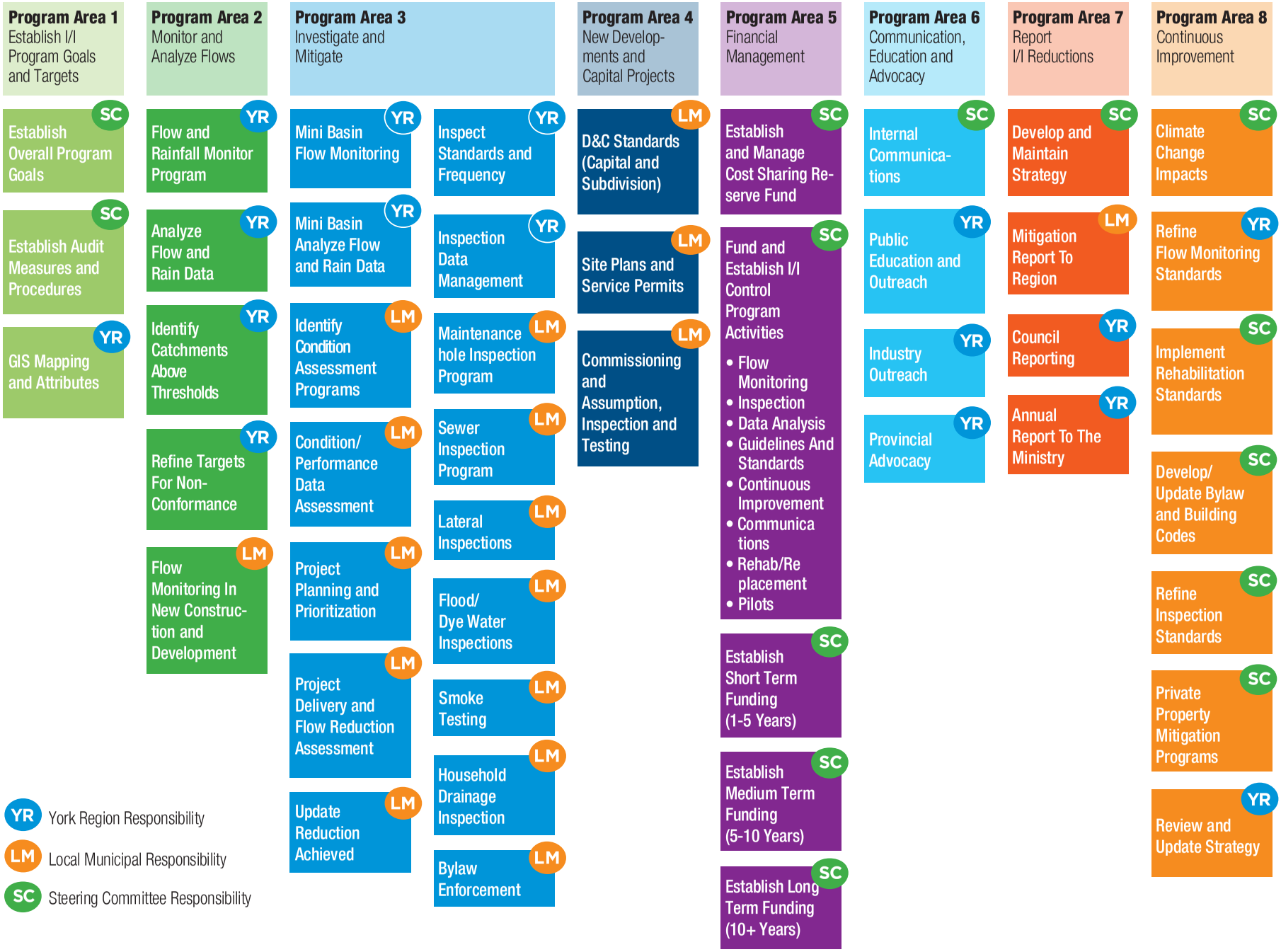
Figure 4 presents the program activities and agencies identified as responsible for delivering specific activities in the 2011 Inflow and Infiltration Reduction Strategy.

In the 2011 Inflow and Infiltration Reduction Strategy, a peak flow reduction target of 71 MLD at Southeast Collector by 2031 was established, of which 40 MLD reduction comes from inflow and infiltration reduction and the balance from water conservation.

Figure 5 presents flow and rainfall monitoring sites installed as part of the Inflow and Infiltration Audit and Flow Monitoring Program. Collecting flow and rainfall data is integral to locating sources of inflow and infiltration and prioritizing areas for remediation.

Table 1 presents a summary of achievements in each program area from 2011 to 2015.

Figure 4 – York Region's 2011 Reduction Strategy Program Areas and Activities Matrix



## Table 1 – Achievements Accomplished - 2011 to 2015

### ✓ PROGRAM AREA 1 – ESTABLISH INFLOW AND INFILTRATION PROGRAM GOALS AND TARGETS

- Water and Wastewater Steering Committee established to foster collaboration between the Region and local municipalities. Representatives from all nine local municipalities and the Region met quarterly.
- A flow reduction target of 71 MLD at Southeast Collector over a 24-hour period during a theoretical 25-year storm event in 2031 was established. This aligns with the 10 per cent instantaneous peak flow reduction target contemplated in the Southeast Collector Individual Environmental Assessment. To achieve the 71 MLD flow reduction, a 40 MLD reduction target in inflow and infiltration was established, with the remaining 31 MLD reduction to be achieved through water conservation.

### ✓ PROGRAM AREA 2 – MONITOR AND ANALYZE FLOWS

- A long term Inflow and Infiltration Audit and Flow Monitoring Program was established and the Region's wastewater service area was delineated into a series of "audit basins" to track long term flows. 248 flow monitors were installed to monitor flows from 218 audit basins. This program also includes data collection from 70 rain gauges.
- Ongoing data analysis identified priority areas for investigation.
- Established Servicing Incentive Program (SIP) requiring flow monitoring in new developments.
- An all pipes hydraulic model was developed to support evidence-based decision making.

### ✓ PROGRAM AREA 3 – INVESTIGATE AND MITIGATE

- A short term flow monitoring program was established to pinpoint priority areas and monitor pre- and post-rehabilitation flows.
- Sanitary Sewer Evaluation Survey (SSES) activities initiated and are ongoing in three priority areas (Kleinburg, Nobleton and Pomona neighborhood in Richmond Hill).
- Sanitary Sewer Evaluation Survey activities completed by developer-funded projects in selected areas in Aurora, Markham, Newmarket, and Vaughan.
- The Region, in partnership with local municipalities, has undertaken pilot projects to gain experience in inflow and infiltration reduction works in Aurora, East Gwillimbury, Georgina, Newmarket, Richmond Hill and Whitchurch-Stouffville. Works completed included 11 km of full sewer length relining, 91 mainline point repairs, 467 maintenance hole repairs and 46 lateral connection repairs.
- A sewer laterals rehabilitation pilot project is ongoing in Aurora, Georgina, East Gwillimbury, Vaughan, and Newmarket.
- Markham has implemented programs to address sources of inflow and infiltration on private property including a downspout disconnection program.

### ✓ PROGRAM AREA 4 – NEW DEVELOPMENTS AND CAPITAL PROJECTS

- Sanitary Sewer System Inspection Testing and Acceptance Guideline developed and adopted.
- Servicing Incentive Program Implementation Guide was developed to promote better construction practices in new development areas.
- Region has partnered with Peel Region, the City of London and the Institute for Catastrophic Loss Reduction to investigate options to address unacceptable inflow and infiltration from new subdivisions.

### ✓ PROGRAM AREA 5 – FINANCIAL MANAGEMENT

- Regional and local municipalities established fund for repair works.
- A 20 year funding target of $100M was set in 2011.

### ✓ PROGRAM AREA 6 – COMMUNICATION, EDUCATION AND ADVOCACY

- Water and Wastewater Steering Committee established to provide a vehicle for information sharing and collaboration.
- Inflow and infiltration website created, maintained and is available to the public.
- Four annual reports have been submitted to the Ministry and made available to the public.

### ✓ PROGRAM AREA 7 – REPORT INFLOW AND INFILTRATION REDUCTIONS

- Inflow and Infiltration Reduction Team worked with local municipal staff to coordinate reduction reporting activities.
- Four annual reports summarizing work completed in the preceding year and with input from local municipalities have been produced and submitted to the Ministry of the Environment and Climate Change.

### ✓ PROGRAM AREA 8 - CONTINUOUS IMPROVEMENT

- Flow monitoring equipment standards reviewed and updated in 2013.
- Lessons learned from pilot projects analyzed and documented to inform future projects.

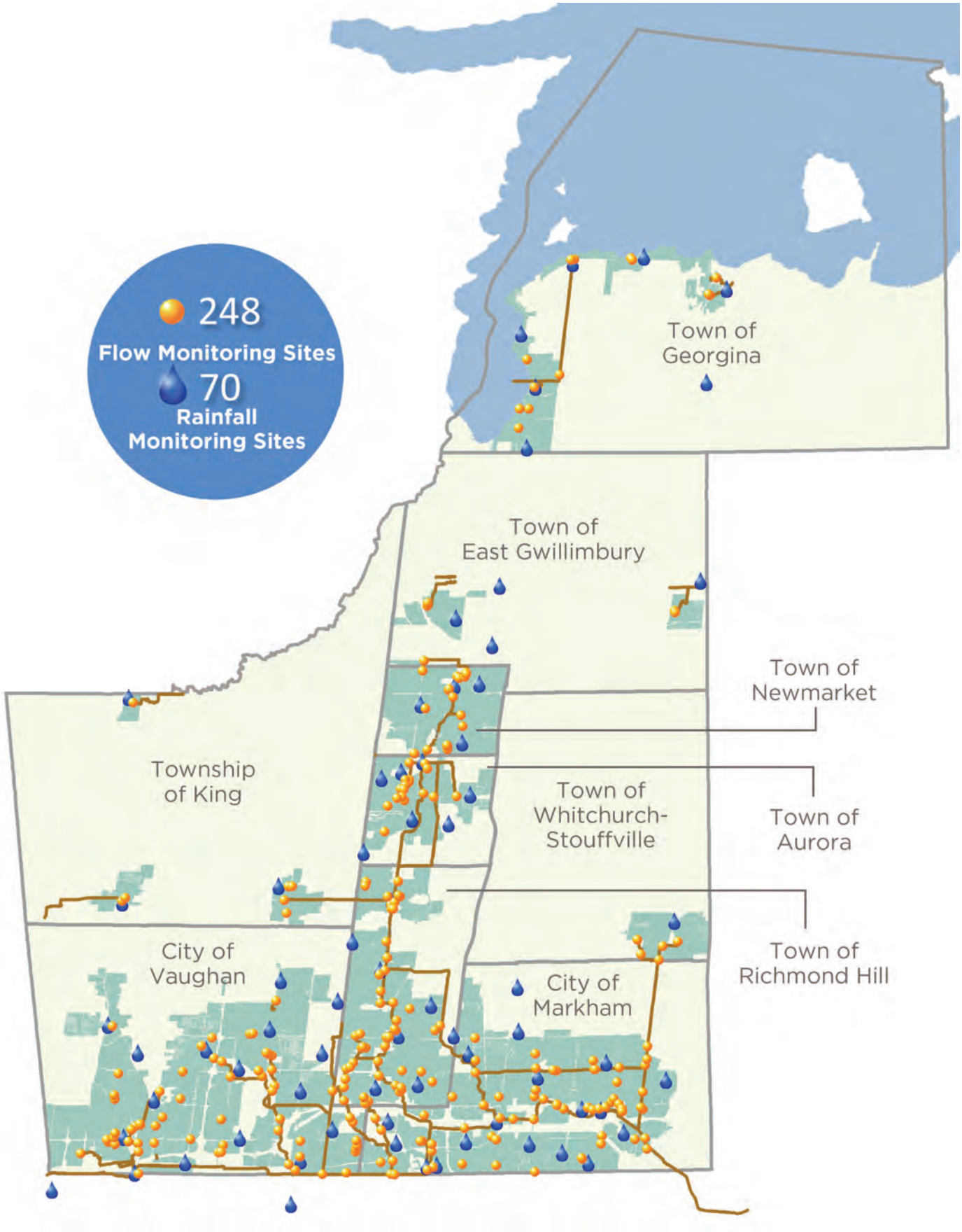



**Figure 5 – Flow Monitoring Stations and Rain Gauge Sites**

Through the efforts of the Region, local municipalities and development community, a total inflow and infiltration reduction of 9.6 MLD had been achieved by the end of 2015. These efforts include: disconnection of downspouts directly connected to sanitary sewer, relining and repair of sanitary sewer maintenance holes, mainlines, and laterals, on-going flow monitoring, modelling and analysis, SSES activities, ongoing maintenance and inspection and the launch of the Region's Servicing Incentive Program.

Table 2 presents the annual inflow and infiltration reduction for the period from 2011 to 2015. By the end of 2015, a total reduction in inflow and infiltration of 9.6 MLD or 24 per cent of the overall inflow and infiltration reduction target of 40 MLD was achieved. This achievement was realized two years ahead of the 2017 timeline of 25 per cent reduction.

**Table 2 – Yearly Inflow and Infiltration Reductions**

| Year | Inflow and Infiltration Reduction (MLD) | % Inflow and Infiltration Reduction Achieved to 2015 |
|---|---|---|
| **2011** | 1.01 | 2.5 |
| **2012** | 4.67 | 11.7 |
| **2013** | 1.34 | 3.4 |
| **2014** | 1.40 | 3.5 |
| **2015** | 1.18 | 2.9 |
| **TOTAL** | **9.6** | **24** |

## 4.0 2016 REDUCTION STRATEGY UPDATE

To update the Strategy in 2016, a comprehensive process was undertaken, which included an update of the Inflow and Infiltration Reduction Strategy Industry Best-in-Class Review, workshops with the Steering Committee, and meetings with senior local municipal and Regional staff. The goal of these activities was to identify opportunities and challenges and where changes would be needed to continue to make progress towards meeting the 2031 inflow and infiltration reduction target. Through this process, it was determined that the 2011 framework consisting of eight program areas was working well and should be retained with some minor modifications.

Leadership is critical to success of inflow and infiltration reduction efforts. Implementation of the Strategy will continue to be directed by the Water and Wastewater Steering Committee. The Steering Committee, made up of Directors from the nine local municipalities and the Region, will continue to guide implementation of the Reduction Strategy and has been a key advisory group for this update.

As part of the Strategy Update, the Steering Committee had valuable discussions to clarify the roles and responsibilities of the Region, local municipalities and Steering Committee in implementing the various measures, programs, and projects. The resulting roles and responsibilities following the Strategy Update are presented in Table 3.

| Table 3 – Roles and Responsibilities | |
|---|---|
| **Responsible Agency** | **Roles and Responsibilities of Region, local municipalities and Steering Committee in Achieving Inflow and Infiltration Reduction** |
| **REGION** | • Continue to set goals for the Strategy.<br>• Maintain integration with One Water approach and Region's water conservation program.<br>• Continue to investigate and implement new technologies and tools to support inflow and infiltration reduction programs.<br>• Continue to undertake flow and rainfall monitoring programs to track inflow and infiltration and identify priority areas.<br>• Identify and conduct SSES activities to identify inflow and infiltration sources in priority areas.<br>• Continue to investigate and implement pilot studies to assess new technologies and approaches for use in the Inflow and Infiltration Reduction Program.<br>• Maintain Regional infrastructure in a state of good repair.<br>• Provide leadership on emerging programs and issues, such as private property programs and climate change.<br>• Continue to analyze and report inflow and infiltration reduction achieved to The Ministry and Regional Council.<br>• Track and report on spending on inflow and infiltration initiatives.<br>• Commit to continuous improvement through collaboration, education and advocacy and innovation. |
| **LOCAL MUNICIPALITIES** | • Continue to support the Region's flow monitoring programs.<br>• Undertake infrastructure rehabilitation and repair work to address sources of inflow and infiltration in priority areas identified through flow monitoring and SSES investigations.<br>• Region to provide flow and rainfall data, when requested, to assist in prioritizing remediation in local systems.<br>• Consider, develop and launch Local Municipal Private Property programs, in conjunction with the Region and other local municipalities.<br>• Maintain local municipal infrastructure in a state of good repair.<br>• Report on activities and achievements to Region annually. |
| **WATER AND WASTEWATER STEERING COMMITTEE** | • Endorse Strategy, goals and interim targets.<br>• Participate in discussions around Region's inflow and infiltration reduction incentive programs.<br>• Provide input to Region's design and construction standards.<br>• Discuss program elements including planned update to the Sanitary Sewer System Inspection, Testing and Acceptance Guideline, private property programs and any changes to municipal bylaws.<br>• Review and refine roles and responsibilities of Region, local municipalities and Steering Committee.<br>• Review and recommend future pilot studies. |

Lessons learned from implementing the I/I Reduction Strategy over the past five years and an updated industry best-in-class review provided the following key inputs to the development of the Strategy Update.

- In the first five years of the Inflow and Infiltration Reduction Program, major achievements have included the Inflow and Infiltration Audit and Flow Monitor Program and the completion of pilot projects. In the future, additional focus will be placed on developing and implementing rehabilitation projects by the local municipalities. Some of the local municipalities may require additional resources to complete these projects.
- The Strategy Update and implementation plan will be organized around S.M.A.R.T. principles (Specific, Measurable, Attainable, Realistic and Timely) to achieve the long term targets. The implementation plan will be a living document, regularly updated with interim goals against which progress can be assessed.
- Innovation, adaptation and continuous improvement are fundamental to this program. New technologies and approaches will be evaluated and applied where appropriate.
- In addition to reporting the inflow and infiltration reduction achievements, report to the Ministry on the combined success of inflow and infiltration reduction and water conservation through measurement of flow at Southeast Collector. The success will be measured against a combined target reduction of 71 MLD to be achieved in 2031; 40 MLD of rainfall derived inflow and infiltration reduction and 31 MLD dry weather flow reduction (water conservation and base infiltration reduction) to achieve the combined reduction goal of 71 MLD.
- The current industry view is that private property sources contribute 40 per cent to 60 per cent of inflow and infiltration in a system. The Strategy Update will consider and address all sources of inflow and infiltration including those located on private property and within new development areas, if long term target reductions are to be achieved.
- Some local municipalities have already achieved success in private property initiatives. Communication and collaboration between all members of the Steering Committee will help to ensure successful program elements, including communication, public education and outreach program components are shared and duplicated.

To date, a 24 per cent reduction in inflow and infiltration has been achieved. Through implementation of the Strategy Update, inflow and infiltration reduction will continue with the current approach, but will also put more emphasis on initiatives in private properties and new developments. It is projected that the Region is on track to achieve its overall inflow and infiltration reduction target of 40 MLD by 2031. Through the implementation of the Strategy Update, an interim target of achieving 50 per cent of the 2031 goal (or 20 MLD) by the end of 2020 has been set. The required activities to achieve the interim and ultimate targets are shown in Table 4.

**Table 4 - Reduction Targets and Required Activities Timelines**

| | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021-2031 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **ACTIVITIES** | | | | | | | | | | | |
| Municipal Remediation Project Implementation | | | | | | | | | | | |
| Servicing Incentive Programs | | | | | | | | | | | |
| Continued Improvement in Construction Practices for New Developments | | | | | | | | | | | |
| Private Property Program Development & Implementation | | | | | | | | | | | |
| **REDUCTION TARGETS** | | | | | | | | | | | |
| Achieve Up to 25% of Target Reduction | | | | | | | | | | | |
| Achieve Up to 50% of Target Reduction | | | | | | | | | | | |
| Achieve 50-100% of Target Reduction | | | | | | | | | | | |

The Strategy Update is organized into eight program areas and builds on successes achieved in the past five years. Each program area contains specific activities with the responsible agency, timing and resource requirements identified. Future activities expected to occur over the next five years, for each of the eight program areas, are also specified and detailed in the following subsections.

Summary of key enhancements recommended for the Strategy Update are provided in Table 5.

**Table 5 Key Enhancements Recommended for the Strategy Update.**

| Program/ Initiative | Description |
|---|---|
| **Local Municipal Inflow and Infiltration Reduction Status Annual Report** | Each local municipality will prepare its own Local Municipal Inflow and Infiltration Reduction Status Annual Report to document inflow and infiltration reduction activities, projects undertaken and annual funding. A draft standard template has been developed for these reports and they will form a part of the Annual Inflow and Infiltration Reduction Program Report submitted to the Ministry. |
| **Data Analysis** | The Region will continue to analyze long term flow and rainfall monitoring data (collected through the Inflow and Infiltration Audit and Flow Monitoring Program). Analysis results will be used to identify priority basins. |
| **Mini-Basin Flow Monitoring** | Flow monitoring will be undertaken in areas less than 100ha in size to assist in identifying sources of inflow and infiltration. |
| **Sanitary Sewer Evaluation Surveys (SSES)** | The Region will continue to investigate priority mini-basins using a variety of evaluation methods selected based on data analysis. Inflow and infiltration sources will be identified and communicated to local municipalities for rehabilitation. |
| **Private Property Programs** | The Region will support the efforts of the local municipalities to establish and implement private property programs to address private property sources. Moving toward a downspout disconnection program is one example of private property action. |
| **Innovative Pilot Projects** | Piloting new and innovative technologies will be completed to achieve continuous improvement in the Inflow and Infiltration Reduction Program. |
| **Update Commissioning, Inspection and Testing Guidelines** | Working with the local municipalities, the Sanitary Sewer System, Inspection, Testing and Acceptance Guideline will be updated to reflect new technologies and lessons learned. |
| **Provincial Advocacy** | The Region will continue to engage the Province on a range of issues to support inflow and infiltration reduction including new development design standards and construction practices. |

The following summarizes achievements to date and key future activities within each Program Area.

## 4.1 Program Area 1 – Establish Inflow And Infiltration Reduction Program Goals And Targets

Setting goals and targets for the Reduction Strategy will help ensure continuous progress is made towards reaching the overall target reduction of 40 MLD by the year 2031 and the interim goal of 20 MLD by the year 2020.

The 2011 Reduction Strategy identified four key activities to be completed in the short term project timeline (2011-2015) in Program Area 1.

Table 6 demonstrates considerable progress made in each of these activities.

**Table 6 - Program Area 1 Activities – Progress Made From 2011 to 2015**

| Activity | Progress Made |
|---|---|
| Develop the audit spreadsheet, establish preliminary baseline, predict inflow and infiltration rates and potential reduction targets. | Audit spreadsheet developed in 2011. Baseline established and inflow and infiltration rates predicted. Potential reduction targets under analysis. |
| Develop all pipes hydraulic model | All pipes hydraulic model developed. |
| Refine detailed Audit procedures using data from 2011 flow monitoring program, flow reduction achievements and outputs of the all pipes hydraulic model. | Audit procedures developed and used in tracking of progress from 2011 to 2015. |
| Assess program status, reconfirm inflow and infiltration goals and targets and timelines for flow reduction based on first five years. | Strategy Update initiated in 2015. |

**As part of the Strategy Update, future activities in Program Area 1 will include:**

- Evaluate the effectiveness of inflow and infiltration reduction using the volumetric measure of the 24 hour volume resulting from a 25 year storm event. The all pipes hydraulic model provides an effective tool to assess inflow and infiltration reduction achievements and assist in the decision making process for implementing remedial works. It is important that the Region continue to update and maintain this model.
- Work collaboratively with local municipalities to establish area targets and goals for specific activities.
- Ongoing evaluation of remedial work completed by both the Region and local municipalities.
- Continued assessment and evaluation of successes achieved.
- Annual reporting by each local municipality to document their progress in inflow and infiltration reduction.
- Undertake annual review of technologies and tools used by this program and make

improvements based on results. Continuous review and adoption of improved monitoring and data analysis procedures and rehabilitation technologies are two examples where enhancements can improve efficiencies and cost effectiveness.

- Improve collaboration and communication with internal and external stakeholders through a variety of activities including ongoing communication, outreach and industry forums.
- Develop and maintain annual implementation plans to identify specific projects, budgets, resource and funding needs. These plans will enable early identification of funding needs and allow for target adjustment to match available funding.

## 4.2 Program Area 2 – Monitor and Analyze Flows

Monitoring and analysis of flow and rainfall data is a critical input into the inflow and infiltration reduction decision making process. Flows in the system vary with rainfall characteristics, seasonality, groundwater conditions, and antecedent conditions.

Table 7 demonstrates that considerable progress has been made in Program Area 2 activities from 2011 to 2015. Many of these activities are long term activities necessary to collect, analyze and track data to assess long term trends.

**Table 7 - Program Area 2 Activities – Progress Made From 2011 to 2015**

| Activity | Progress Made |
|---|---|
| Develop audit basin program, including audit basin delineation, purchase and install flow and rainfall monitoring equipment. | Program developed, equipment procured and installed. |
| Audit basin and mini basin flow monitor installation, maintenance and data analysis. | Long term and short term flow monitors installed and maintained. Data analysis is ongoing. |
| Review flow analysis software applications. | Data management and flow analysis tools evaluated, selected procured and used. |
| Analyze post construction flow data from pilot studies. | Post construction data analyzed and results reported in Annual Reports to the Ministry. |
| Determine flow reduction from developer-funded projects. | Ongoing and results reported in Annual Reports to the Ministry. |
| Complete mass balance analysis to establish base infiltration rates. | Analysis is ongoing. |

**As part of the Strategy Update, future activities in Program Area 2 will include:**

- Collect and analyze system wide flow data from predefined audit basins through the continuation of the Inflow and Infiltration Audit and Flow Monitoring Program.
- Collect and analyze system wide rainfall data.
- Analyze data for dry and wet weather conditions to identify priority areas and assess success of completed rehabilitation projects.

In addition, flow and rainfall data can be used to update and calibrate the Region's All Pipes Hydraulic Model and to track long term changes in flow. Collected data supports several key Regional initiatives as noted above and is increasingly used by the local municipalities to support their analysis needs.

Figure 6 shows a typical rain gauge station used for measuring rainfall.

**Figure 6 – Tipping Bucket Rain Gauge**

Program Area 2 includes activities designed to collect and analyze data and identify priority areas. Continued efforts are needed for:

- Data collection including permanent monitoring, audit basin monitoring, mini-basin monitoring, post construction monitoring and rainfall monitoring. Permanent and audit basin flow monitoring programs are intended to be long term programs that will support operations and assess long term trends. Mini-basin and post construction monitoring are intended to be shorter term programs (single season) designed to pinpoint areas for rehabilitation and/or confirm that rehabilitation has been successful. These programs are intended to be reviewed on a continual basis to confirm equipment, tools, and analysis procedures.
- Flow and rainfall monitoring site maintenance services and data QA/QC will be required.
- Data analysis and priority area mapping will be a continuous process designed to identify priority areas for mini-basin monitoring and investigations based on predefined inflow and infiltration thresholds. Priority mapping will be discussed at the Water and Wastewater Steering Committee.
- Analysis of post construction flow data to assess the success of completed projects. Audit basin flow data will also provide an important tool to validate the effectiveness of completed repairs. This will be supplemented by mini-basin flow data where warranted and feasible.
- Monitoring flows from new developments as part of the Servicing Incentive Program and as part of the inflow and infiltration in new developments pilot project.
- Analysis of mini-basin flow data to pinpoint areas for rehabilitation followed by SSES activities to identify inflow and infiltration sources. Rehabilitation plans will be developed using the information gained through the mini-basin flow monitoring and SSES activities. Local municipalities will complete repairs in the local system within priority areas based on SSES findings. The Region will provide monitoring, inflow and infiltration analysis and SSES results to guide repair requirements.

## 4.3 Program Area 3 – Investigate and Rehabilitate

Program Area 3 will use information generated as part of monitoring and analysis activities to guide investigation activities that will identify the severity, extent and location of inflow and infiltration sources and ultimately rehabilitation and removal of these sources. Some local municipalities already have programs in place to investigate and mitigate inflow and infiltration sources.

Table 8 demonstrates existing activities in Program Area 3 and the considerable progress made in each of these activities.

The 2011 Reduction Strategy identified four key activities to be completed in the short term project timeline (2011-2015) in Program Area 3. SSES and rehabilitation activities are ongoing activities and dovetail with asset management programs maintained by the Region and the local municipalities.

**Table 8 – Program Area 3 Activities – Progress Made From 2011 to 2015**

| Activity | Progress Made |
|---|---|
| Develop SSES inspection program and budgets for identifing priority areas. | SSES inspection programs completed in pilot projects in Aurora, East Gwillimbury, Georgina, Newmarket, Richmond Hill and Whitchurch-Stouffville and in three priority areas in King, Vaughan and Richmond Hill. |
| Complete rehabilitation in pilot areas and complete post construction assessment. | Rehabilitation pilot projects completed in Aurora, East Gwillimbury, Georgina, Newmarket, Richmond Hill and Whitchurch-Stouffville and success assessed through post construction analysis. |
| Determine flow reduction achieved by Developer Funded projects. | Flow reductions determined and documented in the Annual Reports. |
| Establish procedures and policies for private sewer lateral rehabilitation. | Sewer lateral rehabilitation pilot project is ongoing in Aurora, Georgina, Easy Gwillimbury, Vaughan and Newmarket. |

Figure 7 demonstrates a positive dye testing in the City of Vaughan during a Sanitary Sewer Evaluation Survey.

**Figure 7 – Dye Testing in the City of Vaughan**

**As part of the Strategy Update, future activities in Program Area 3 will include:**

- The Region's Inflow and Infiltration Team will plan Program Area 3 activities for the next five years, including the necessary investigation work, on an annual basis or more frequently. Local municipalities may also support planning and executing required investigation work. Budgets and schedules will be discussed at the Steering Committee.
- Analysis of mini-basin flow data to pinpoint areas for rehabilitation followed by SSES activities to identify inflow and infiltration sources. Rehabilitation plans will be developed using information gained through the mini-basin flow monitoring and SSES activities. Local municipalities will complete repairs in the local system based on SSES findings. The Region will provide monitoring, inflow and infiltration analysis and SSES results to guide repair requirements.
- A project prioritization model will be developed for SSES investigation, with input from local municipal representatives on the Steering Committee. The Region and local municipalities will work together to select areas for SSES investigations based on the project prioritization model. Dedicated Local Municipal Coordinators are recommended to execute these programs and identify specific sources of inflow and infiltration. SSES investigations will include techniques such as visual inspection, CCTV inspection, maintenance hole inspection, lateral sewer inspection and private property drainage assessments with specific investigation needs identified based on existing information and flow monitoring results. In some areas, local municipalities may elect to complete SSES investigations.
- SSES methods will need to be updated with new technologies as they emerge. The Region's Inflow and Infiltration Team, together with the Steering Committee, will consider updates to SSES methods.
- SSES results as well as the status of repairs will be documented in an annual status report prepared by each local municipality and submitted to the Region through the Steering Committee.
- Following completion of the repair work, post construction assessment will be completed. Flow data collected as part of the Inflow and Infiltration Audit and Flow Monitoring Program will provide an important tool to validate the effectiveness of completed repairs.
- Asset management and state-of-good-repair programs, already in place in the local municipalities and the Region, will be integrated within this Program Area. SSES inspection data will also be used for asset management.
- Local municipalities will explore and develop private property programs with the support of the Region. The Steering Committee will provide a forum for local municipalities to share information, learn from one another and consolidate knowledge.

## 4.4 Program Area 4 – Design and Commissioning

Program Area 4 addresses design and commissioning of new infrastructure within the Region and encompasses Regional infrastructure, local municipal infrastructure and infrastructure needed to service new developments.

The 2011 Reduction Strategy identified four key activities to be completed in the short term project timeline (2011-2015) in Program Area 4.

Figure 8 shows maintenance hole joint sealing technology using (Riser-Wrap) which is used to seal joined sections of new maintenance holes against ground water infiltration.

Table 9 demonstrates that considerable progress has been made in Program Area 4 activities from 2011 to 2015.


**Figure 8 – Riser-Wrap Used to Seal New Maintenance Hole in the Township of King to Prevent Ground Water Infiltration.**

| Table 9 – Program Area 4 Activities – Progress Made From 2011 to 2015 | |
|---|---|
| **Activity** | **Progress Made** |
| Compile and review existing municipal development/subdivision agreements to determine gaps and opportunities. Establish wording for new subdivision agreements that could include additional testing and acceptance criteria. | • Municipal development/subdivision agreements compiled and assessed.<br>• Sanitary Sewer Inspection, Testing and Acceptance Guideline created and adopted, in full or in part, by local municipalities. |
| Review new development flow monitoring data and determine if changes to inflow and infiltration allowance for new construction are possible. | • No changes to inflow and infiltration allowance for new development were proposed. |
| Review OBC related building practices for new construction and evaluate need for OBC changes.<br><br>Continue to meet with contractor, developer community and suppliers/materials industries to discuss potential changes to building construction standards. | • Sanitary Sewer Inspection, Testing and Acceptance Guideline created and adopted, in full or in part, by local municipalities.<br>• Servicing Incentive Program Implementation Guidelines developed with more stringent construction and inspection standards. |

**As part of the Strategy Update, future activities in Program Area 4 will include:**

- Addressing design and commissioning of new local municipal and Regional infrastructure as well as infrastructure needed to support new development.
- Update to the 2011 Sanitary Sewer System Inspection, Testing and Acceptance Guideline. The current guideline has been adopted in full or in part by all local municipalities.
- Update the Region's design standards to incorporate new measures that will reduce inflow and infiltration from new infrastructure. This will include measures identified in the Servicing Incentive Program Implementation Guide.
- Review of standard local municipal bylaws, development approval standards, Sewer Use By-Laws and subdivision agreements with an objective to adopt consistent requirements that will minimize inflow and infiltration from new development.
- Use of flow monitoring data including flow monitoring in new sub divisions to validate inflow and infiltration allowances used throughout the Region and local municipalities.
- Continued partnerships with other jurisdictions and industry groups to gather information on acceptable levels of inflow and infiltration in new development, propose new standards and to advocate for changes at municipal and provincial levels of government.

## 4.5 Program Area 5 – Financial Management

Program Area 5 supports maintenance of long term and sustainable funding necessary to invest in measures, projects, and programs that will allow the Region and local municipalities to meet long term goals.

The 2011 Reduction Strategy identified six key activities to be completed in the short term project timeline (2011-2015) in Program Area 5.

Table 10 demonstrates considerable progress made in each of these activities.

**Table 10 – Program Area 5 Activities – Progress Made From 2011 to 2015**

| Activity | Progress Made |
|---|---|
| Review financial requirements for 2011-2015 activities to allocate budget for short term including a review of alternative funding sources (e.g. development funded remediation) and budget for construction of additional remediation projects. | Developer Funded Inflow and Infiltration Pilot Projects approved by Regional and Local Municipal Councils for Markham, Aurora, Richmond Hill, Vaughan and Newmarket. |
| Review and refine short and long-term funding requirements for capital and operating program based on works and cost/benefits completed. | Financial requirements updated annually as part of the annual budget process. |
| Investigate private property subsidy and grant programs for lateral rehabilitation, downspout and foundation drain removal, review alternatives, establish funding impacts and potential funding sources. If implemented, develop financial procedures for releasing and auditing subsidy and grant programs. | Sewer lateral rehabilitation pilot project is ongoing and lessons learned and cost data are being tracked. |
| Assess the inflow and infiltration reserve against project and financial forecasts to confirm that sufficient short and long-term funding is available. | City of Markham has established a financial assistance plan as part of their sanitary sewer downspout disconnection program. |
| Review and update all financial management activities to reflect current state of the overall Inflow and Infiltration Reduction Program. | Tracking of capital plan budget is ongoing for implementation of the Inflow and Infiltration Reduction Strategy. |
| Develop 10 Year Operational and Capital Budget. | To be addressed through the Strategy Update and implementation plan.<br><br>10 year Regional budget forecast prepared as part of annual budget process. |

**As part of the Strategy Update, future activities in Program Area 5 will include:**

- The Region and local municipalities will each prepare inflow and infiltration expenditure planning reports annually.
- Required remedial works identified through SSES activities will inform program funding requirements including funding needed to rehabilitate local systems.
- Where future pilot projects are identified, the Steering Committee will allocate these projects to a specific local municipality. Pilot projects may be required from time to time to demonstrate innovative rehabilitation technologies or to demonstrate accepted technologies to address different sources of inflow and infiltration. These pilots will benefit all local municipalities as they will inform future implementation of similar projects.
- For the next five years of implementation, the Region and interested local municipalities will explore the business case of jointly funded Local Municipal Coordinator positions. These staff, who will be jointly funded, will assist local municipalities in a range of inflow and infiltration related activities and will strengthen communication and collaboration between the Region and the local municipalities. Specific duties will be defined by the Region and the local municipality depending on needs.
- Ongoing and continual review of service delivery methods to ensure that the Region and local municipalities are getting the best value for the investment.

## 4.6 Program Area 6 – Communication, Education and Advocacy

Program Area 6 supports communication, education and advocacy activities. Regular and informative communication between the Region, local municipalities and the Development Community will be essential to achieve the long-term inflow and infiltration reduction target.

The 2011 Reduction Strategy identified five key activities to be completed in the short term project timeline (2011-2015) in Program Area 6.

Table 11 demonstrates considerable progress made in each of these activities.

**Table 11 – Program Area 6 Activities – Progress Made From 2011 to 2015**

| Activity | Progress Made |
|---|---|
| Create template for municipal reporting and secure endorsement by respective Councils. | • Local Councils endorsed the Reduction Strategy in 2011.<br>• Steering Committee established to provide a vehicle for decision making and reporting. |
| Develop short and long term communications materials including establishing an industry focus group to meet twice annually to discuss changes in Regional guidelines and procedures. | • Website communications materials updated and maintained.<br>• Development industry consulted as part of the development of the Sanitary Sewer Inspection, Testing and Acceptance Guideline. |
| Develop 2011 Council Report and work with local municipalities to ensure key program messages are presented to Council. | • Local and Regional Councils endorsed the Reduction Strategy in 2011. |
| Update public communication plan and develop, maintain enhanced Region inflow and infiltration reduction program website. Assess, review and update plan. | • Regional website content updated and maintained. |
| Review feasibility of extending inflow and infiltration communications into existing outreach programs. | • Inflow and Infiltration Reduction Program considered in a range of outreach activities. |

**As part of the Strategy Update, future activities in Program Area 6 will include:**

- An improved approach to internal and inter-agency communications to encourage information sharing between the Region, local municipalities and Steering Committee. This approach will include exploring the option and benefit of developing and distributing newsletters to inform internal staff at the Region and local municipalities of the important and successful initiatives being undertaken. The proposed Local Municipal Coordinator(s) will also foster two way communication.

- Enhanced and regular updates of the Region's inflow and infiltration website to provide additional resource information on private property sources and what residents can do to help.
- Development of an interactive map tool to show the locations of current studies and activities.
- In collaboration with the local municipalities, creation of a simple report card to provide the public at large with key information on program activities and successes.
- Communications is a key requirement of any private property program and strong communications are needed to drive program uptake. Each local municipality that launches a private property program will require a communications plan. The Steering Committee and the Region's Inflow and Infiltration Team will develop a common communication plan framework. Each local municipality will be able to use the framework as a basis to develop a communication plan that meets their particular needs.
- Host frequent "State of Inflow and Infiltration" workshops and engage the development, building and construction industries in discussions about improvements to construction methods, design standards and guidelines and others.
- Participate in national and international industry forums focused on inflow and infiltration to promote The Region's Inflow and Infiltration Program as best-in-class and to continue to learn from other best-in-class programs.
- Build a stronger relationship and engage in discussion with the ministry and other Provincial Ministries on a range of issues to support inflow and infiltration reduction including new development design standards and construction practices.

## 4.7 Program Area 7 – Report Inflow and Infiltration Reduction

Regular reporting of successes and challenges of the Inflow and Infiltration Reduction Program is necessary to build on lessons learned and to establish whether targets and goals have been met.

The 2011 Reduction Strategy identified four key activities to be completed in the short term project timeline (2011-2015) in Program Area 7.

Table 12 demonstrates considerable progress made in each of these activities.

**Table 12 – Program Area 7 Activities – Progress Made From 2011 to 2015**

| Activity | Progress Made |
|---|---|
| Receive and review Regional and Municipal inflow and infiltration reports and evaluate current conditions throughout YDSS and inflow and infiltration initiatives and prepare Annual Reports to The Ministry. | • Annual Reports to the Ministry prepared with input from local municipalities in 2012, 2013, 2014 and 2015. |
| Develop and present first annual Council Report describing program status, financial impacts and progress made in the first year of implementation based on information received from local municipalities. | • Council has received, first Inflow and Infiltration Reduction Strategy Annual Report in 2012.<br>• A number of other Council reports were prepared between 2011 and 2015 for specific inflow and infiltration initiatives and projects including Inflow and Infiltration Reduction Pilot Projects, Inflow and Infiltration Audit and Flow Monitoring Program and equipment purchase, Inflow and Infiltration Reduction Pilot Projects, Tri-Party Agreements, and the Servicing Incentive Program. |
| Incorporate results from post construction analysis of prior years' remediation projects and update audit and measures template with resulting flow reduction attainment. | • Post construction assessment results included in Annual Reports to the Ministry. |
| Update Reduction Strategy at five year interval. | • The Strategy update initiated in 2015 will be submitted to the Ministry by March 31, 2016. |

In the Strategy Update, regular reporting will include Local Municipality Inflow and Infiltration Reduction Status Annual Reports, to inform the Steering Committee of their progress, and Annual Reporting to the Ministry on program implementation. It is anticipated that the Annual Reports to the Ministry will be refined over time. Starting in 2017, a key change will be to track and report on inflow and infiltration reduction based on achieving reductions of 40 MLD rainfall derived inflow and infiltration reduction and 31 MLD dry weather flow reduction (water conservation and base infiltration reduction) to achieve the combined reduction goal of inflow and infiltration reduction and water conservation of 71 MLD.

**As part of the Strategy Update, future activities in Program Area 7 will include:**

- Each local municipality has committed to providing a Local Municipality Inflow and Infiltration Reduction Status Annual Report to document their activities to the Steering Committee. For local municipalities who participate with the Region in the Local Municipality Coordinator Program, the Coordinator will provide key assistance in preparing these reports. These reports will provide details on investigation activities, rehabilitation activities completed and any capital projects that will benefit inflow and infiltration reduction.
- The Region's Inflow and Infiltration Team will explore with Steering Committee the value of newsletter as part of the best-in-class practice to promote inflow and infiltration reduction. The Region's Inflow and Infiltration Team will continue to prepare an Annual Report to the Ministry to report on implementation status and the inflow and infiltration reduction achieved. As per the SEC IEA conditions, to date, four Annual Reports have been prepared and submitted. Future discussions with the Ministry will focus on the format of annual updates.

## 4.8 Program Area 8 – Innovation and Adaptation

The Region is committed to innovation, adaptation and continuous improvement in business practices and efficiencies to drive results. From 2011 to 2015, continuous improvements were achieved in a number of key technical areas through investigation, analysis and pilot projects.

The 2011 Reduction Strategy identified 13 key activities to be completed in the short term project timeline (2011-2015) in Program Area 8. Table 13 demonstrates considerable progress made in each of these activities.

**Table 13 – Program Area 8 Activities – Progress Made From 2011 to 2015**

| Activity | Progress Made |
|---|---|
| Finalize and validate rehabilitation standards and engage industry as required. | Completed and ongoing pilot projects reviewed to document lessons learned. |
| Finalize and implement new Construction and Development Commissioning Standards and Guidelines and update as needed. | Sanitary Sewer Inspection, Testing and Acceptance Guideline prepared in 2011 and implemented, entirely or in part, by the same local municipalities. |
| Establish Private Property Working Group to develop short- and long-term activities related to private property flow mitigation. | Members of the Water and Wastewater Steering Committee discussed issues surrounding private property reduction efforts. |
| Develop consistent wording and clauses in sewer use bylaws to support private property inspection needs and implement new sewer use bylaw. | A number of local municipalities have updated their sewer use bylaws. |
| Review permanent flow monitoring procedures and analysis. | Completed as part of Inflow and Infiltration Audit and Flow Monitoring Program. |
| Develop Region wide climate change model | Criticality assessment planned for wastewater system. |
| Review design and construction standards and revise criteria, where required. | Criteria review completed. |
| Review potential impacts and reporting requirements for new Federal and/or Provincial regulations. | Reporting requirements for new regulations addressed. |
| Define and implement required administrative structure, procedures to administer private property subsidy program. | City of Markham established Sanitary Sewer Downspout Disconnection Program. |
| Review program staffing requirements and retain staff to support program. | Region's Inflow and Infiltration Team in place. |
| Establish procedures for establishing costs and benefits for inflow and infiltration reduction, review effectiveness of remediation projects. | Effectiveness of rehabilitation projects completed and documented in Annual Reports to the Ministry.<br>Lessons learned and detailed cost database maintained for pilot projects. |
| Re-assess Strategy components against Industry practices and determine new best practices and possible changes and opportunities. | Best-in-Class Industry Review updated as part of the Strategy Update in 2016. |
| Update Strategy. | Reduction Strategy update initiated in 2015 and will be submitted to the Ministry by March 31, 2016. |

Focus on innovation, adaptation and continuous improvement will continue in the Strategy Update to improve efficiencies and drive results. It is anticipated that advancements will be made in the areas of rehabilitation technologies, monitoring, data management processes, and analysis. The Region's Inflow and Infiltration Team will also continue to expand their focus to include emerging issues such as inflow and infiltration sources from private property and climate change impacts, mitigation and adaptation, as well as resource recovery.

**As part of the Strategy Update, future activities in Program Area 8 will include:**

- Continued investment in new monitoring technologies to ensure efficiency and reliability including the adoption of state-of-the-art flow monitoring equipment. As flow monitoring equipment has a finite life, cyclical replacement of the existing flow monitoring assets will involve an assessment of replacing existing equipment with more technologically advanced equipment.
- Development and implementation of standards for rehabilitation technologies. Continuous advances in rehabilitation technologies are occurring and the Region will continue to pilot new technologies to gain valuable information. This information will be shared with the local municipalities so that the most economical and effective technologies are identified.
- The Steering Committee will work to recommend refinements to bylaws, inspection standards and building codes with a view to ensuring high standards are adopted consistently throughout the Region in the design and commissioning of new wastewater infrastructure.
- The Inflow and Infiltration Team will work on developing innovative tools and technologies that will continually improve efficiencies. Improvements to web based tools, database integration and SMART technologies will be considered to improve the efficiency of business practices.
- Local municipalities that establish comprehensive private property programs will collect a significant amount of inspection data associated with individual properties. The Steering Committee and the Region's Inflow and Infiltration Team will work together to develop standard tools, including data management and analysis tools for private property inspection data. The Region's Inflow and Infiltration Team will provide support and will document outcomes.

# 5.0 CONCLUSION

The Region and the nine local municipalities will take on joint responsibility for the continued implementation of the Inflow and Infiltration Reduction Strategy.

Lessons learned from the first five years of the Inflow and Infiltration Reduction Program provided valuable input to the Strategy Update. Best-in-class research provided new strategic direction on future focus.

Building on the significant progress made in the first five years of the program, where flow monitoring system was implemented and standards developed, the next five years will move towards implementation of inflow and infiltration reduction projects. It is expected that a 50 per cent of the overall 2031 inflow and infiltration reduction target can be achieved by 2020 as the program moves into full implementation.

The Strategy Update recommends that work continue in the eight program areas. Key enhancements recommended include:

- Local Municipal Annual Reporting Template: Standardize reporting template for annual local municipal reporting on inflow and infiltration reduction activities and expenditures to the Region to feed into the Inflow and Infiltration Reduction Program Report submitted annually to the Ministry.
- Data Analysis: Regional data management and analysis procedure will be reviewed and enhanced.
- Flow Monitoring: Expand flow monitoring to basins less than 100 hectares in size (mini-basins) to assist in identifying sources of inflow and infiltration.
- Sanitary Sewer Evaluation Surveys: The Region will continue to take the lead in sanitary sewer evaluation surveys to identify sources of inflow and infiltration.
- Private Property Programs: The Region in partnership with local municipalities will explore and develop a private property program to pursue inflow and infiltration source detection and to implement remediation works in private properties.
- Downspout Disconnection Program: The Region supports local municipalities moving toward a downspout disconnection program.
- Innovation Pilots: Piloting innovative technologies that can reduce inflow and infiltration in Regional and local systems more effectively.
- Standardize Commissioning and Inspection Testing: Working with local municipalities on the enhancement and implementation of the Region's Inspection, Testing and Acceptance Guideline and standardizing commissioning standards to enhance inflow and infiltration reduction practices.
- Provincial Regulation: Continue to advocate the Province on regulation changes for new development practices and procedures to help reduce inflow and infiltration in new developments.