

PRIORITIES AND KEY INITIATIVES COMMITTEE – MARCH 21, 2011

INFLOW AND INFILTRATION REDUCTION & LONG TERM WATER CONSERVATION STRATEGIES CITYWIDE

Recommendations

The Commissioner of Engineering and Public Works, in consultation with the Commissioner of Finance and City Treasurer, recommends:

1. That Council endorse the Inflow and Infiltration Reduction and the Long Term Water Conservation Strategies that have been developed in collaboration with the area municipalities and endorsed by Regional Council on February 17th, 2011, subject to minor adjustments to the final drafts arising out of the pre-submission consultation with the Ministry of the Environment;
2. That through development and endorsement of the Inflow and Infiltration Reduction Strategy, York Region and the City commit to:
 - develop and maintain this Strategy including the programs, goals and inter-agency and regulatory reporting requirements for staged reduction of inflow and infiltration over the next 20 years;
 - recommend to future Councils that they commit funds for inflow and infiltration reduction that is economically justified by the avoidance of future treatment and conveyance costs;
 - measure wastewater flows before and after carrying out construction/rehabilitation works on sewers and to document inflow and infiltration expenditures and flow reduction measures; and
 - continue to work together in a collaborative manner over the life of the Strategy and to commit the appropriate staffing and financial resources towards implementation of the Strategies based on a business case analysis.
3. That staff report back to a future Finance and Administration Committee on the financial details associated with the implementation of the Inflow and Infiltration Reduction and Long Term Water Conservation Strategies; and
4. That a copy of this report be forwarded to York Region.

Contribution to Sustainability

Inflow and infiltration are unwanted sources of water within the existing City and Regional sanitary sewerage systems. By taking steps to reduce and eliminate these sources of excess water, additional conveyance capacity becomes available, thereby contributing to a more sustainable infrastructure network and increasing overall operational efficiency.

Water conservation policies and related efforts will assist in the protection of natural resources and long term water supply, maximizing sustainable growth and development, and minimizing energy consumption.

The proposed joint York Region and Local Municipal Inflow Infiltration Reduction and Long Term Water Conservation Strategies are consistent with the objectives of the City's Community Sustainability and Environmental Master Plan (Green Directions Vaughan, April 2009). The policies, decision making framework and implementation plans related to the reduction of inflow and infiltration and water conservation will assist in the pursuit of:

- Sustainable growth and development;
- Minimizing energy consumption;
- The creation of a City with sustainable built form;
- The conservation and protection of our long term water supply, and
- Sharing sustainable best practices and ideas between and among municipal staff and the community.

Economic Impact

There are no immediate budgetary impacts resulting from the adoption of this report.

The Inflow and Infiltration Reduction Strategy will be supported by a collaborative long term funding model based on a cost sharing approach between the two tiers of local governments.

The key funding principles are:

- A set rate will be collected by both the local and Regional level as identified through the needs of the Strategy and as agreed to by the municipal partners.
- The amount collected at the local level will be used to address priorities identified both through the Strategy and as determined by each local municipality.
- The amount collected at the Regional level will be used to address Regional inflow and infiltration priorities both at the Regional and local level.
- The allocation of Regional funds intended for use in the local systems will be managed and allocated by a joint team with staff representatives from each municipality and the Region. Funding will be granted based on the most effective application to achieve the desired inflow and infiltration improvements as quickly as possible.

The City currently budgets approximately \$1.2 million annually for the maintenance of the existing sanitary sewer system. Additional funding and resources for the Strategies are being requested as part of the draft 2011 Water/Wastewater Budget. It is anticipated that as further monitoring and investigation is done throughout the City's sewerage system, additional funding and resources may need to be allocated in future operating and capital budgets to effectively implement the initiatives and programs set out in the Strategies.

Communications Plan

One of the key mandates of the Strategies is to implement a comprehensive communications, education, and advocacy plan to clearly message the environmental benefits of the Inflow and Infiltration Reduction and Long Term Water Conservation Strategies to the various stakeholder groups including residents, businesses and the construction industry.

Purpose

The purpose of this report is to seek Council's endorsement of the Inflow and Infiltration Reduction and Long Term Water Conservation Strategies, which have been prepared by York Region in collaboration with the area municipalities.

Background

Wastewater servicing in York Region is multi-jurisdictional based on a two tier governance structure. York Region is responsible for major pumping stations, trunk sewers and treatment plants. The area municipalities are responsible for the local collection sewerage systems and pumping stations that outlet into the Regional trunk system.

On March 31, 2010, the Ministry of the Environment approved the Individual Environmental Assessment for the Region's Southeast Collector Trunk Sewer Project subject to a series of conditions. One key condition required the Region to develop an Inflow and Infiltration Reduction Strategy, which shall include a program for the reduction of inflow and infiltration in the Southeast Collector Trunk Sewer from both the Regional and local municipal sewerage systems. This Strategy shall include reduction priorities, targets, timelines, tactics and initiatives, and associated implementation costs.

In order to develop the comprehensive Strategy, the Region formed an Inflow and Infiltration Task Force in April 2010. The Task Force established a Water & Wastewater Steering Committee that is comprised of representatives from each of the nine municipalities and the Region. The Steering Committee is responsible for reviewing inflow and infiltration issues and formulating an overall direction for the development of the Strategy.

On June 8th, 2010, Vaughan Council adopted the following recommendation with respect to the development of a joint Regional and Area Municipal Inflow and Infiltration Reduction Strategy:

"That in partnership with the Region of York, the City of Vaughan agrees to actively participate in the Inflow and Infiltration Reduction Task Force to:

- continue to seek out sources of inflow and infiltration;*
- adopt standards and guidelines intended to reduce inflow and infiltration in new developments and within existing systems; and*
- Develop adequate funding and cost sharing principles to address future remediation projects."*

The Water and Wastewater Task Force has been meeting on a regular basis since April of 2010. Senior staff from Development / Transportation Engineering, Public Works and Finance has participated in these meetings. On January 31, 2011, staff provided a report to the Priorities and Key Initiative Committee on the status of the joint Regional and Municipal Water and Wastewater Task Force, and the development of the proposed strategies for inflow / infiltration reduction and long term water conservation.

Subsequently, on February 15th, 2011, Council adopted the following recommendation:

"That staff be directed to report back to a future Priorities and Key Initiatives Committee meeting on the final recommended York Region and Local Municipal Inflow Infiltration Reduction and Long Term Water Conservation Strategies and implementation details."

Inflow and Infiltration Reduction and Long Term Water Conservation Strategies

On February 17th, 2011, Regional Council endorsed the recommendations of the reports to the Regional Environmental Services Committee meeting on the draft Inflow and Infiltration Reduction and Long Term Water Conservation Strategies, copies of which are included as Attachments No. 1 and 2 to this report. These Strategies along with a proposed implementation plan will be completed and submitted to the Ministry of the Environment by March 31, 2011.

Inflow and Infiltration Reduction Strategy

The draft Inflow and Infiltration Reduction Strategy is defined by a series of program areas and activities, which are highlighted below:

1. Overall Program Goals and Inflow and Infiltration Targets

Based on Ministry of the Environment (MOE) approval conditions related to the Individual Class

Environmental Assessment Study for improvements to the York-Durham Southeast Collector Sewer, York Region and all local municipalities must commit to a 10% reduction in peak flows due to inflow and infiltration over the next 20 years through water efficiency and inflow and infiltration reduction programs. This target must be achieved throughout the entire Regional and local municipal sewerage and water systems. The reduction of wet weather flows together with water conservation efforts will minimize total conveyance, treatment and disposal system costs and improve overall system security and efficiency.

2. Monitor and Analyze Flows

Monitoring will measure wet weather flow response in the sanitary sewer system to help identify areas of concern, isolate problem areas, and provide guidance for areas that require additional field investigation. Continuous and permanent flow monitoring over an extended time period is critical in identifying these variations in flow. A variety of flow metering techniques will be deployed to meet the requirements of the Strategy. The monitoring program will be developed early on in the Strategy and will include details such as flow meter type, meter accuracy, data quality and management procedures, financial costs, meter relocation planning, etc.

3. Investigate and Mitigate

The Strategy describes the processes that will be applied to investigate the severity, extent and location of the inflow and infiltration sources. Detailed field investigations using fog and dye testing, CCTV inspections, and manhole inspections will be conducted in areas that are identified as high priority - direct connections from roof downspouts and cross connections, degrading infrastructure or improper installation.

Subject to the results of the investigations, solutions will be identified and specific rehabilitation techniques will be selected based on cost effectiveness, criticality, risk of failure, expected lifecycle / performance improvements, and environmental impacts.

4. New Construction and Capital Projects

The Strategy describes the appropriate commissioning standards that will be applied to new sewerage systems to ensure design conformance.

5. Financial Management

The objective of the financial management component of the Strategy is to develop a sustainable source of funding to support the long term implementation that is equitable to the partners and community while addressing inflow and infiltration reduction targets. Based on the Region's projected estimates, an initial funding target of \$100 million over a 20 year period was used to assess the potential funding requirements. This equates to a future annual investment of \$5 million per year across the Region. This Strategy requires that each local municipality contributes and maintains a specific and sustainable funding allocation towards the inflow and infiltration reduction program. A preliminary list of program activities associated with the required funding includes the following:

- Flow monitoring
- Inspection programs
- Data analysis
- Development of common guidelines and standards
- Continuous improvement
- Communication programs
- Rehabilitation/replacement programs
- Pilot tests

Funding for the inflow and infiltration reduction program will come from water and sewer rates.

6. Communication and Management

A comprehensive communication plan has been identified as one of the components required to successfully achieve inflow and infiltration reduction in York Region. The Region and area municipalities shall jointly oversee the communication, education and advocacy programs to ensure the messaging meets the evolving program, and to ensure the programs are effectively delivered to the various stakeholders. A communication and advocacy team will work closely with other members of the program team to ensure current and future works comply with all applicable regulations.

7. Reporting Inflow and Infiltration Reduction

An annual report will be presented to the Ministry of the Environment detailing the progress on implementing the Strategy including inflow and infiltration reductions. The first report shall be provided one year following finalization of the Strategy (March 31, 2012) and every 12 months thereafter. The report will describe the status of each of the milestone activities and the progress towards the stated inflow and infiltration reduction target.

In support of the Region's annual report to the MOE, each local municipality will be required to plan for and develop an annual Inter-Agency Summary Progress Status as well as achievement reports. The Inter-Agency report will contain information that describes the local municipality's inflow and infiltration reduction activities that have occurred during the previous year and activities anticipated for the future.

8. Continuous Improvement

The Strategy describes the continuous efforts required to improve the way services or programs are implemented and focuses on areas which may require enhancement as the Strategy is implemented.

Long Term Water Conservation Strategy Components

The Long Term Water Conservation Strategy builds on the success of the "Water for Tomorrow" program, which was adopted by York Region in 1998. The proposed Long Term Water Conservation Strategy details specific conservation and efficiency programs that will need to be implemented by both the Regional and local municipalities over the next 20+ years.

Water conservation related programs will improve water management practices that will in turn reduce and enhance the beneficial use of water. The value and cost-effectiveness of water-use efficiency can be measured in terms of conserving and protecting our long term water supply; maximizing sustainability; and minimizing energy consumption. The basic components of the Long Term Water Conservation Strategy, which was endorsed by York Region on February 17th, 2011 are highlighted below:

1. Best-in-Class Water Conservation and Efficiency Measures

The Strategy describes the preparation, review and analysis of best-in-class water conservation and efficiency programs, initiatives, strategies and tactics adopted by other jurisdictions throughout the world. It has been created by reviewing water efficiency and conservation practices worldwide, and adopting those that are technically, environmentally and economically feasible for implementation in York Region.

2. Development of Performance Targets and Timelines

Performance targets will be developed in conjunction with the Region and area municipalities which will establish a breakdown of the water savings targets and timelines based on continuation of current "Water for Tomorrow" programs and implementation of new programs and tactics.

3. Consultation With All Stakeholders

All aspects of the Long Term Water Conservation Strategy were informed by findings from the public engagement and consultation process. Public consultation sessions were held in September and October 2010 to engage a wide variety of stakeholders throughout the Region. These sessions provided public outreach and education initiatives for water efficiency and conservation programs. The Strategy includes a comprehensive on-going communication plan which includes education and an advocacy plan.

It is important to note that overall water conservation will also result in a reduction in flows entering the City and Regional sanitary sewerage systems, thereby making these systems more efficient and sustainable.

Governance and Strategy Leadership

The Region intends that both Strategies will be championed and led jointly by the Water and Wastewater Task Force with overall leadership, direction and assistance being provided by Regional staff. As the Regional Strategies are implemented over the next 20 years, the Task Force will continue to provide primary leadership for the Strategy as it represents the interests of both the Region and each of the area municipalities.

Regional Assignment of Servicing Capacity

The Ministry of the Environment conditions of approval for the Southeast Collector Sewer Individual Class Environmental Assessment require that specific environmental sustainability targets related to inflow and infiltration reduction and water conservation be achieved in both the Regional and local municipal sewerage systems. Accordingly, Regional assignment of servicing capacity to local municipality's is contingent upon participation in the development and implementation of the Inflow and Infiltration Reduction and Water Conservation Strategies. The City's continued participation in the implementation of these Strategies will ensure that future distribution of servicing capacity will be available to the City to provide for the planned growth envisioned in the City's Official Plan.

Vaughan's Current Inflow and Infiltration Reduction Program

Enhanced sanitary sewer inspection work throughout Vaughan's local sewerage system has been underway over the last several years as part of York Region's pilot project. This work has been funded by the Region and has been spearheaded by the City's Public Works Department, in close cooperation with Development Engineering staff. Approximately \$135,000 in fog testing and camera inspection work was completed in Vaughan as part of the Region-funded project. The Region is now reviewing the data collected in order to determine the extent of inflow and infiltration within Vaughan's local sewerage system for areas that have been monitored to date.

In addition to the work completed for the Region, City Engineering and Public Works staff has been actively involved in inflow and infiltration reduction for many years. Ongoing routine maintenance activities associated with inflow and infiltration reduction include:

- Closed circuit (CC) TV inspections of sewer pipes;
- Fog and dye testing;
- New development inspections;

- Manhole inspections and repairs;
- Cross connection investigation and repair;
- Lateral repairs;
- Mainline repairs; and
- Sewer monitoring.

Large 'scale sewer replacement projects are also undertaken by the Engineering Services Department to improve the overall condition of the City's sewer network which in turn reduces inflow and infiltration. To meet the targets and objectives set out in the Inflow and Infiltration Reduction Strategy, it is anticipated that there will be a need to augment and expand the City's current program.

Relationship to Vaughan Vision 2020 / Strategic Plan

In consideration of the strategic priorities related to Vaughan Vision 2020, the recommendations of this report will assist in:

- The pursuit of excellence in service delivery;
- Planning and managing growth and economic vitality;
- Leading and promoting environmental sustainability;
- Maintaining assets and infrastructure integrity;
- Ensuring and enhancing community safety, health and wellness;
- Ensuring financial stability; and
- The demonstration of leadership and promotion of effective governance.

This report is consistent with the priorities previously set by Council, however additional resources will be required to implement the final Strategies. As the strategy development progresses, staff will submit funding requests through the appropriate capital and operating budget process in order to effectively meet our local obligations related to these initiatives.

Regional Implications

Through the development and implementation of the Strategies, the Region and the nine local municipalities have the opportunity to demonstrate leadership in inflow and infiltration reduction and long term water conservation within the industry and contribute to the sustainability of the water and wastewater systems. On February 17th, 2011, Regional Council endorsed both the draft Inflow and Infiltration Reduction and Long Term Water Conservation Strategies.

Conclusion

The endorsement and implementation of the Inflow and Infiltration Reduction and Long Term Water Conservation Strategies will result in increased system capacity in both local and Regional servicing systems thereby allowing the City and the Region continued growth in a more sustainable and environmentally friendly manner.

It is anticipated that additional funding and resources will need to be allocated in future operating and capital budgets to successfully implement the initiatives and programs set out in the Strategies.

Attachments

1. York Region – Environmental Services Committee Report, February 9, 2011
Inflow and Infiltration Reduction Strategy (Adopted by Regional Council on February 17, 2011)
2. York Region – Environmental Services Committee Report, February 9, 2011

Long Term Water Conservation Strategy (Adopted by Regional Council on February 17, 2011)

Report prepared by:

Jennifer Cappola-Logullo, Water / Wastewater Engineer, Ext. 8433
Michael Frieri, Manager of Engineering Planning & Studies, Ext. 8729
Andrew Pearce, Director of Development/Transportation Engineering, Ext. 8255

Respectfully submitted,

Bill Robinson, P. Eng.
Commissioner of Engineering and
Public Works

Andrew Pearce, C.E.T.
Director of Development /
Transportation Engineering

Brian Anthony, CRS-S, C. Tech.
Director of Public Works

6

INFLOW AND INFILTRATION REDUCTION STRATEGY

The Environmental Services Committee recommends the adoption of the recommendations contained in the following report dated January 17, 2011, from the Commissioner of Environmental Services.

1. RECOMMENDATIONS

It is recommended that:

1. Regional Council endorse the Inflow and Infiltration Reduction Strategy (the Strategy), subject to minor adjustments to the final drafts arising out of the pre-submission consultation with the Ministry of the Environment. Through development and endorsement of the Strategy, York Region and local municipalities commit to:
 - Develop and maintain this Strategy including the programs, goals and inter-agency and regulatory reporting requirements for staged reduction of inflow and infiltration over the next 20 years
 - Recommend to future Councils that they commit funds for inflow and infiltration reduction that is economically justified by the avoidance of future treatment and conveyance costs
 - Measure wastewater flows before and after carrying out construction/rehabilitation works on sewers and to document inflow and infiltration expenditures and flow reduction measures
 - Continue to work together in a collaborative manner over the life of the Strategy and to commit the appropriate staffing and financial resources toward implementation of the Strategy based on a business case analysis
2. The Regional Clerk circulate this report to the Clerks of local municipalities.
3. The Regional Clerk forward a copy of this report to the Ministry of the Environment, Central Region Office.

2. PURPOSE

The purpose of this report is to present the Strategy developed in accordance with the current Inflow and Infiltration Reduction Program and pilot projects and requirements of the Conditions of the Minister of the Environment as part of the approval of the Southeast Collector Trunk Sewer Individual Environmental Assessment. York Region is the first Regional Municipality required by the Ministry of the Environment to meet such unique and stringent conditions related to inflow and infiltration in Regional and local sewer systems.

The Strategy provides an overview of current inflow and infiltration and describes the targets, activities, timelines and milestones of future objectives and programs being considered by the Region and local municipalities to manage inflow and infiltration.

3. BACKGROUND

Reducing inflow and infiltration has been an integral part of servicing considerations by the Region since the first Water and Wastewater Master Plan was developed in 1997. The 2001 York Durham Sewage System Master Plan update specifically identified water conservation and extraneous flow reduction as a significant design consideration for all York Durham Sewage System projects. In combination with alternatives considered during the Southeast Collector Trunk Sewer Individual Environmental Assessment, inflow and infiltration reduction efforts across the Region were increased in 2007 with Regional Council approving a commitment of \$23 million in the 10-year Capital Plan with ongoing efforts by both Regional and local municipal staff to control inflow and infiltration.

Although advances in inflow and infiltration reduction measures have been significant, a considerable amount of additional work is now required to meet the Minister's conditions. In summary, approval of the Southeast Collector Trunk Sewer is subject to stringent conditions based upon the following overall directions:

- A compliance, monitoring and reporting program is to be established
- York Region is required to establish a stakeholder advisory committee consisting of representatives from local and regional municipalities, agencies, environmental groups and residents
- A review of best in class inflow and infiltration reduction strategies are to be completed in conjunction with the Region and the local municipalities and an independent peer review of the Strategy is to be presented to the advisory committee, and submitted to the Ministry of the Environment
- A performance management plan is to be developed and then submitted to the advisory committee and the Ministry of the Environment

To date, York Region and local municipal inflow and infiltration reduction pilot programs have focused on identifying and reducing flows originating from public infrastructure. However, inflow and infiltration flows from private sources are common in the local municipalities within the Region. Based on similar systems across North America and the findings of the Industry Practice Scan, it is estimated that 50%–70% of all inflow and infiltration comes from private property sources.

Inflow and infiltration is inherent in York Region's sewer system

As sewer systems age, infrastructure tends to deteriorate and the likelihood that inflow and infiltration will enter the sewer tends to increase and consume additional sewer capacity. Poor construction practices and guidelines can also contribute to the amount of inflow and infiltration in the system. This extra volume of water can potentially overload the sewage collection system pipes causing back-ups. Raw sewage overflows can also occur during storm events posing risks to public health and the environment. Additional costs are incurred to convey and treat these extraneous flows.

2011-2031 inflow and infiltration reduction strategy developed in partnership with local municipalities

The purpose of the Strategy is to document and describe the recommended program and the implementation sequence for the Region and local municipalities to reduce flows from sewer systems within the Region.

The Region formed an Inflow and Infiltration Task Force in April 2010 to successfully develop a comprehensive Strategy that addresses the Minister's Conditions. The Task Force is comprised of representatives from all nine local municipalities and the Region and is responsible to review inflow and infiltration issues and formulate an overall direction for development and implementation of the Strategy.

The Strategy outlines efforts required to reduce flows and addresses the conditions as described above. The resulting action plan is based upon previous project experience, input from the Task Force and findings from the Industry Practice Scan and Peer Review Process. Throughout development of the Strategy, York Region and the local municipalities have worked collaboratively to identify the various activities and roles of their respective organizations to help support program implementation.

4. ANALYSIS AND OPTIONS

Establishing inflow and infiltration goals and targets is key to program success

The Southeast Collector Trunk Sewer Individual Environmental Assessment contained a detailed evaluation of the effectiveness of water conservation and inflow and infiltration reduction measures across several municipalities. An instantaneous peak flow reduction of 10% within the Southeast Collector during a 25 year storm event was the target outlined in the Southeast Collector Trunk Sewer Individual Environmental Assessment. This amount of instantaneous peak reduction corresponds to a volumetric reduction of approximately 71 megalitres over a 24 hour period under a 25 year storm event. Reducing this volume will be accomplished through the combined efforts of the Long

Term Water Conservation Strategy and the Inflow and Infiltration Reduction Strategy. The 10% peak reduction is approximately a 15% reduction in 2031 average day flows.

Preliminary assessment indicates that the Long Term Water Conservation Strategy will contribute 40%-50% of the overall reduction required, leaving approximately 41 megalitres per day targeted for inflow and infiltration reduction. The Long Term Water Conservation Strategy is defined in a separate report on the Environmental Services Committee February 9, 2011 agenda.

Through development and endorsement of the Strategy, York Region and local municipalities commit to:

- Develop and maintain this Strategy including the programs, goals and inter-agency and regulatory reporting requirements for a staged reduction of inflow and infiltration over the next 20 years
- Recommend to future Councils that they commit funds for inflow and infiltration reduction that are economically justified by the avoidance of future costs to treat and convey inflow and infiltration
- Measure wastewater flows before and after carrying out construction/rehabilitation work on sewers and to document inflow and infiltration expenditures and flow reduction measures
- Use the information for future inflow and infiltration reduction processes.
- Continue to work together in a collaborative manner over the life of the Strategy and to commit the appropriate resources towards the implementation of the Strategy

Inflow and infiltration reduction program timelines span a 20 year period and beyond

The schedule and timeline for achieving inflow and infiltration reduction goals are preliminary and will be updated as progress is made through implementing the Strategy. Final timing of activities is contingent upon successful implementation of preceding activities.

A series of short term and ongoing activities is required to ensure that adequate planning activities are conducted and that resources are available to implement the Strategy. The Strategy will be submitted to the Ministry of the Environment on March 31, 2011. Annual performance management plans will be developed and submitted. Subsequent Strategy updates will be developed with the Region and local municipalities and submitted every five years.

Investigating and mitigating inflow and infiltration sources will ensure program success

Sanitary sewer system investigations are key in determining where critical areas of inflow and infiltration are occurring due to direct storm water connections, degrading infrastructure or improper installation.

Sanitary sewer investigation techniques include:

- Smoke testing
- Closed circuit television mainline inspection
- Closed circuit television lateral inspections (in many cases both private and public laterals)
- Manhole inspections
- Flood/dye testing
- Household drainage inspections

In February 2008, the York Region and local municipal Inflow and Infiltration Reduction Program started as a cooperative effort between the Region and the nine local municipalities. Approximately 25% of the entire wastewater system was monitored through 121 flow monitoring locations. A total of 77 locations were identified as having inflow and infiltration. These were prioritized to 26 locations in which inspections were conducted. Data collected during the program was used to identify specific defects that could be targeted for inclusion as potential remediation pilot projects.

A total of 1,585 manholes were inspected and analysed. More than half of the manholes did not appear to have structural defects. None of the manholes inspected demonstrated catastrophic failure. Twenty-two manholes had significant infiltration occurring at the time of inspection. Closed circuit television inspections were completed and analysed for 84 kilometres of mainline pipes in the local municipalities. Defective joints and encrustation were the most predominant defects. As the target area for the original flow monitoring was focused on older clay and concrete mains, this trend was expected. Two-thirds of the pipes were assigned a low inflow and infiltration potential with the remaining third having a high inflow and infiltration score.

Closed circuit television lateral inspections were analysed for approximately 80 kilometres of pipes. The majority of the laterals inspected did not have significant service defects. Minor defects were encountered in 200 inspections, moderate defects were found in 33 laterals inspected, and none of the pipes were deemed to be in detrimental repair. The most frequently encountered defects were defective joints, roots and encrustations. The majority of the pipes inspected were assigned a low inflow and infiltration score.

Asset management condition assessment programs are used to identify system deficiencies

Recognizing that the Region and local municipalities each conduct ongoing condition assessments as part of their asset management programs, any procedures utilized should recognize inflow and infiltration as a system deficiency. Ongoing condition assessment and any future inspections specific to inflow and infiltration reduction should complement this Strategy.

Appropriate inflow and infiltration investigation methods must be used to locate sources of inflow and infiltration. Standardized inspection procedures will lead to the development of a rehabilitation plan which includes the appropriate and cost-effective rehabilitation techniques that should be implemented to resolve inflow and infiltration related problems.

Bylaw enforcement for sewer inspections will help reduce inflow and infiltration from private property

To ensure access to the private portion of the sewer network, the Region and local municipalities will ensure that their respective sewer use bylaws include provisions such as right of entry or inspection that will allow for inspection access by the municipality or their contractors.

These bylaws can be used to access the property for all related work, including installing cleanouts, liners or new pipe as well as conducting closed circuit television work on laterals.

Currently, the City of Vaughan, Towns of Markham and Georgina have bylaws which stipulate access be given to staff into areas where wastes or storm waters are discharged for the purpose of inspection and examination of processes, private sewer connections and other works.

A best in class review of private access bylaws will be conducted with Regional and local municipal staff to formulate common language and direction for Region wide adoption.

Communication and education of inflow and infiltration reduction program is necessary

Communications, education and advocacy have been identified as necessary components required to achieve inflow and infiltration reduction in York Region. A coordinated team of Regional and local municipal staff will oversee the creation of clear and consistent messaging with a consistent brand identity for use both internally and externally with various stakeholder groups. The communications and advocacy staff team will work closely with other members of the program team to create a communications plan that will meet the needs of the evolving program.

Communications and advocacy will play a strong support role in working with technical staff to deliver key messages to various stakeholders. Key focus areas are:

- Internal communication for Steering Committee and staff
- External communication for council, public and other agencies
- Development of consistent and appropriate messaging (for council, public, other agencies)
- Coordination with leadership and advocacy to identify stakeholders

- Development of communication plan (timing, media, based on communication template, etc.)

York Region and municipal staff will work in collaboration to develop materials, workshops and tools required to assist staff in meeting the goals and objectives of the inflow and infiltration reduction program. The communications and advocacy team will liaise with regulatory compliance and policy staff to ensure that current and future works comply with all applicable regulations.

Continued industry communication and outreach will help build strong program and construction standards

The Inflow and Infiltration Reduction Program will consult with industry stakeholders on a regular basis to ensure that developing policies and standards meet the needs of inflow and infiltration reduction and the building/construction industry. Ongoing communication through an industry advisory committee could engage the various stakeholders.

Stakeholders that will be included in this type of consultation are: building inspection officials, product and equipment manufacturers, engineering and design consultants, sewer and water contractors, developers and local homebuilders associations, environmental regulators, conservation authorities and trade groups.

The communications and advocacy staff team will identify opportunities to promote the ongoing inflow and infiltration reduction work to the water and wastewater industry through conferences, workshops, webinars, trade magazines and seminars. Continuous improvement efforts, partnerships for research, innovation and demonstration projects will be explored.

These relationships will ensure integrity of program and construction standards and will create support from industry practitioners for implementation of these standards in new development and construction.

Best in class practice research study shows York Region's strategy is leading edge

As part of the Strategy development, a comprehensive best in class practice research study of 16 International and North American agencies was conducted. The agencies selected for the best in class review had current strategies, were identified as leading practitioners within other industry program reviews, and had a reputation among practitioners as being progressive with well documented programs. The selected agencies shared similar problems and approaches to inflow and infiltration as experienced within York Region. Each agency had well documented components of a strategy, a similar governance structure, and was considered progressive in reducing inflow and infiltration and had similar goals and objectives to the Regional program.

Of the 16 agencies where the highest level of research was completed:

- Four were International (Greater Dublin – Ireland, Mullumbimby-Australia, Auckland – New Zealand and North Shore City –New Zealand)
- Five were Canadian (Metro Vancouver and Capital Regional District - British Columbia, Halifax Regional Municipality - Nova Scotia, the Region of Niagara and Region of Waterloo in Ontario)
- Seven were American (Metropolitan Council-St. Paul Minnesota , Western Lake Superior Sanitary District, Renewable Water Resources-South Carolina, Milwaukee Metropolitan Sewerage District, Wisconsin, King County, Washington Metropolitan Sewer District of Greater Cincinnati, and Massachusetts Water Resources Authority

Peer review provided positive feedback and suggested increased flow monitoring and private property rehabilitation

A peer review of the Strategy was completed along with the best in class practice scan. Metropolitan Council, St. Paul Minnesota; Milwaukee Metropolitan Sewerage District, Wisconsin; King County, Seattle; and Metropolitan Vancouver all took part in the Peer Review and provided comments and recommendations on the Strategy, timelines, deliverables and program components.

In general, participating agencies endorsed the Strategy and confirmed that the document was well presented, comprehensive and met and often exceeded industry practice. Key comments include:

- A more robust flow monitoring program across the Region and local municipalities to accurately set a baseline
- Stronger and earlier consideration for private property rehabilitation and renewal in the Strategy
- The Task Force approach was felt to yield a more consistent focus for the program's longevity
- The Strategy lays good foundation to help the Region and local municipalities begin the infancy action plan to successfully build a sound asset management program

Table 1 provides a breakdown of the inflow and infiltration reduction program and component timelines based on continuing the current program and implementing new tactics.

Table 1
Inflow and Infiltration Reduction Region and Strategy Timelines

Activity	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020 - 2031
Establish Baseline flows													
Enhanced Program Development													
Pilot Project Implementation													
Measure Success of Pilot Projects													
Refine Targets for I/I Reduction													
Ongoing Capital Projects & Flow Reduction													
Up to 25% of Target Reduction													
25 -100% of Target Reduction													
MOE Annual Report													
Strategy Update to MOE													

5. FINANCIAL IMPLICATIONS

The objective of the funding component is to develop a sustainable source of funding to support the long term implementation of the Strategy that is equitable to the partners and community while addressing inflow and infiltration reduction targets.

Being a two tier system, local municipalities currently have responsibility for ensuring that the local sanitary collection system is maintained and operating effectively. Programs are funded at the municipal level with each municipality determining annual capital requirements based on asset condition. Funding sources for these programs are primarily derived from user rates calculated based on water consumption flows. Alternate funding has also been made available from time to time from various Provincial and Federal infrastructure programs.

The Region is responsible for transmission of sewage from the local systems to final treatment facilities as well as final treatment. Funding for the Regional system is provided through wholesale user rates incorporated into the local water/sewer billing and Development Charges Rates. The Region applies this funding primarily to the Regional infrastructure with some contribution towards infrastructure studies that benefit the local municipalities. Studies typically recommend improvements which are then implemented by the local municipalities. Until recently, there has been limited capital investment from the Region for improvement of the local systems. With the Region's recent 2007 program for flow monitoring and associated pilot projects, a significant investment of \$23 million was approved for the local systems across the Region.

Proposed system wide collaborative funding model will sustain inflow and infiltration reductions over the long term

The Inflow and Infiltration Reduction Strategy will be supported by a collaborative long term funding model based on a cost shared approach between the two tiers of local government. The key funding principles are:

- A set rate will be collected at both the local and Regional level as identified through the needs of the Strategy and as agreed to by the municipal partners
- The amount collected at the local level will be used to address priorities identified both through the Strategy and as determined by each local municipality
- The amount collected at the Regional level will be used to address Regional inflow and infiltration priorities both at the Regional and local level
- The allocation of Regional funds intended for use in the local systems will be managed and allocated by a joint team with staff representatives from each municipality and the Region. Funding will be granted based on the most effective application to achieve the desired inflow and infiltration improvements as quickly as possible

In the absence of a full program scope and based on staff estimates, an initial funding target of \$100 million over a 20 year period was used to assess the proposed funding requirements. This equates to an annual investment of \$5 million per year across the Region. The proportionate share based on an average cost of \$0.04 per cubic meter of water sales (\$0.02 of the local municipal rate and \$0.02 on the Regional rate). Where system improvements can be made to create an overall standing reduction in inflow and infiltration and thereby increasing system capacity, Development Charges Funding will be used.

From the \$23 million that Regional Council approved in 2007 as part of the 10 year Capital Plan:

- \$5 million has been spent in 2008-2010 on flow and rainfall monitoring and analysis
- \$10 million will be spent in 2011-2012 on nine local municipal high priority pilot projects for inflow and infiltration rehabilitation
- The remaining \$8 million will be spent in 2013 and beyond as part of Inflow and Infiltration Reduction Strategy

Strategic financial action plan to ensure funding model adapts to program findings

Short Term (1-5 Years) – Actions on the financial plan include the following:

- Develop preliminary cash flow plan to establish interim funding requirements
- Establish reserves where necessary to maintain funds
- Investigate other funding strategies used in governments with successful inflow and infiltration reduction programs

- Review funding and financing options to address private side inflow and infiltration reduction
- Establish process to identify and apply for alternative external funding sources
- Investigate development charge collection for equitable proportion of funding
- Establish appropriate governance and coordination model to manage overall funding and prioritization exercise effectively
- Initiate governance meetings
- Implement early phases of capital projects to achieve long term objectives

6. LOCAL MUNICIPAL IMPACT

Local municipal endorsement of the Inflow and Infiltration Reduction Strategy required to fulfill conditions of approval

Local municipal staff have been involved in the development of the Inflow and Infiltration Reduction Strategy through participation in the Water and Wastewater Steering Committee. Local municipal staff have committed to bring reports to local Councils to seek endorsement of the Inflow and Infiltration Reduction Strategy by March 31, 2011 to fulfill conditions of approval for both the Southeast Collector Trunk Sewer Individual Environmental Assessment.

Successful implementation of this program will require access to private property

Private property infrastructure generally refers to sewer service laterals, which connect building plumbing to the municipality's sanitary sewer systems. In some cases the private property infrastructure might also include collection pipes, pump stations, and/or treatment plants. Potential sources of inflow and infiltration from private property include: broken sewer laterals, root intrusions into laterals, uncapped sewer cleanouts, and cross connections from roof drains and/or foundation drains. Sump pump cross connections are an additional source of inflow and infiltration. The total length of the wastewater collection system in the York Durham Sewage System service area is approximately 7,000 kilometres. Of this total, approximately 300 kilometres is owned by York Region, 3,000 kilometres is owned by local municipalities, and 3,700 kilometres is owned privately.

Eliminating infiltration from the public mains while ignoring the private infrastructure will compromise the Region's efforts to reduce infiltration into the Southeast Collector Trunk Sewer short of the overall program goals. Reducing inflow and infiltration on private property is required for success of the Strategy and program. Access to private property is critical to achieving continued inflow and infiltration reductions over and beyond the Regional and local municipal systems.

As revealed in the Industry Practice Scan, the first step in addressing private infiltration is to ensure each municipality's sewer use regulations, specifications or bylaws establish guidelines for "acceptable" levels of infiltration and establish the municipality's authority to inspect private plumbing for infiltration and order repairs. A more thorough effort to reduce private infiltration will require direct internal inspection of private lines.

To successfully address inflow and infiltration from private property the long term Strategy must include the following:

- Establish legal authority to enter private property under municipal bylaws or other binding agreements
- Create a strong program of communication and technical assistance to help homeowners design an alternative discharge method for the flows
- Establish a clear policy regarding responsibility for the cost of repairs including subsidy or grant programs
- Establish municipal authority to order the remediation of the problem by the property owner, even if the municipality plans to cover the cost of disconnecting the flows itself
- Include a program of follow up inspections after repairs are made and periodically inspect repairs/disconnections thereafter
- Establish a strong public outreach and education component so that the public is aware of the problem and the benefits of inflow reduction

How extraneous flows from private property can be addressed

The industry has identified a broad range of options to address extraneous flows from private property. The Region and local municipalities should consider the following options within the coming years:

- Household plumbing and drainage inspections
- Downspout disconnection by Region, municipality or property owners
- Foundation drain disconnection programs by Region, municipality or property owners
- Lateral rehabilitation programs by Region, municipality or property owners
- Time of re-sale inspections and/or lateral inspection or certification programs

7. CONCLUSION

York Region and local municipalities will take joint overall responsibility to implement the Inflow and Infiltration Reduction Strategy. The Region and local municipalities will also be required to further define and implement the requisite activities necessary to ensure that the Strategy is continually maintained, enhanced and implemented. This process will commence in April 2011 and is anticipated to continue as a sustained program. The Strategy will be updated as required as data is collected, new information is learned and new technology becomes available.

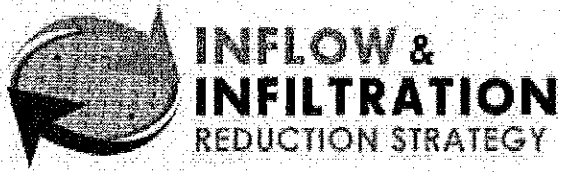
Review and update of the overall Strategy will require the sustained commitment of Regional and local municipal resources over the life of the program. Updates and

revisions to the Strategy will be presented to the Ministry of the Environment annually and in five-year update reports. York Region will submit to the Regional Director and the Southeast Collector Advisory Committee an annual report detailing its progress on implementing the Strategy including inflow and infiltration reduction. In addition to the first report that will be delivered to the Minister on March 31, 2011, the Region is required to update the Strategy, to the satisfaction of the Regional Director, at least once every five years until the Strategy is finalized or until otherwise directed by the Ministry of the Environment.

For more information on this report, please contact Lucas Cugalj, Director, Strategy and Business Planning at (905) 830-4444, Ext. 5041.

The Senior Management Group has reviewed this report.

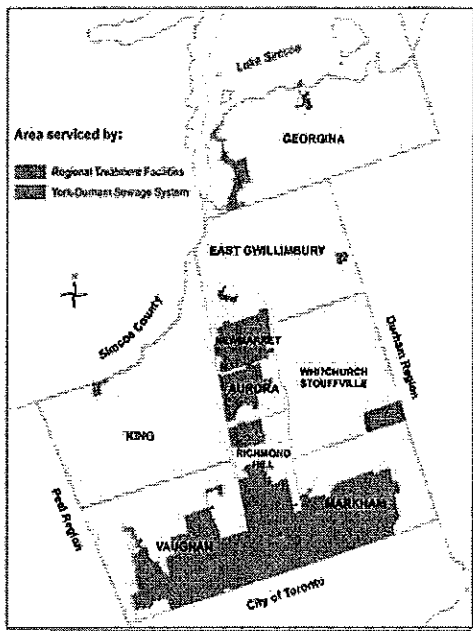
(The attachment referred to in this clause is attached to this report.)



DRAFT INFLOW & INFILTRATION REDUCTION STRATEGY EXECUTIVE SUMMARY

Executive Summary

York Region (the Region) is one of six Regional, “upper tier” Governments in Ontario. There are nine local or “lower tier”, municipalities within the Region: the City of Vaughan, the Towns of Aurora, East Gwillimbury, Georgina, Markham, Newmarket, Richmond Hill, Whitchurch-Stouffville, and the Township of King.



Wastewater servicing is multi-jurisdictional based on a two tier municipal governance structure. Sewage from most of the communities in the Region is collected through a combination of local municipal and Regional sewer systems. York Region is responsible for major pumping stations, trunk sewers and treatment plants. The local municipalities provide direct collection and management of the local system infrastructure and wastewater flows into the Regional trunk system. In addition, private property owners are responsible for wastewater mains and service laterals within their property.

On March 31, 2010, the Minister of the Environment approved the Individual Environmental Assessment for York Region’s Southeast Collector (SEC) Trunk Sewer project which involves the construction of a 15 km tunneled sanitary trunk sewer. This capital project is vital to service the approved growth within the Region. The approval was subject to a series of conditions.

Specifically, Subsection 8.2 states that the Region is required to develop an Inflow and Infiltration Reduction Strategy (the Strategy), which *“shall include a program for the reduction of inflow and infiltration by the Regional Municipality of York to the Southeast Collector Trunk Sewer from its and its lower tier municipalities’ sewage systems. This program shall include reduction priorities, targets, timelines, tactics and initiatives, and the associated costs to implement these.”*

This Strategy document has been developed by the Region and local municipalities in response to the Minister's Conditions and describes the process that the Region intends to undertake in order to successfully meet those conditions.

The Strategy will build upon programs already underway. York Region and local municipalities each have existing programs in place, including but not limited to operations and maintenance programs, asset management programs, inspection and monitoring programs, and inflow and infiltration reduction. It is the purpose and intent of this Strategy to build upon these existing programs to meet or exceed the requirements and intent of the Minister's Conditions.

Through its development and implementation, York Region and the local municipalities have an opportunity to demonstrate leadership in inflow and infiltration reduction within the water and wastewater industry. The Region and local municipalities' current commitment to inflow and infiltration reduction will serve to form the foundation upon which a world class program can be developed.



The Strategy document is divided into 3 sections:

Section 1: Background and Rationale

Inflow and infiltration is surface water and groundwater that enters the sewage collection system. Inflow: is 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 manhole covers. Infiltration: is groundwater that enters through holes and cracks in manholes, laterals and sewer pipes.

Reducing inflow and infiltration has been an integral part of servicing considerations by York Region since the first Water and Wastewater Master Plan developed in 1997. The 2001 York Durham Sewage System (YDSS) Master Plan update specifically identified “water conservation / extraneous flow reduction” as a significant design consideration for all YDSS projects. In conjunction with alternatives considered during the Southeast Collector Trunk Sewer Individual Environmental Assessment, inflow and infiltration reduction efforts were stepped up in 2007 with Regional Council approving a commitment of \$23 million in the 10 year capital plan to study and implement pilot remediation projects in both Regional and local municipal systems.

Peak inflow and infiltration usually occurs during long periods of precipitation, snow melt or large storm event, and can result in sewer backups, system overflows, risks to health, damage to the environment and increased costs.

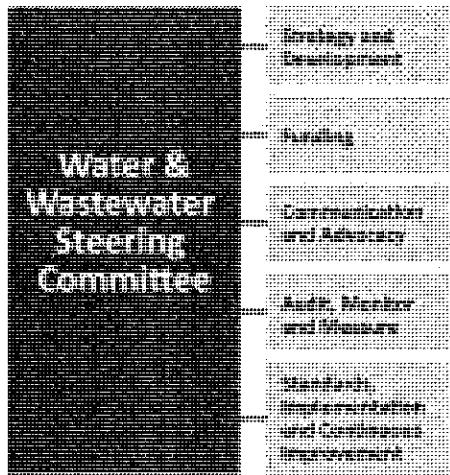
Excessive inflow and infiltration consumes sewer capacity for existing residents and future growth. In addition, as sewage systems age it is more likely that inflow and infiltration will enter the collection system. Developing this long term Strategy has; therefore, been developed to proceed with York Region’s initiatives further to achieve set goals for reducing inflow and infiltration throughout the Region while ensuring that all of the Minister of the Environment’s conditions of approval related to reduction of inflow and infiltration for the SEC project are met.

This section depicts the purpose and goals of the Strategy as well as asset principals, and provides a brief description of the Region and local municipal sewage system, its major hydraulic components and the impact that anticipated growth could have on the system. Previous projects and existing inflow and infiltration control efforts that are being conducted within the system are also discussed in detail.

Section 2: Strategy Development

In order to develop such a comprehensive Strategy to meet the Minister’s Conditions, the Region formed an Inflow and Infiltration Reduction Task Force (the Task Force) in April 2010. The Task Force established a Water & Wastewater Steering Committee (the Steering Committee) that is comprised of representatives from each of the nine municipalities and the Region. The Steering Committee is responsible to reviewing inflow and infiltration issues and formulating an overall direction for the development of the Strategy.

DRAFT INFLOW & INFILTRATION REDUCTION STRATEGY – EXECUTIVE SUMMARY



To support the Steering Committee, five working groups were established to address the following Strategy areas:

- Strategy Development
- Funding
- Communication and Advocacy
- Audit, Monitor and Measure
- Standards, Implementation and Continuous Improvement.

Through a series of bi-weekly and monthly meetings by each of the working groups, each reviewed, developed and strategized the key program initiatives and they developed work plans for the implementation of the Inflow and Infiltration Reduction Strategy. In addition, another committee has been formalized at the direction of the Minister's Conditions which is the Southeast Collector Advisory Committee (SeCAC). This committee included members of the local community, Regional staff and staff from external agencies. The committee is charged with providing input, comments and suggestions on topics relating to the commissioning of the Southeast Collector Trunk Sewer and input and comments on the Strategy document.

To ensure that the components are met or exceed leading industry practice, the Region undertook an industry wide international best in class review. The key findings from this international review are also included within the Strategy document and a number of programs to align with best practices have been identified within this Strategy. A gap analysis between international practices and the Region's programs was completed and the recommended Strategy was developed. It was found that the programs and activities included within this Strategy meet and often exceed international best practices. Section 2.5.2 in the Strategy includes a comparison table describing key components and activities of leading edge practices against the current and future inflow and infiltration reduction program in the Region.

The recommendations, work plans and conclusions of the working groups were determined through a consensus based approach using input gathered through the best in class review and the input of the Steering Committee and working group members.

Finally, a peer review of the overall strategy document was completed in December 2010 by several leading agencies which included King County (Seattle, Washington), Milwaukee Metropolitan Sewerage District (Milwaukee, Wisconsin), Metropolitan Council (St. Paul, Minnesota) and Metro Vancouver (Vancouver, British Columbia). A PowerPoint presentation and electronic copies of the Strategy document were presented to the peer reviewers. Comments were compiled, validated by York Region and where appropriate were incorporated in the finalization of this Strategy. In general, the feedback received about the Strategy from the peer review agencies was very positive and constructive. No significant gaps were identified, demonstrating that the Strategy was well received and thorough.

Section 3: 2031 Inflow and Infiltration Reduction Strategy

The Strategy is defined in a series of high level program areas, each of which will require that a number of specific program activities be accomplished. The program areas were selected based on their consistent representation in other best in class inflow and infiltration reduction programs.

This approach includes defining or addressing issues in each of the following program areas:

- Establish Overall Program Goals and Targets
- Monitor and Analyze Flows
- Investigate and Mitigate
- New Construction and Capital Projects
- Financial Management
- Communication and Education
- Report Inflow and Infiltration Reduction
- Continuous Improvement

Section 3 defines each of these program areas and provides descriptions of the specific program activities and deliverables that will be required within each program area. These deliverables are necessary to successfully reduce inflow and infiltration in the area tributary to the Southeast Collector Trunk Sewer and to meet the Minister's Conditions.

Governance and Formation of Strategy Leadership

It will be necessary to define the leadership for implementing the Strategy. The Region intends that the Strategy will be championed and led jointly by the Task Force with overall leadership, direction and assistance provided by Regional staff. The Task Force, comprised of representatives from each of the nine municipalities and the Region, was initially responsible to review inflow and infiltration issues and formulate an overall direction for the development of this Strategy. Local municipal members were responsible for reporting back to their respective organizations and Councils.



As the Regional Strategy is implemented over the next 20 years, the Task Force will continue to provide primary leadership for the Strategy, representing the interests of both the Region and each of the municipalities, and having responsibility for reporting to the Minister as required to meet the Conditions that have been set forth.

Program Area 1 – Establish Inflow and Infiltration Reduction Program Goals and Targets

The Southeast Collector Trunk Sewer Individual Environmental Assessment contained a detailed evaluation of the effectiveness of water conservation and inflow and infiltration reduction measures across several municipalities. In general, a targeted 10% reduction of flows is thought to be achievable in York Region.

For the service area draining to the Southeast Collector (SEC) Trunk Sewer, it was determined that the volumetric reduction target is 71 mega litres over a 24 hour period. Reduction of this volume will be accomplished through the combined efforts of the Long Term Water Conservation Strategy and Inflow and Infiltration Reduction Strategy.

Preliminary assessment has indicated that the Long Term Water Conservation Strategy would contribute 40% to 50% of the overall reduction required.

At the highest levels, the goals of the Region and the local municipalities include:

- Reduce inflow and infiltration rates over a 20 year period into the Southeast Collector Trunk Sewer and within the Region,
- Minimize total conveyance, treatment and disposal system costs, and
- Implement a long term program that exceeds the Conditions set forth by the Minister.

DRAFT INFLOW & INFILTRATION REDUCTION STRATEGY – EXECUTIVE SUMMARY

Through the development of this Strategy, York Region and the local municipalities commit:

- To develop and maintain this Strategy including the programs, goals and inter-agency and regulatory reporting requirements for a staged reduction of inflow and infiltration over the next 20 years.
- To recommend to future Councils that they commit funds for inflow and infiltration reduction that is economically justified by the avoidance of future costs to treat and convey inflow and infiltration.
- To measure wastewater flows before and after carrying out construction/rehabilitation work on sewers and to document inflow and infiltration expenditures and flow reduction measures.
- To use the information gathered in future inflow and infiltration reduction processes.
- To continue to work together in a collaborative manner over the life of the Strategy and to commit the appropriate staffing and financial resources toward the implementation of the Strategy.

Activity	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020 - 2031
Establish Baseline flows													
Enhanced Program Development													
Pilot Project Implementation													
Measure Success of Pilot Projects													
Refine Targets for I/I Reduction													
Ongoing Capital Projects & Flow Reduction													
Up to 25% of Target Reduction													
25 -100% of Target Reduction													
MOE Annual Report													
Strategy Update to MOE													

The service area will be divided into a series of increasingly smaller, nested drainage basins to allow analysis, rehabilitation and auditing within reasonably sized geographic areas.

GEOGRAPHIC DELINEATION	NUMBER	AVG. LENGTH (KM)	DESCRIPTION
Service Area	1	2,740	Permanent Monitoring of the entire area draining to the Southeast Collector Trunk Sewer
Sewer Shed	5	548	Permanent Monitoring of the York Durham Sewer System Local Municipalities
Major Basin	54	343	Short Duration Monitoring of model calibration basins
Audit Basin	159	17	Permanent Monitoring of basins at the level which inflow and infiltration reduction is audited
Mini Basin	450	7	Temporary Monitoring of mini basins
Catchment	2900	1	Temporary monitoring of sub catchments

Geographic Delineation of the YDSS

Existing inflow and infiltration volumes, targets and successful reduction will be reported at the audit basin level.

Due to the complexity of the audit and measure process, the detailed procedures for the analysis and audit processes will be included in a separate appendix of this Strategy.

Program Area 2 – Monitor and Analyze Flows

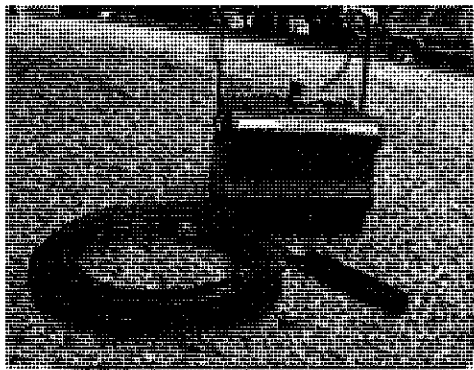
Wet weather flows can be highly variable depending on seasonal groundwater table fluctuation, snow pack, and antecedent moisture condition. Continuous and permanent flow monitoring over a sufficient time period is necessary to reveal these variations in flow. York Region and its local municipalities will need to utilize a network of short duration and continuous flow monitors in order to measure and record the changes in inflow and infiltration rates over time and determine flow rates under a variety of seasonal conditions.

It is recognized that a variety of flow metering technologies will be required to meet the requirements of the Strategy beyond the equipment currently owned by York Region. The selection of flow monitoring equipment will be determined by matching the appropriate technology with local hydraulic conditions. The flow monitoring implementation will balance the cost / benefit of various technologies and will also consider site specific hydraulic conditions. The flow monitoring program requirements for all levels of flow monitoring will be developed early on in the Strategy and will include details such as flow meter type, meter accuracy, data quality and management procedures, financial costs, meter relocation planning, etc.

Flow monitoring will include:

- Permanent Trunk / Municipal Monitoring
- Audit Basin
- Mini Basin
- Post Construction
- New Development Areas
- Rainfall Monitoring
(including “virtual rain gauges”)

Based on best practice experience and conclusions acquired from the International Best Practices Study it is anticipated that ongoing flow monitoring activities will be required throughout the course of



the Strategy.

During the Region and Municipal Phase 1 Pilot Project in 2008-2010, the Region developed comprehensive inflow and infiltration analysis procedures that will continue to be used in future years of the Strategy.

The methodologies for each of the major activities used in the analysis of inflow and infiltration related flows are generally:

- Rainfall analysis
- Dry weather flow analysis
- Wet weather flow analysis

Inflow and infiltration characterization and prioritization

York Region has previously developed and will continue to utilize a color coding system for plotting the inflow and infiltration responses for each rain event. Audit basins will be analyzed using the key factors identified in the following table. Based on the results of the thresholds, each basin will be categorized as a low (green), medium (yellow) or high priority (red).

Key Factors for Prioritization	Ranges & Color-Coding
Instantaneous Peaking Factor (Flow Peak/Flow Average)	PF < 4 (Low) 4 < PF < 8 (Medium)
RDI per Pipe Area (Lpd/mm-km)	RDI < 280 (Low) 280 < RDI < 560 (Medium)
% of Rain Entering System (%)	Cv < 5% (Low)
York Region (Towns) Peak I/I Flow per hectare (Inflow+Infiltration) (L/s/ha)	Flow/ha < 0.25 (Low) 0.25 < Flow/ha < 0.35 (Medium)

Program Area 3 – Investigate and Mitigate

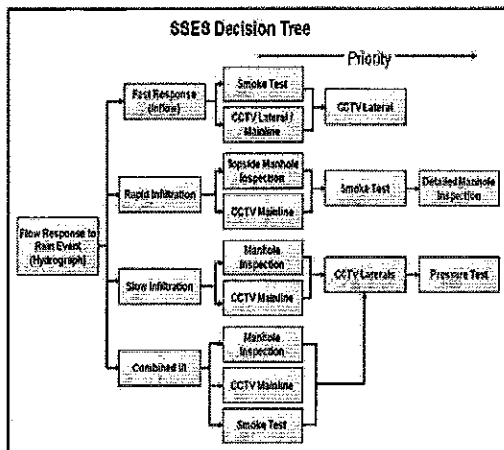
The Strategy describes the processes that will be applied to investigate the severity, extent and location of inflow and infiltration sources. The sewerage system that drains to the SEC has been delineated into a series of drainage basins. Additional flow monitoring will be conducted at the outlet of mini basins in order to identify specific locations or areas that display evidence of elevated inflow or infiltration flows.

Inspections

Specific basins will be identified where additional desktop, physical and electronic inspections will be required. In addition to specific inflow and infiltration related inspections, ongoing asset management related condition assessment programs will be completed. The inflow and infiltration related inspections will be implemented as a series of sanitary sewer evaluation studies

(SSES) and/or conducted as part of the condition assessment program.

A sample decision making tree for inspection activities is shown below.



The two major objectives of the field investigation activities and analysis are:

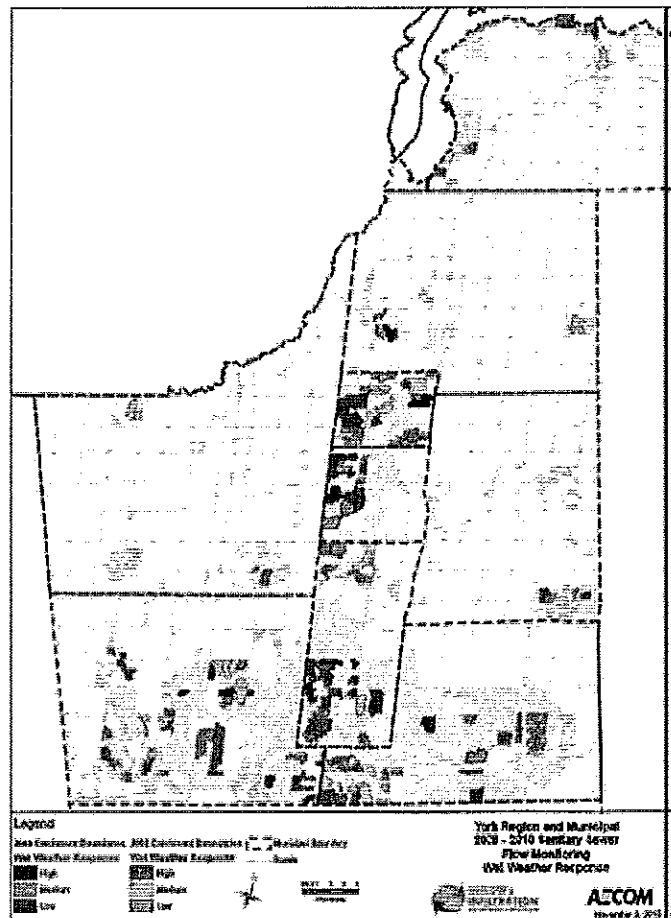
- Identifying specific inflow and infiltration sources and system structural and performance conditions.
- Applying standardized defect distress coding and inspection practices in order to reflect the severity and extent of issues.

SSES investigation techniques will include:

- Desktop analysis and drive by inspections
- Smoke testing
- Closed circuit television mainline inspection
- Closed circuit television lateral inspections (in many cases both private and public laterals)
- Manhole inspections
- Flood/dye testing
- Household drainage inspections

Mitigation through Project Delivery

Following the results of detailed flow analysis and structural and hydraulic assessments, cost effective solutions will be identified and specific rehabilitation techniques will be selected. Potential rehabilitation projects have been identified and prioritized based on several factors including: cost benefit, criticality, risk of failure, expected lifecycle and performance improvements, environmental impacts, social implications, plant performance, and operation and maintenance cost savings.



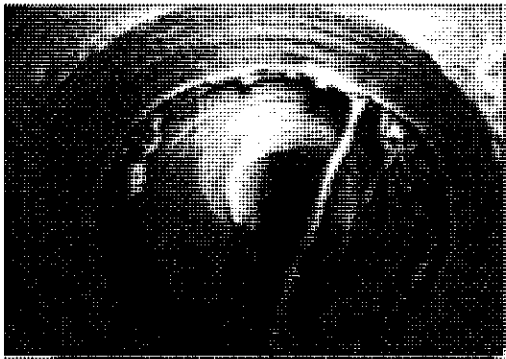
The project delivery and assessment phase of the Strategy will involve the design and construction of rehabilitation and replacement projects. Projects will be selected based on defined criteria and approved by the Steering Committee.

A risk framework and process has been implemented in the Region that includes an assessment of the risk associated with health and safety, financial impact, service level impact, socio-economic impact, liability and regulatory compliance. The risk of failure is then reviewed against the probability of failure to determine an overall priority.

The initial phase of project delivery is already underway with the implementation of the initial nine pilot projects that were identified in the Region and Municipal Inflow and Infiltration Phase 1 Pilot Program. Construction of the initial public right of way pilot projects is anticipated to occur prior to 2013. Upon completion, post construction flow monitors will be installed to validate that inflow and infiltration reduction has been successfully achieved.

Future project prioritization activities include:

- Develop an inter-agency project prioritization model (or optimized decision model) that will help to ensure consistency in the way that inflow and infiltration reduction related projects are prioritized.
- Prioritize and provide funding for the 16 un-committed Phase 1 Pilot Program Projects as described in Section 1 of the Strategy.



Determining Inflow and Infiltration Reduction Achieved

In a manner similar to the pilot projects planned for the Region and Municipal Inflow and Infiltration Phase 1 Pilot Program, and after future projects are constructed, reduction will be measured and the structural condition of the rehabilitated sewer system will be evaluated to ensure that the predictions for flow reduction and the effectiveness of the selected solutions were met.

As system rehabilitation and repair work is completed and post construction flow monitoring is conducted and the data is analyzed, a hydraulic model will be updated with revised hydrologic input parameters which simulate inflow and infiltration entering the system. Upon recalibration, the hydraulic model will then be used to characterize the newly repaired Audit basin and the 25 year design storm projections can be simulated. Revised inflow and infiltration volumes and reduction targets will be input into an audit process spreadsheet model to reflect actual reductions and to quantify any remaining difference between actual and targeted inflow and infiltration reduction.



External Asset Management Condition Assessment Programs

To complement the Strategy, the Region and local municipalities are currently conducting ongoing condition assessment as part of their asset management programs, ongoing programs, procedures and condition assessments as they relate to asset management or inflow and infiltration reduction should complement this Strategy. The Steering Committee or its designated working group have been collaborating to coordinate these municipal programs with the Regional Strategy.



Inspection Standards

In order to support the efficient collection and use of inspection records, it is important that inspections are completed in a consistent manner (including the municipal right of way and private property) and data is collected using standardized procedures and terminology. York Region has developed a series of Technical Specifications and Standards for closed circuit television mainline/lateral inspections, manhole inspections, and smoke testing that will be collectively used by the Region and the local municipalities for future inspections.

A comprehensive “routine” inspection program including the frequency and type of the inspection recommended is being developed that is based on the age and criticality of the discrete components.

Design and Construction Standards

Efforts to prevent inflow and infiltration from occurring in new construction should be ongoing, even as the program addresses existing inflow and infiltration sources. Precluding the entry of potential future inflow and infiltration into the system from new construction is an important element of the Strategy. Application of sound engineering design practices, development of specifications cognizant of inflow and infiltration, and enforcement of the specifications through adequate construction inspection of both the public and private infrastructure at all phases of construction are being recognized as key elements for achieving a tighter sewer system. A review and update of existing design standards is being recommended and is on going.

Program Area 4 – New Developments and Capital Projects

The objective of this section is to describe how construction standards for right of way and private infrastructure are being updated and utilized to ensure conformity to design intent.

New development commissioning practices have been developed and reviewed by the Region and local municipalities that consider:

- Visual Inspection
- Leakage Tests (Infiltration and Exfiltration)
- Deflection Testing
- Closed circuit television Inspections
- Smoke Tests
- Flow Monitoring

Through the analysis of flows in new development areas, a review of the current Infiltration allowance for inflow and infiltration is going to be completed.

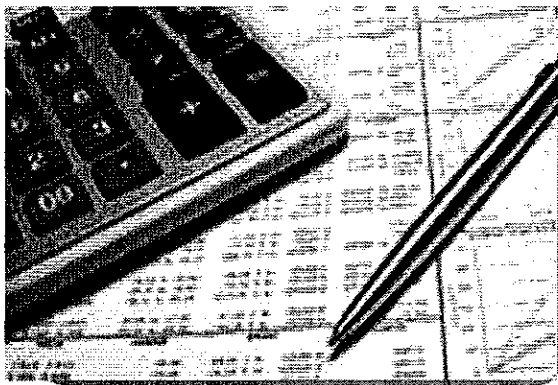
In addition, future activities identified include:

- Finalizing development of design and rehabilitation standards,
- Compilation of Regional and local municipal Sewer Use and Discharge Bylaws,
- Development of uniform Sewer Use Bylaws to allow access and improvements on private property,
- Development of standard procedures for flow analysis and catchment prioritization.

Program Area 5 – Financial Management

The objective of the funding component is to develop a sustainable source of funding to support the long term implementation of this Strategy that is equitable to the partners and community while addressing the inflow and infiltration reduction targets required through the Minister's Conditions.

In the absence of a full program scope, and based on Regional estimates, an initial funding target of \$100 million over a 20 year period was used to assess the potential funding requirements. This equates to a future annual investment of \$5 million per year across the Region.



The Strategy will be supported by a collaborative long term funding model based on a cost shared approach between the two tiers of government.

The key funding principles are:

- A set rate will be collected at both the local and regional level as identified through the needs of the Strategy and as agreed to by the municipal partners.
- The amount collected at the local level will be used to address priorities identified both through the Strategy and as determined by each local municipality. The funding is to be used to meet the objectives of the Strategy in support of inflow and infiltration reduction. Any additional investments required to maintain local sanitary infrastructure will be in addition to the amounts required by the Strategy.
- The amount collected at the Regional level will be used to address Regional inflow and infiltration priorities both at the Regional and local municipal level. Investments in the local systems will be made to accelerate resolution of Regional priorities through augmenting local funding sources.
- The allocation of Regional funds intended for use in the local systems will be managed and allocated by a joint board made up of representatives from each municipality and the Region, and will be granted based on the most effective application to achieve the desired inflow and infiltration improvements as quickly as possible.

The Strategy requires that each local municipality contributes and maintains a specific and sustainable funding allocation towards the Inflow and Infiltration Reduction Program. However, this funding shall be allocated to the local system from which it is collected for future allocation through reserves or other appropriate means.

The funding requirement does not preclude the local municipality from collecting additional funding from the rate for other infrastructure and asset management needs of the local sewer system.

The net impact of the new Strategy could be an increase in local rates or a reallocation of existing local rates. This would be dependent on current and future needs as determined by each municipality and provided that the local municipal system meets a Regional performance standard determined through the Strategy.

Funding is a Region wide controlled pool that is directed by the Task Force, and is allocated based on the priorities developed through the Inflow and Infiltration Reduction Strategy to achieve the greatest system benefits region wide.

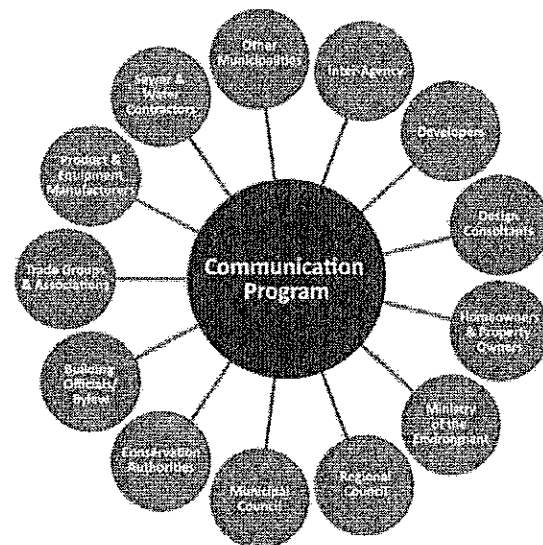
A preliminary list of program activities that will require funding includes:

- Flow monitoring
- Inspection programs
- Data analysis
- Development of common guidelines and standards
- Continuous improvement
- Communications programs
- Rehabilitation/replacement programs
- Pilot tests

To accomplish this, short term (1-5 years), medium term (5-10 years) and long term (10 years and beyond) planning horizons have been developed to establish and sustain funding for the Strategy. Funding requirements will continue to be reviewed and updated throughout the implementation of the Strategy.

Program Area 6 – Communication and Education

Communications, Education and Advocacy have been identified as one of the components required to successfully achieve inflow and infiltration reduction in York Region. A coordinated team of Regional and local municipal staff will oversee the creation of clear and consistent messaging with a consistent brand identified for use both internally and externally with the various stakeholder groups. The communications and advocacy staff team will work closely with other members of the program team to create a communications plan that will meet the needs of the evolving program.



Communications and Advocacy will play a strong support role in working with technical staff in delivering the key messages to the various stakeholders.

The key areas of focus will be:

- Internal communication for Steering Committee and staff
- External communication for council, public, other agencies
- Identify who needs to know what and when

- Development of consistent and appropriate messaging (for council, staff, public, other agencies)
- Coordination with leadership and advocacy to identify stakeholders
- Development of a communication plan (timing, media, based on communication template, etc.)

The communications and advocacy staff team will liaise with regulatory compliance and policy staff to ensure that current and future works comply with all applicable regulations.

Program Area 7 – Report Inflow and Infiltration Reductions

The Region has developed this Strategy for long term inflow and infiltration reduction and it is anticipated that the Strategy will evolve over time and as such it will be a living document to be used by the Region and local municipalities to guide the management of the Inflow and Infiltration Reduction Programs.

Per the Minister's Conditions (Condition 8.8) the Region is charged with submitting to the Ministry of the Environment and the SeCAC, an annual report detailing its progress on implementing the Strategy including inflow and infiltration reductions. The first report is required to be provided one year following finalization of the Strategy and every 12 months thereafter.

The first annual report will be submitted to the Ministry of the Environment on March 31, 2012. This report will describe the status of each of the milestone activities and the progress towards the stated inflow and infiltration reduction target.

In alignment and support of the annual and five year update reporting requirements that the Region has with the Ministry of the Environment, each local municipality will be required to plan for and develop

an annual Inter-Agency Summary Progress Status as well as Achievement reports.

The Inter-Agency reports will contain information that describes the local municipalities inflow and infiltration reduction activities that have occurred during the previous year and activities planned for the upcoming period:

- Sewer system mapping
- Update on the amount of infrastructure inspected for inflow and infiltration source detection purposes
- The extent of new sewer construction and sewer repair and replacement work
- A summary of the results of all flow monitoring work undertaken
- The location and frequency of all sanitary sewer overflows
- A summary of expenditures for sewer system evaluation, repair and replacement activities
- Planned activities, milestones and budget allocations for the upcoming period

Program Area 8 – Continuous Improvement

Continuous improvement is an ongoing effort to improve the way services or programs are implemented. While this Strategy serves as a starting point and seeks to provide the technical requirements of implementing the various programs, there will be a number of key areas and future initiatives required over the short and long term.

The following areas have been identified as areas to focus on which may require enhancement as the Strategy is implemented:

- Review and refine data analysis and exchange procedures
- Review and refine flow monitoring standards
- Review and refine/implement rehabilitation standards

- Develop/update Sewer Use Bylaws and Building Codes
- Review and refine inspection Sewer System Evaluation standards (SSES)
- Review new technologies (inspection and rehabilitation)
- Review and refine Design and Construction Standards
- Review and implement private property mitigation programs
- Review and update overall Inflow and Infiltration Reduction Strategy document

Private Property Inflow and Infiltration Reduction Programs

Private property mitigation is a key component of any best practice program. This Strategy makes specific recommendations about the future programs that are required within the Region to mitigate extraneous wet weather flows from private property. These programs include the access and inspection of properties in order to confirm the locations of any direct storm water connections and the structural condition assessment of private laterals through to the implementation of projects on private property.

Private side inspection and mitigation projects could include:

- Enhanced standards for construction on private property
- Household drainage and inspection programs
- Authoritative power review such as consent to enter
- Downspout and foundation drain disconnection projects
- Lateral rehabilitation and replacement projects
- Outreach and Communication Programs
- Financial assistance programs

Review and Update Overall Strategy

The Steering Committee, led by, and in collaboration with an assigned Program Manager employed by the Region, will assume joint responsibility to implement this Strategy. They will also be required to further define and implement the requisite activities necessary to ensure that the Strategy is continually maintained, enhanced and carried out properly and in a timely manner. This process will commence in 2011 and is anticipated to continue until the Strategy is finalized.

The Strategy will be updated when necessary as data is collected, new information is learned, and new technology becomes available. Review and update of the overall Strategy will require the continual commitment of Regional and local municipal resources over the life of the Strategy. Updates and revisions to this Strategy will be presented to the Ministry of the Environment annually and in five year update reports.

Conclusion

York Region and local municipalities will take joint overall responsibility to implement the Inflow and Infiltration Reduction Strategy. Furthermore, they will be required to further define and implement the requisite activities necessary to ensure that the Strategy is continually maintained, enhanced and implemented. The implementation process will commence in April 2011 and is anticipated to continue as a sustained program. The Strategy will be updated as required as data is collected, as new information is learned and as new technology becomes available. Review and update of the overall Strategy will require the continual commitment of Regional and municipal resources over the life of the program.

5

LONG TERM WATER CONSERVATION STRATEGY

The Environmental Services Committee recommends the adoption of the recommendations contained in the following report dated January 26, 2011, from the Commissioner of Environmental Services.

1. RECOMMENDATIONS

It is recommended that:

1. Regional Council endorse the Long Term Water Conservation Strategy, subject to minor adjustments to the final drafts arising out of the pre-submission consultation with the Ministry of the Environment.
2. The Regional Clerk circulate this report to the Clerks of the local municipalities.
3. The Regional Clerk forward a copy of this report to the Ministry of the Environment, Central Region Office.

2. PURPOSE

This report provides information on the Long Term Water Conservation Strategy. The Draft Long Term Water Conservation Strategy Executive Summary is attached for reference (*Council Attachment 2*). Completion of the Strategy and submission to the Ministry of the Environment on March 31, 2011 is required to fulfill conditions of approval for both the Southeast Collector Trunk Sewer Individual Environmental Assessment and the Intra-basin Transfer initiative.

3. BACKGROUND

York Region has embraced water conservation and efficiency since 1998 as a very effective component of the long term drinking water supply strategy. The *Water for Tomorrow* program continues to incorporate leading edge technology and innovative programs since its inception as demonstrated in *Council Attachment 1*.

Since 2008 the *Water for Tomorrow* program has provided:

- 31,000 toilet and 11,500 subsidized rain barrel rebates to residents
- 480 installed pre-rinse spray valves to commercial kitchens

Water saved from the programs initiated since 2008 is approximately 2.1 million litres per day, which is enough water to service a community of 8,300 people.

Since 1998 *Water for Tomorrow* has provided:

- 60 water audits to businesses
- 124 water efficient landscape Seminars
- 10,700 individual garden visits
- 106,000 low-flow showerheads, installed
- Leakage monitoring and reduction on local municipal water systems

Water saved from all programs initiated since 1998 is approximately 22.4 million litres per day, which is enough water to service a community of 88,000 people.

Completion and submission of the Long Term Water Conservation Strategy fulfills stringent conditions placed on York Region by the Ministry of the Environment

A previous report (May 12, 2010, Report No. 5 Clause 4 of the Environmental Services Committee) outlined the conditions of approval for water conservation and efficiency for the Southeast Collector Trunk Sewer. Subsequently the Ministry of the Environment extended the same conditions of approval to York Region's proposal for an increase in Intra-Basin Transfer.

The Long Term Water Conservation Strategy has been developed based upon the following Ministry of the Environment directions:

- A review of best-in-class water conservation and efficiency measures
- Development of performance targets and timelines in conjunction with the Region and its local Municipalities
- Thorough consultation with stakeholders from throughout the Region, the Ministry of Environment's Central Region office, and Canadian water efficiency and conservation experts
- Independent peer review by members of the Alliance for Water Efficiency
- Presentation to the Southeast Collector advisory committee.

Annual reporting to Ministry of the Environment requires new processes to be developed and implemented

Additional conditions of approval from the Ministry of the Environment specify that York Region must carry out the Water Conservation Strategy, report annually on targets and performance measures and update the strategy every five years. A detailed monitoring and reporting process must be developed to account for water conservation and efficiency initiatives from many new program components. This process will be developed in coordination with local municipal staff to ensure that residential and

industrial/commercial water use is accurately recorded based on a standardized framework.

York Region is the first Canadian municipality required to comply with this type of detailed monitoring and reporting structure. There are currently no industry standards to adopt. York Region will be creating a reporting mechanism that is unique and in doing so will continue to demonstrate leadership in the water industry.

The Long Term Water Conservation Strategy identifies new and innovative approaches to water efficiency and conservation. It is critical for the Region, in partnership with the nine local municipalities, to determine accurate water consumption data by user type (ie residential, industrial, commercial) in order to accurately report the amount of water saved while ensuring programs are cost effective and achieving expected results. In addition, detailed monitoring and analysis processes must be developed and implemented on all programs and initiatives to ensure water savings are realized. These initiatives together will allow programs to adapt as necessary to ensure York Region meets annual targets set out in the Long Term Water Conservation Strategy.

4. ANALYSIS AND OPTIONS

Water conservation and efficiency is supported by a Regional strategic plan hierarchy and policy framework based on sustainability

Vision 2026 is comprised of a vision statement, eight goals and action areas that describe what the public and Regional Council envisioned for the Region to 2026. Vision 2026 guides all Council decisions and is a key component of York Region's strategic planning and business planning processes. Fundamental to this vision is a commitment to forging a legacy of sustainability. Vision 2026 is scheduled to be updated using a 40 year time horizon to 2051 that will build upon existing goals and further integrate the Region's Sustainability Strategy. It is anticipated that the next generation of the Vision document will identify the availability, access and safety of water resources as an emerging trend that will impact services required by future York Region residents.

In 2007, Regional Council approved the York Region Sustainability Strategy, "*Towards a Sustainable Region*". The strategy provides a long term framework for making more effective decisions about all municipal responsibilities that better integrate the economy, environment and community.

Implementation of the Long Term Water Conservation Strategy fulfills several action areas of the Sustainability Strategy including becoming a leader on the water conservation front in Canada, further integration between land-use planning and urban design, and the investigation and adoption of green building principles to ensure more liveable and efficient communities.

Both Vision 2026 and the Sustainability Strategy have informed the Region's growth management strategy and the update to the Regional Official Plan approved in September, 2010 by the Ministry of Municipal Affairs and Housing. As a result, the Regional Official Plan is a comprehensive plan focused on city building, maintaining a dynamic economy, providing integrated and responsive human services and protecting and enhancing the natural environment. Specifically, the Regional Official Plan establishes a policy framework for creating healthy sustainable communities including development of a long term water conservation strategy.

Best in Class program components are basis of Long Term Water Conservation Strategy

A detailed best-in-class review of water efficiency and conservation practices worldwide was undertaken as the first step in developing the Strategy. Literature and case study examples were reviewed from academic, municipal and upper level government, non-government organizations and the private sectors. Insight and experience was gathered from those involved with the development of the best-in-class projects.

The strategy has been created by reviewing best-in-class programs and tactics and adopting those that are technically, environmentally and economically feasible for implementation in York Region. All of the new components and tactics were identified in the best-in-class review and build upon the success of the current *Water for Tomorrow* program.

Governance and Administration

- Multi-stakeholder advisory group
- Measurement and reporting framework to meet annual requirements
- Detailed implementation plans with full cost benefits and return on investment assessments
- Integration with Infrastructure Master Planning
- Partnerships for pilot and demonstration projects

Policies and Bylaws

- Evaluate against the best in class review: summer water conservation bylaw, new development incentive programs, plumbing retrofits on resale homes
- Advocacy to encourage water efficiency and reuse in Provincial Permit to Take Water and Building Code changes

Rebates and Other Financial Instruments

- Continuation of rebates and programs offered to residents and businesses through *Water for Tomorrow* (toilets, humidifiers, rain barrels, audits)
- Subsidized landscape design service, coupon discounts for water efficient plants
- Incentives for low income housing
- Full-cost recovery conservation oriented pricing

New Development

- Evaluate Sustainable Home Incentive and LEED Programs to increase participation
- Water conservation guideline for industrial, commercial and institutional sectors
- Water efficient fixtures and landscaping and irrigation requirements for new developments
- Detailed monitoring program to evaluate water savings

Infrastructure

- Leakage monitoring and repair
- Opportunities to reduce water waste through comprehensive evaluation and maintenance programs

Regional Municipal Systems

- Develop and implement monitoring program to evaluate water consumption by sector (residential, industrial, commercial and institutional)
- Water conservation guidelines for retrofits of municipally owned buildings

Marketing, Outreach and Education

- Continuation of educational components offered through *Water for Tomorrow*
- Development of a ten-year education and outreach plan
- Public outreach through community groups, to new Canadians and subsidized housing
- Youth/community project that addresses local climate change issues
- Multi-cultural "Praise Water Week"

Pilot Projects

- Expedited development approvals for Green Building
- Rainwater harvesting and grey water projects
- Outdoor water use reduction targeting high water users and irrigation systems
- Implement water conservation guideline for industrial, commercial and institutional sectors
- Water efficient demonstration landscapes
- Retrofit and showcase municipal facilities, document water/energy savings outcomes
- Quantify volume of water used in watermain flushing
- Dual plumbing in new public building
- Innovative ways to deal with water use in sports fields, splash pads

Detailed implementation plans including cost/benefit analysis will be completed within the first five years of the strategy implementation to determine suitability, timing, resource requirements and cost of each component.

The 2011 residential consumption rate is approximately 252 L/person per day based on projections from the 2009 Water and Wastewater Infrastructure Master Plan.

Table 1 provides a breakdown of the water savings targets and timelines based on continuation of current *Water for Tomorrow* programs and implementation of new programs and tactics.

Table 1
Water Savings Targets and Timelines
York Region Jurisdiction and Initiative Programs

	Year			
	2016	2021	2026	2031
Residential Water Use Targets (litres per person per day)	241	235	232	230
Expected Water Savings (million litres per day)	13.4	16.6	11.0	15.7

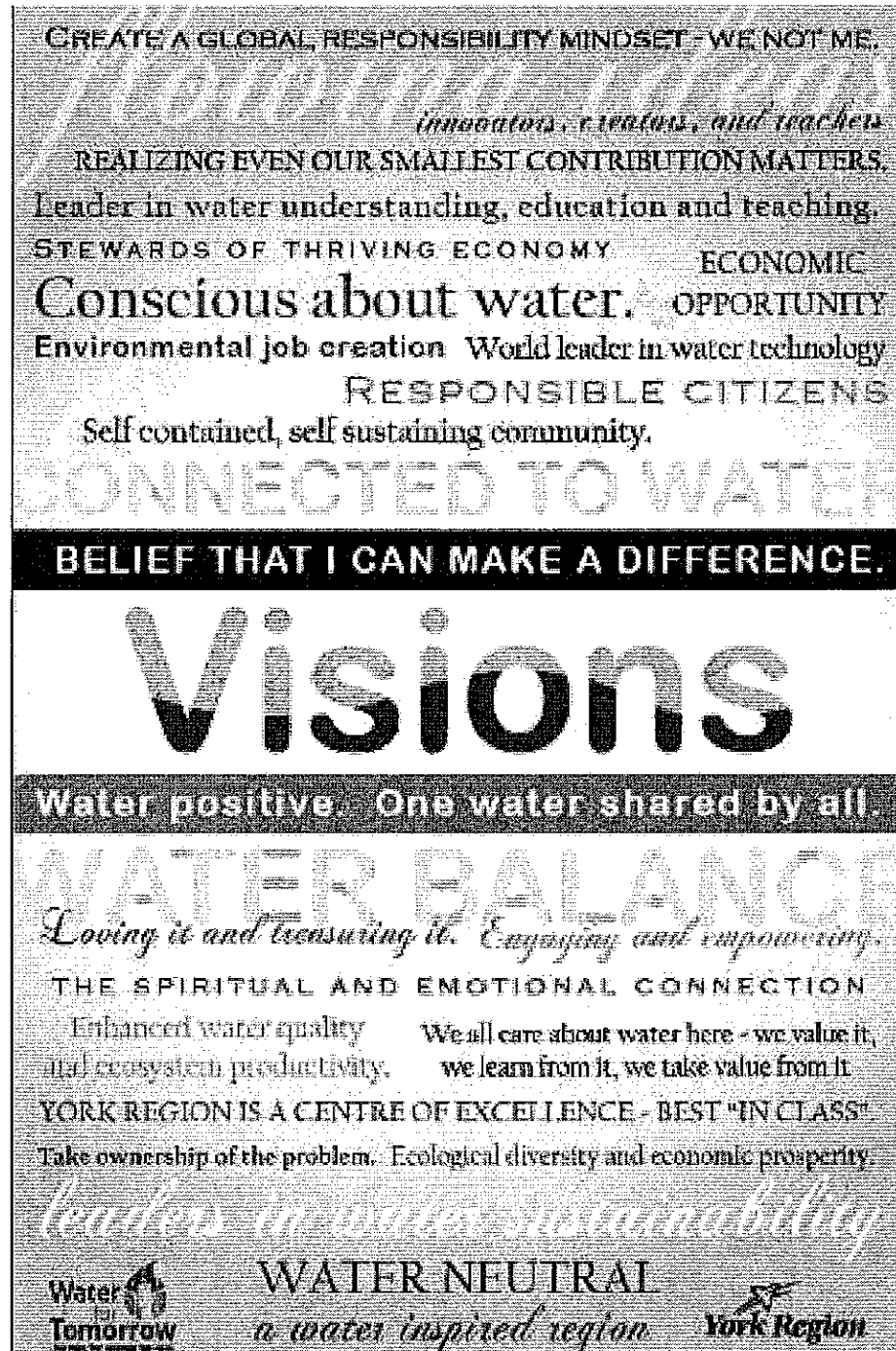
A copy of the Draft Long Term Water Conservation Strategy Report Executive Summary is included in *Council Attachment 2*.

Extensive public consultation and engagement has resulted in a public vision for the future

During September and October 2010, six public consultation sessions were held to engage a wide variety of stakeholders throughout York Region. The full list of all organizations that participated in consultation sessions is included in *Council Attachment 3*.

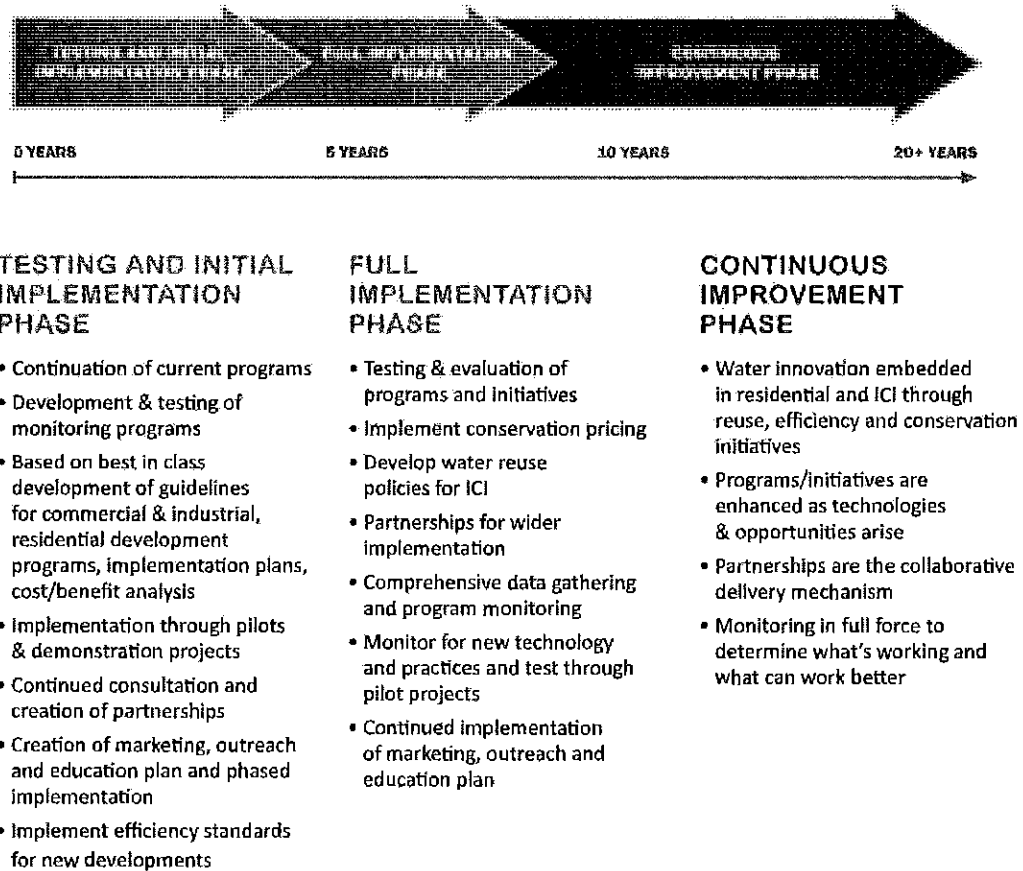
The six consultation working sessions brought people from an attitude of wondering why water conservation is important, to an understanding of the full realm of water efficiency and conservation program components and belief that they can make a difference. Through the public's involvement, participants created a public vision for water efficiency and conservation programming in York Region. A summary of the vision can be found in Figure 1.

Figure 1
Public Vision



The public vision has been embedded into all technical components and has been developed into an action strategy, shown in Figure 2.

Figure 2
Action Strategy



5. FINANCIAL IMPLICATIONS

\$43 million is available in the proposed 2011 update of the 10-year capital budget for continuation of the successful *Water for Tomorrow* programs and for the initial development of new components. Funding for these programs is provided 98.44% from development charges and 1.56% from user rates.

A breakdown of the 10-year capital budget for water conservation and efficiency is provided in Table 2.

Table 2
2011 Proposed Ten-Year Capital Budget

Program	Ten Year Budget
Rebates and Incentives	\$27,000,000
Education, Outreach and Customer Service	\$6,500,000
Leak Reduction	\$6,000,000
Pilot Projects and Implementation Planning	\$3,500,000
Total	\$43,000,000

Implementation plans will be created for each year from 2011 to 2016 for all priority programs required over the next ten years. Detailed cost benefit analysis will determine resourcing and full funding requirements to implement Regional and local municipal water conservation work.

There is an opportunity for the Province of Ontario to demonstrate leadership in the area of water efficiency by allowing the sale of only high efficiency toilets (i.e. 4.8 or 3 L/flush) throughout the province. In addition, changes to the building code to mandate the use of high efficiency toilets will ensure that all new homes use much less water.

These changes at the provincial level would allow York Region to save approximately \$18 million over ten years in funding of toilet rebates. This money could be reallocated and used to implement other new program components identified in the Long Term Water Conservation Strategy.

6. LOCAL MUNICIPAL IMPACT

Local municipal endorsement of the Long Term Water Conservation Strategy required to fulfill conditions of approval

Local municipal staff have been involved in developing of the Long Term Water Conservation Strategy through participation in the Water and Wastewater Steering Committee and through attendance at public consultation sessions. Municipal staff have committed to bring reports to local Councils to seek endorsement of the Long Term Water Conservation Strategy by March 31, 2011 to fulfill conditions of approval for both the Southeast Collector Trunk Sewer Individual Environmental Assessment and the Intra-basin Transfer initiative.

The continued commitment of local municipalities in working with the Region to develop and implement water conservation and efficiency programs is essential for providing servicing allocation for sustainable growth in York Region and for compliance with the full intentions of the Southeast Collector and Intra-basin Transfer initiative conditions of approval.

Development of implementation plans, pilot and demonstration projects with local municipal staff will identify the full long term funding and resource requirements at both the Regional and local municipal level.

Examples of pilot projects include:

- Expedited development approvals process for green buildings
- Development and testing of water efficiency, water reuse and irrigation guidelines in industrial, commercial and institutional facilities
- Retrofit and showcase of municipally owned facilities and document water-energy outcomes of facility-level water/energy efficiency retrofits
- Quantify the use of water for mains flushing and disinfecting and identify procedures to reduce water use
- Residential water efficiency landscaping

7. CONCLUSION

Completion and submission of the Long Term Water Conservation Strategy to the Ministry of the Environment fulfills conditions of approval for both the Southeast Collector Trunk Sewer Individual Environmental Assessment and the Intrabasin Transfer proposal.

Water conservation and efficiency are key components of a sustainable future for York Region. Reducing the amount of treated water used by the public and businesses of the Region will reduce future capital investments extend the life of infrastructure already built, reduce energy consumption and ensure that adequate water supply is available for the future.

The Long Term Water Conservation Strategy identifies new and innovative approaches to water efficiency and conservation. Testing and implementing these initiatives in York Region will demonstrate even greater municipal leadership and help ensure that *Water for Tomorrow* continues to be an award winning program.

For more information on this report, please contact Laura McDowell, Director Environmental Promotion and Protection at (905) 830-4444 Ext. 5077.

The Senior Management Group has reviewed this report.

(The three attachments referred to in this clause are attached to this report.)

Water Conservation and Efficiency Initiatives in York Region Timeline



LONG TERM

Water

Conservation Strategy

Council Attachment 2

York Region

DRAFT: LONG TERM WATER CONSERVATION STRATEGY EXECUTIVE SUMMARY



East Gwillimbury



Whitby-Stouffville

York Region has more than a decade of conservation and efficiency programming, which to date saves more than 22-million litres of water each day.

Through the *Water Efficiency Master Plan Update (2007)*, York Region developed a plan for water conservation to 2016. The Long Term Water Conservation Strategy (LTWCS) builds on the results and success of previous plans by providing overarching guidance for Regional water conservation and efficiency programming for the next 40 years.

York Region submitted proposals to the MOE for both the expansion of sewage flow capacity in the Southeast Collector Trunk Sewer Individual Environmental Assessment and for an Intra-basin Transfer of drinking water from Lake Ontario to the communities of Aurora, Newmarket and East Gwillimbury. One of the conditions of approval for these undertakings is

the development of a 40-year Long Term Water Conservation Strategy. The completion and submission of this strategy to the Ministry of the Environment on March 31, 2011 builds on York Region's commitment to sustainable development and long term water conservation and efficiency programs and practices.



1. INTRODUCTION

York Region is centrally located in the Greater Toronto Area (GTA), directly north of the City of Toronto, in Ontario, Canada. York Region covers 1,756 square kilometres (678 square miles) and is comprised of nine local municipalities. It is the only Region in the GTA without direct access to Lake Ontario. Currently, the Region's drinking water supply comes from multiple sources: Lake Simcoe located in the northern portion of the Region, ground water sources, and Lake Ontario via water supply agreements with both the City of Toronto and the Region of Peel to offset demand on groundwater and to meet the needs of water customers in the southern municipalities.

Water Efficiency Planning and Programming

York Region is one of the fastest growing Regions in Canada with a current population of over 1 million. The population is projected to increase by approximately 500,000 by 2031 and by approximately 800,000 by 2051. Without concerted efforts in water conservation programming, demand on water supply and wastewater treatment systems is expected to increase in accordance with population growth. In 1997 York Region embarked on a Long Term Water Supply Master Plan and since its implementation in 1998, water conservation and efficiency has been an integral part of York Region's long-term drinking water supply strategy. Through *Water for Tomorrow*, York Region has saved an estimated 22.4 million litres of drinking water per day, which translates to a total water savings sufficient to supply a community of about 88,000 people.



The *Water Efficiency Master Plan Update* was completed in 2007 and set the stage for a 10-year conservation and efficiency plan for York Region. (A copy of the Plan is included in Appendix 1). The Plan established the strategic direction for water efficiency and also supports York Region's Sustainability Strategy. In developing the Master Plan Update, an extensive list of water conservation and efficiency measures, based on local and North American programs, were evaluated and a short list of recommended measures were identified and have been implemented since that time through *Water for Tomorrow*, the Region's successful water efficiency and conservation program.

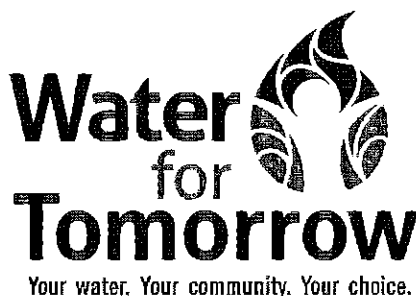
The measures fall into four main categories as follows:

1. Residential programs – initiatives targeting single and multi-family dwellings and addressing indoor water use with fixture and appliance incentive programs and water audits; and addressing outdoor water use, through landscape audits and water efficient lawn and garden care information and guidance.

2. Industrial, Commercial and Institutional (ICI) programs – initiatives aimed at ICI building owner/managers, proprietors of laundromats and commercial kitchens and large volume industrial clients. The Region provides rebates for water efficient fixtures, equipment and in the case of industrial clients, water audits including a capacity buy-back incentive to replace inefficient processes with water efficient ones.

3. Distribution Leakage Detection – an International Water Association water audit and water balance of the municipal and regional distribution system was undertaken and a proactive leak detection and repair program was initiated.

4. Education Program – water conservation and efficiency outreach and education initiatives including workshops, web site, displays, DVDs, informational resources, partnerships with garden centre retailers and marketing incentives for water efficient plant material targeting residents. Curriculum resources including an interactive web site, York Children's Water Festival and a calendar contest have been developed to help educate and engage students.



1.1 Project Purpose

Development, completion and submission of the LTWCS to the Ministry of the Environment on March 31, 2011 is required to fulfill Conditions of Approval for both the Southeast Collector Trunk Sewer for additional sewer flow capacity and the Intra-basin Transfer initiative to supply drinking water from Lake Ontario to the communities of Aurora, Newmarket and East Gwillimbury.

The LTWCS includes the following:

- Preparation, review and analysis of best-in-class water conservation and efficiency programs, initiatives, strategies and tactics adopted by other jurisdictions throughout the world.
- Consultation with lower-tier municipalities, the Southeast Collector Advisory Committee, the public, relevant government agencies and the Central Regional Office of the MOE.
- Completion of peer review of the strategy compared to the best-in-class tactics and strategies used by other jurisdictions
- Implementation of the water conservation and efficiency strategy.
- Submission of monitoring and reports annually on progress in implementing the strategy.
- Undertake a review and update of the strategy at a minimum once every 5 years until the MOE Central Region Director indicates that it is no longer required.



The provincial requirements for the strategy and other conditions of approval are consistent with the Region's water conservation goals and expand on the *Water Efficiency Master Plan Update* and York Region's Sustainability Strategy.

The Long Term Water Conservation Strategy enhances and extends to 2051 the Region's commitment to innovative water conservation and efficiency programming, water resource protection, energy conservation and greenhouse gas reduction.

2. VISION AND OBJECTIVES

With consideration to the conditions of approval set out by the MOE, a new approach that moves beyond traditional water management planning for the development of the LTWCS is being taken. Typically, increasing supply and Demand-side Management (DSM) – freeing up existing supply through the use of water efficient technologies at the consumer or demand-end of the supply system – are employed to accommodate growth.

The strategic decision to take a new approach led to the use of “Soft Path” to establish a long term vision for water conservation and efficiency in the Region. The Soft Path approach involved engaging stakeholders throughout the Region to develop a vision for a water future. The collective vision of “No New Water” evolved from public engagement and consultations. The definition of no new water reflects the aspirational goal for 2051. Even with water conservation, the demand for water will continue to increase over the decades due to approved increases in population and employment. By 2021 it is anticipated that the threshold of increasing demand may be reached and the continued implementation of progressive water conservation and efficiency programming coupled with new water saving technologies, regulations, practices and processes will result in a continuous reduction in per capita water use.

To achieve the vision of “No New Water”, the LTWCS will require:

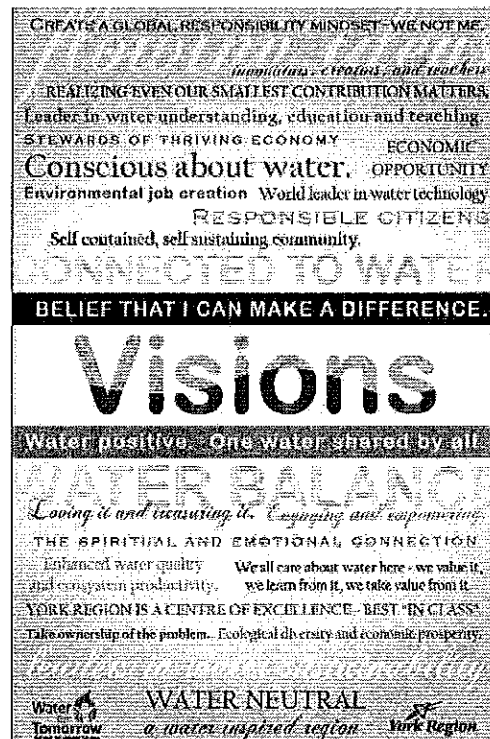
- Implementation of Regional incentive programs
- Provincial support through Ontario Building Code and/or legislative changes to allow the use of high efficiency fixtures in all new developments
- Adoption of reused water (i.e. rainwater, stormwater, grey water) as a water source for all outdoor and other non-potable uses beginning in 2021.

Numerically speaking, per capita water could decline to 150 litres per day from its current level of 252 litres per day. There are many aspects of the aspirational goal of “No New Water” that are currently beyond Regional jurisdiction. Achieving this vision will involve all sectors and facets of Regional life, from how individual residents use water at home and at work to building new water efficient communities and ICI developments.

The ambitious vision of the LTWCS is consistent with the sustainability and water conservation objectives of York Region, which are set out in the Region's *Water Efficiency Master Plan Update (2007)*, *Sustainability Strategy (2007)*, and *Regional Official Plan (2009)*, and those articulated by stakeholders throughout the consultation process.

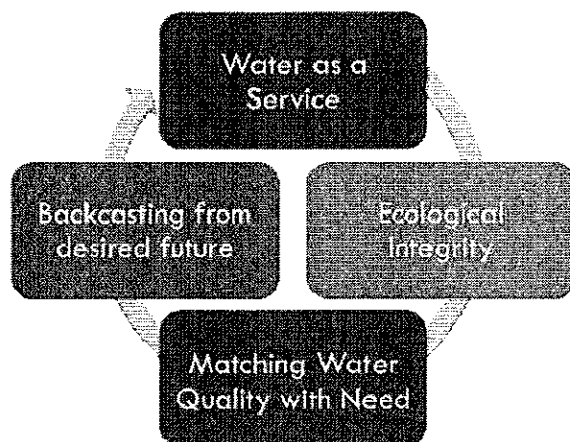
The objectives for the LTWCS are summarized as follows:

- Be a municipal leader in water conservation and efficiency.
- Maximize sustainability of the water supply through the application of best-in-class technology and practices.
- Minimize energy consumption and reduce York Region's carbon footprint.
- Maximize the use of energy efficient technologies, processes and practices.
- Minimize the financial costs to York Region water customers
- Maximize partnerships with local municipalities and utilities for the cost-effective delivery of York Region's water conservation and efficiency programs
- Maximize the reliability of the water supply system
- Minimize the risk of water service disruptions
- Maximize system flexibility to respond to change
- Ensure York Region's drinking water supply meets all existing and future regional, provincial and federal public health and drinking water quality standards
- The Regional non-potable water supply meets future standards and is of acceptable quality for intended non-potable uses.
- Align York Region's strategic goals as set out in the Regional Master Plan and York Region's Sustainability Strategy
- Actively engage with public, youth and other regional stakeholders to find effective means of conserving and protecting the water supply.
- Deliver effective focused water conservation education programs for youth, residents and ICI sector.
- Develop marketing and outreach resources and initiatives to engage the diverse cultures living and working within York Region.



3. PROJECT APPROACH

A multi-disciplinary and integrated approach was employed to develop the LTWCS. Project management was the responsibility of Regional staff with guidance and support provided by local municipal staff. A project Advisory Panel of conservation and efficiency experts was established to guide the development of the LTWCS and provide input and feedback throughout the process (See Section 4.1.1 of the main report for a detailed description of the Advisory Panel). Additional guidance and feedback were provided by MOE staff and the Southeast Collector Advisory Committee. External consultant specialists provided research and support to Regional project staff (see Section 4.1.2 of the main report for a description of the LTWCS Project Team).



3.1 Soft Path

The Soft Path approach informed the strategy development process. Four guiding principles of the Soft Path approach include:

1. All water is considered a service provider and therefore other means of providing those services (i.e., transportation of waste, irrigation, heating and cooling), should be considered
2. Match water quality with quality of need, such as non-potable water for irrigation.
3. Ecological integrity of water sources and their ecosystems incorporated up front in the planning process
4. Identify a long-term vision for a water future and back-cast to determine the programs and processes needed to attain the vision

The soft path approach is founded on the assumption of ecological limits. It is designed to recognize the limits of water resources. In other words, withdrawing increasingly more and more water to meet growing demand presents risks to the community water supply and to local ecosystems. By tapping into the wasted water within the existing system and matching the water supply source with the quality of water required to perform the service, the soft path approach ensures the sustainability of the water supply system.

The application of Soft Path is unprecedented in a large, two-tier municipality with nine autonomous municipalities such as York Region.

4. PROJECT METHODOLOGY

A four-phased process was employed to develop the LTWCS: Phase 1, Project Design and Organization; Phase 2, Review and Research; Phase 3, Public Engagement and Consultation; and Phase 4, Analysis and Strategy Development. Phase 2 and 3 ran concurrently with the findings from each phase informing the other (A detailed discussion of the project methodology is provided in Section 4.2 of the main report).

4.1 Best in Class

A review of best-in-class water conservation and efficiency programs and practices from jurisdictions around the world was undertaken in Phase 2. A preliminary scan of external water conservation reports and programs, contact with sector experts and a review of internal Regional studies and reports was undertaken to identify leading jurisdictions for the best-in-class review. Over 175 leading water conservation programs, policies and initiatives covering hard infrastructure through pricing, and outreach and education were reviewed for the best-in-class research. A detailed discussion of the findings from the best-in-class review is provided in Section 5.0 and a copy of the Best-in-class Report is included in Appendix 5.

4.2 Public Engagement and Consultation

Concurrently with the Review and Research phase was engagement and consultation with a wide range of stakeholders throughout the Region. Stakeholder engagement was critical in developing a vision for the LTWCS. Findings from the best-in-class review were shared with stakeholders, providing an opportunity to collectively explore innovative ways and means of achieving the vision. Stakeholders identified

key themes for the duration of the LTWCS and identified “time zones” for their development and implementation. The key themes for each identified time zone to emerge from the public engagement and consultation process is summarized below.

All aspects of the LTWCS, from the vision for a water future for York Region through the assessment and vetting of program components, were informed by findings from the public engagement and consultation process (A complete discussion of the process is included in Section 4.3 of the main report).

4.3 Scenarios

Once the long term vision of “No New Water” and aspirational water saving targets were identified through public consultation and engagement, scenarios – an exploration of ways and means to realize the vision – were developed. In developing the scenarios an analysis of water consumption by municipalities and an assessment of potential water savings achievable across all sectors was undertaken. Three scenarios summarized below considered conservation program uptake rates and potential reductions in indoor and outdoor water use as a result of new regulations, new technology, pricing and other drivers both regionally and provincially. Through this soft path process, the scenarios explore possible water savings from regionally developed incentive programs to more complex regulatory and infrastructure related initiatives.

The aspirational target scenario of no new water by 2051 used a back-casting methodology by assuming total water used across all sectors in 2051 is equivalent to that used in 2011. Any potential scenario, including no new water, cannot be a straight line from 2011 to 2051. Programs and practices take time to develop and reach potential, particularly where policy,

regulations, and infrastructure are concerned; therefore, there will be an increase in actual total consumption before a decrease back to 2011 levels

The three scenarios developed are summarized as follows and are presented in Table 1 – Water Use Scenarios.

York Region Jurisdiction – Incentive Programs: This scenario assumes 10% uptake of new development incentive-based programs from the Region achieving 150 litres per capita per day (lpcd), indoor use. Total residential outdoor water use is reduced by 2.5% every 5 years through incentive and education programs and other financial drivers such as conservation-oriented pricing.

Provincial Programs and Support – Incentive Programs + Legislative Changes: All of the above incentive and education programs plus provincial updates to the building code and/or plumbing code to include water efficient fixtures to bring indoor water use to 175 lpcd beginning in 2016 and 150 lpcd beginning in 2021 and/or legislation giving municipalities the authority to enforce building standards above and beyond the Ontario Building and Plumbing Code.

No new Water – Incentive Programs + Legislative Changes + Water Re-use: Includes all of the programs and initiatives identified in the previous scenarios with the addition of significant water reuse and/or alternative sources for use in fixtures and processes that do not require potable water such as outdoor irrigation, industrial process water, toilet flushing, etc. commencing in 2021. This scenario aspires to achieve 150 lpcd unit rate average for all residents, new and existing development and includes indoor and outdoor potable water use. In conjunction, ICI total water consumption would be reduced from the Water and Wastewater Master Plan anticipated 216.6 million litres per day (MLD) to 131.8 MLD by matching water quality with quality of need.

The scenarios and their potential impact on water use over the 40 year timeframe of the LTWCS are discussed in detail in Section 4.4.6.

Table 1 - Water Use Scenarios

	Residential water use (litres per person)			
	2011	2021	2031	2051
York Region Jurisdiction • Incentive Programs	252	236	230	222
Plus Provincial Programs and Support • Incentive programs and legislative changes		233	227	219
"No New Water" • Incentive programs, legislative changes and adopting water re-use or alternative sources for all outdoor and other non-potable uses		233	206	199

5. RESEARCH FINDINGS & ASSESSMENT

The findings from the best-in-class review are the basis for the program components that comprise the LTWCS. The best-in-class programs and practices from leading jurisdictions were assessed for their relevance and applicability to York Region prior to inclusion in this strategy.

The program components from the best-in-class review were organized into the following categories:

Governance & Administration – research showed that leading jurisdictions in water conservation and efficiency utilize multi-stakeholder, multi-disciplinary committees to provide advice, guidance and feedback on programs from concept and design through implementation and monitoring. Representation on such committees often include local residents, academic experts from colleges and universities, builders/developers, H2O facility managers and operators, landscape irrigation specialist and landscape designers/contractors, plumbers, water auditors, process engineers, and water and wastewater industry professionals.

Another management tool employed by leading water conservation jurisdictions is program tracking and reporting. Many best-in-class jurisdictions use an annual scorecard approach to track and assess water savings and the return on investment (ROI). Water saving targets and key performance indicators are developed and used to track the success of any given conservation and efficiency initiative.

Policies and By-laws – In leading jurisdictions, particularly those where water shortages are a reality, policy and regulatory initiatives to drive conservation actions down the water supply chain are commonplace. National, provincial/state and local level policies and regulations identified through the best-in-class research addressed all facets of water conservation and efficiency from pricing and economic instruments to building and technology performance standards. Regulations are used in combination with incentive and education based initiatives providing a mix of carrots and sticks.

Rebates and Other Financial Instruments – Financial incentives, such as tax credits and rebates for water conservation fixtures, equipment and devices and/or penalties for excessive water use or wastage are utilized by best-in-class jurisdictions. It should be noted that such financial instruments are not stand-alone drivers for conservation but rather are part of a larger suite of initiatives used by municipalities or water utilities.

New Development – As research showed, the greatest opportunity for water conservation and efficiency resides with new development. Practices such as dual plumbing for grey water recycling, installations of cisterns and rain water harvesting systems, landscape design for zero or minimal irrigation, etc., are more viable for new development. It is important to note however, that responsibility for planning and development approval for new construction resides with the nine local municipalities, not with the Region.

Conservation-Oriented Pricing – Best-in-class jurisdictions employ some form of conservation-oriented pricing which is attaching an economic value to a unit of potable water at a level that encourages water conservation on the part of the consumer. There are three forms of conservation-oriented pricing:

- **fixed rate** where the value is set at a point to encourage conservation (some form of discount to low income customers is often provided)
- **seasonal tiered block rate** where a seasonal rate or surcharge is applied during the warm weather months to discourage excessive water use for irrigation and other outdoor purposes. The goal is to reduce summer peak demand which can result in greater than 50% increase in water use and strain on the water supply system.
- **tiered block rate** involves the application of a tiered or increasing block rate concurrent with a customer's water use. Those customers who use the least amount of water pay the lowest unit rate while those using the most pay a premium or the highest per unit cost for the water.

Pilot and Demonstration Projects – Pilot and demonstration projects are standard business practice for all potentially large scale undertakings. Leading jurisdictions used pilot projects to test new technology, rebates and other financial incentives, policies and by-laws, pricing models, etc. In addition, demonstration projects aimed at residents and ICI clients were used by many municipalities to showcase the benefits of a given water conservation practice or technology.

Regional-Municipal System – The best-in-class review examined the practices in three main stages of a system life cycle; planning, design and construction, and operation. Leading jurisdictions harmonize water quality objectives with water conservation and they do so by:

- closely scheduling infrastructure construction with the service demand to avoid oversized mains with underserved population;
- having a robust water quality program including co-ordinated sampling and conservation-based automated flushing program;
- employing pressure control and flow monitoring such as district metered areas within a leak detection program; and,
- assessing the condition and implementing an asset management program for water main replacement to prioritize repair and replacement of leak- or break-prone mains.

5.1 Screening and Evaluation

Best-in-class potential program

components were identified for each of the categories identified above. In order to identify those program components to be included in the LTWCS, screening and evaluation criteria specific to

York Region were developed to qualitatively analyse options. Screening or “knock-out” criteria culled the list of potential program components. Those components which passed the screening process were then assessed and ranked based on evaluation criteria (A detailed discussion of the screening and evaluation criteria and approach is included in Section 5.8).



6. PROGRAM COMPONENTS

The screening and evaluation of potential LTWCS program components resulted in a go-forward list of projects, practices and initiatives to be evaluated and/or implemented between 2011 and 2021. It is considered impractical at this stage to suggest potential program components beyond the 10-year horizon since beyond this timeframe it is reasonable to assume that there will be policy and legislative changes, new technology and process and/or climate and other related ecological and water resource changes that will impact the LTWCS and the program components to be considered for implementation.

The strategy includes a qualitative analysis of program components that pass requirements pertaining to health, climate suitability,

Regional strategic alignment and are within the control of the Region or are achievable through strategic partnerships with lower tier municipalities or other stakeholders. Full qualitative and quantitative vetting of program components, including cost-benefit analyses, return on investment (ROI) assessments, technology evaluations, market surveys and analyses, and pricing options/models assessments will be initiated in 2011 and 2012.

A summary of the LTWCS program components to be implemented over the next decade is summarized in Table 2 below. To reiterate, these components were drawn from the best-in-class global review and from existing York Region water conservation and efficiency initiatives and are consistent with the findings from the consultation process.

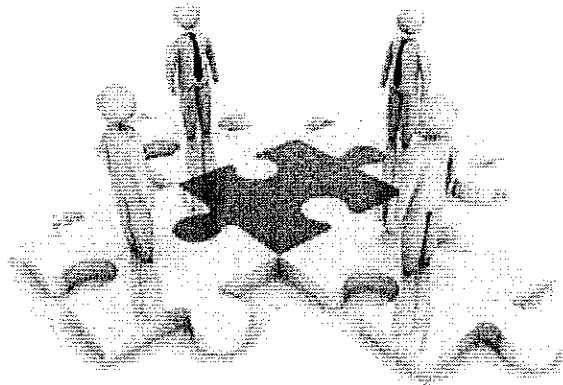


Table 2: Summary of Program Components by Category

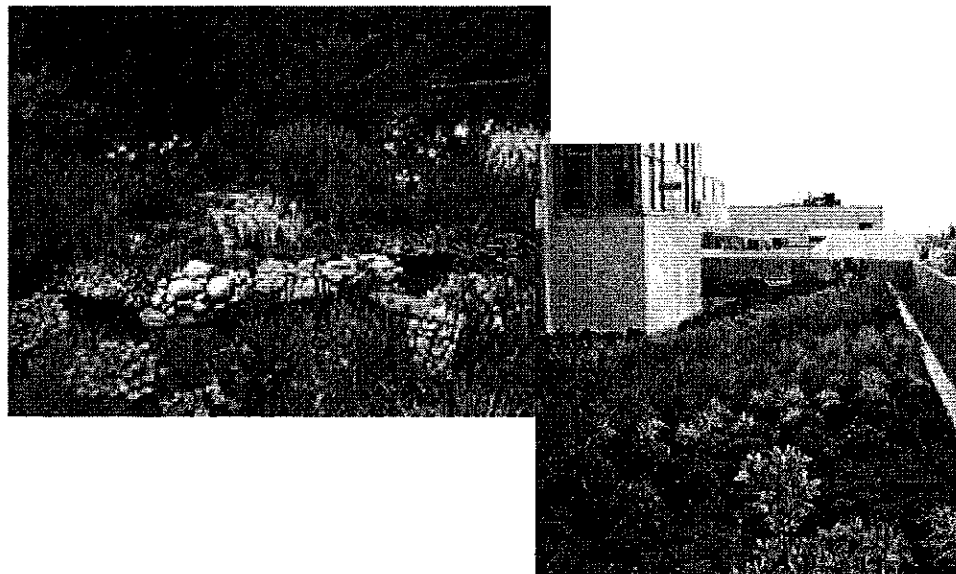
Program Category	Program Component
GOVERNANCE & ADMINISTRATION	Measurement and reporting framework
	Regional-municipal Advisory Group
	Implementation Plans
	Multi-stakeholder Advisory Group
	Incorporate LTWCS into infrastructure Master Plan
POLICIES & BY-LAWS	Conservation and low impact development for new development by-law
	Conservation plans for facilities/complexes
	Plumbing retrofit on resale by-law
	Drought response by-law
	Process water reuse by-law
	Update summer conservation by-law
	Water efficiency fixtures and appliances for new development and renovation by-law
	Irrigation system sensor by-law
	Individual unit water metering for multi unit complexes
REBATES & OTHER FINANCIAL INSTRUMENTS	Free water audits and capacity buy-back for businesses
	Incentive for hot water recirculation systems in homes
	Subsidized residential landscape design service
	Front-loading clothes washer installations in Laundromats
	Multi-unit metering subsidy
	Coupon discounts for xeriscape plants
	HET Toilet rebate
	Develop new rebates and incentives and/or modify existing ones
	Subsidized WaterSense toilet installations in multi-family dwellings
	Water efficient fixture rebate
	Water efficient residential furnace humidifier
	Low income incentive program
	Pre-rinse spray valve for commercial kitchens
	Subsidized rain barrels

Table 2: Summary of Program Components by Category

Program Category	Program Component
NEW DEVELOPMENT	Implementation of East Gwillimbury program
	Integrate WaterSense when updating SHIP
	Develop conservation and reuse guidelines
	Integrate WaterSense into LEED programs
	Modify LEED for high rise to increase uptake
	Detailed monitoring for new development
	Modify SHIP to increase uptake and monitor
	Expedited approvals process for green building with local municipalities
	Study to quantify water use for main flushing and disinfecting
	Water reuse projects
	Water efficient landscapes
	Aquifer recharge through community-level water reuse
PRICING	Full cost conservation-oriented pricing
MARKETING OUTREACH & EDUCATION	Community-level great 'unlawning' challenge
	Regional marketing, outreach and education strategy
	Water efficient landscape workshops
	Free individual landscape assessments
	Water efficiency outreach program for new Canadians
	Children's Water Festival
	Sector specific water efficiency seminars and workshops
	Water efficiency outreach program for low income housing
	Grade 7 water efficiency curriculum for schools
	Develop curriculum unit on "embedded water"
	Region water efficiency calendar contest for Grade 7 students

Table 2: Summary of Program Components by Category

Program Category	Program Component
PILOT PROJECTS	Expedited approvals for green building in partnership with local municipalities
	Capture and demonstrate results from upgrades at public facilities
	Water reuse projects
	Water efficient landscapes
	Water efficient irrigation
	Dual plumbing in new public buildings
	Quantifying water use for main flushing and disinfecting
	Aquifer recharge through community-level water reuse
REGIONAL-MUNICIPAL SYSTEM	District meter areas
	Flow and pressure control
	Leak detection program
	Design and construction methods – water efficiency and water quality
	Design leakage rates
	Flushing and disinfection
	Disinfection design practices
	Water system and storage flow (circulation) design
	System flushing and swabbing
	Process control at water treatment plants



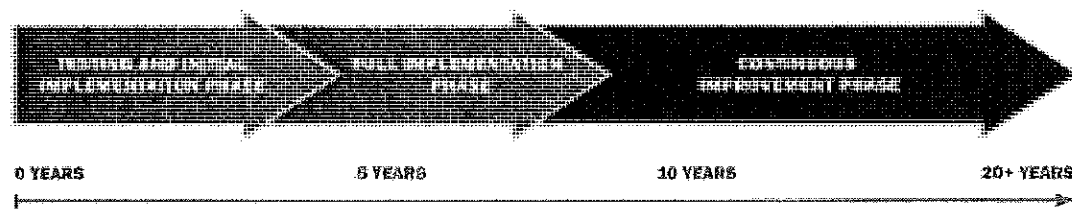
7. IMPLEMENTATION SCHEDULE

The implementation of the LTWCS program components is based on a 10-year timeline in recognition that beyond this timeline unforeseeable changes to federal and provincial policy and regulations, climatic conditions (and resulting alterations in weather patterns, water resources, water availability), area watersheds and ecosystems, and residential and ICI development and technology will occur. The implementation of the LTWCS is divided into three primary phases (see Table 3 below).

A timeline for the implementation of detailed implementation plans, cost benefit and return on investment is summarized in Table 4.

Table 3 – Summary of Key Actions by Phase

* The Region has and continues to implement Water Efficiency Master Plan Update water conservation and efficiency initiatives.



TESTING AND INITIAL IMPLEMENTATION PHASE

- Continuation of current programs
- Development & testing of monitoring programs
- Based on best in class development of guidelines for commercial & industrial, residential development programs, implementation plans, cost/benefit analysis
- Implementation through pilots & demonstration projects
- Continued consultation and creation of partnerships
- Creation of marketing, outreach and education plan and phased implementation
- Implement efficiency standards for new developments

FULL IMPLEMENTATION PHASE

- Testing & evaluation of programs and initiatives
- Implement conservation pricing
- Develop water reuse policies for ICI
- Partnerships for wider implementation
- Comprehensive data gathering and program monitoring
- Monitor for new technology and practices and test through pilot projects
- Continued implementation of marketing, outreach and education plan

CONTINUOUS IMPROVEMENT PHASE

- Water innovation embedded in residential and ICI through reuse, efficiency and conservation initiatives
- Programs/initiatives are enhanced as technologies & opportunities arise
- Partnerships are the collaborative delivery mechanism
- Monitoring in full force to determine what's working and what can work better

Table 4
Timeline of Detailed Implementation Planning

Program Components	New Programs	2011	2012	2013	2014	2015
New Developments	Develop plan to increase uptake of SHIP and LEED programs	start				
	Develop detailed monitoring program	start				
	Implement detailed monitoring					
	Create commercial industrial conservation and efficiency guideline	start				
	Pilot and demonstration projects					
Governance, Policies and Administration	Multi Stakeholder Advisory Group					
	Evaluate conservation based Pricing				start	
	Evaluate plumbing retrofits on resale homes			start		
	Develop annual measurement and reporting framework	start				
	Provincial Advocacy to encourage water efficiency					
	Incorporate results of LTWCS into infrastructure master plans			start		
Regional-Municipal System	Leak reduction					
	Develop process and implement monitoring and evaluation of water consumption	start				
	Guideline for retrofits of municipally owned buildings	start				
	Pilot and demonstration projects					
Financial Incentives	Capacity buy-back for industrial commercial institutional	start				
	Clothes washer installations for industrial commercial institutional	start				
	Evaluate low income incentive program				start	
	Evaluate multi unit meter subsidy			start		
Outdoor Water Use	Evaluate water efficient landscape design and assessment programs		start			
	Evaluate water conservation bylaw		start			
	Pilot Projects					

8. OPPORTUNITIES AND CONSTRAINTS

In the review of best-in-class jurisdictions in water conservation and efficiency, opportunities and constraints for York Region's LTWCS were identified and may be summarized as follows:

8.1 Opportunities

Many of the leading jurisdictions in water conservation and efficiency are located in areas where water availability for most of the year, and year in and year out, is a reality. As a result, there are national and/or provincial/state policies, programs and regulations in place which support water conservation programming.

- **Established Water Conservation and Efficiency Programming** – York Region's 10-plus year record of water conservation and efficiency is consistent with other leading jurisdictions which have an established pattern of conservation-oriented water management. Consequently, the LTWCS is not a starting point, but rather, effectively builds on the success of existing Regional programs and processes.

- **Wholesaler Influence** – As a result of its wholesaler status, the Region can to a degree use policies and pricing to influence or motivate conservation and efficiency programming and practices at the local municipal level. In leading jurisdictions where there is a wholesale supplier and municipal/utility provider structure, pricing and contractual arrangements are used to drive conservation down to the consumer.
- **Partnerships** – Best-in-class jurisdictions, without exception, use partnerships and joint ventures with their municipal/utility clients and with other stakeholders to develop and deliver more impactful and cost-efficient water conservation and efficiency programs. York Region is well positioned to utilize existing partnership to deliver programs and to foster new partnerships. Strong connections with key stakeholders were made through the LTWCS public engagement and consultation process and there is a significant opportunity for the Region to cultivate these relationships into productive partnerships.

8.2 Constraints

The best-in-class review also highlighted possible barriers or constraints to achieving targeted water savings through the LTWCS. In some instances, the Region has the authority or the capacity to overcome or mitigate the constraint, in other instances; it is beyond the control and/or influence of the Region itself.

- **Supporting Provincial Legislation and Regulations** – All best-in-class programs and practices by leading jurisdictions were backed by supporting state/provincial and/or national policies, programs and regulations. Leading countries in water conservation such as Australia, Spain, America, Germany and England have state and/or national requirements for water conservation and in some jurisdictions, such as California, actual reduction targets are set for all regions. This approach ensures a level playing field, creates a favourable market for water conservation products and services, and provides municipalities or water utilities with the tools they need to make water efficiency and conservation a reality.
- **Ontario Plumbing and Building Code** – Of particular reference as a major obstacle to enforcing water efficient building standards is provincial Plumbing and Building Code. Section 35 of the Act stipulates that the Act and the code supersede all municipal by-laws and in the event that the "...Act or the building code and a municipal by-law (includes upper-tier municipalities) treat the same subject-matter in different ways with respect to standards... [the] Act or the building code prevails and the by-law is inoperative to the extent that it differs from [the] Act or the building code for the use of a building."
- **Climate** – Many leading jurisdictions in water conservation and efficiency are located in areas with arid or semi arid climates where water availability issues are a reality throughout the year and winter freezing is not a consideration. Certain initiatives, such as centralized grey water systems for irrigation, are not necessarily viable in York Region. Such systems are used in areas where there is year-round irrigation. In York Region, the season is about 3 to 4 months with high outdoor water demand for only about 2 of those months. This reality limits the ROI of such systems for York Region.
- **Regional-Municipal Structure** – As an upper tier municipality comprised of nine local municipalities, the Region has limited authority in many areas pertaining to water conservation and efficiency. The local municipalities or their utility representatives are responsible for direct communications with customers and water billing; collection of customer water use data, planning and development approvals and the municipal portion of the water distribution system.

- **Soft Path** – Although it was chosen because of its innovative engagement process and holistic approach to water management, Soft Path is untested in a large upper tier Region with nine independent, local municipalities. In addition, there are two potential constraints associated with Soft Path. Firstly, scientific knowledge of water ecosystem needs is a new and evolving science and the scope of water sources to be taken into consideration is vast. Secondly, full cost accounting does not currently take into consideration the value of conserved water in terms of wastewater treatment, water source protection, etc., therefore there is an inherent bias toward conventional solutions.
- **Access to Water Use Data** – the local municipalities or their water utility providers are responsible for the collection of customer water use data. From a Regional perspective, two significant constraints exist. Firstly, it is often very difficult to secure the needed water use data and secondly, there is limited consistency in the data that is collected and supplied to the Region making analysis and comparisons difficult at best.
- **Planning and Development Approvals** – Local municipalities have primary responsibility for the review and approval of new construction. Best-in-class jurisdictions use incentives, such as expedited approvals and increased density allocations and disincentives such as increased development fees or surcharges to drive green building and the use of water conservation products and practices. In order to implement such leading initiatives, the Region will require the active participation of the local municipalities.
- **Water System** – Currently there is a lack of quantifiable data on water usage for construction and operation purposes and a lack of detailed condition and performance data on water mains. In conjunction, there is a significant cost associated with maintaining existing high risk water mains and there are competing demands to maintain water quality in the face of diminished water demand.

9. RECOMMENDATIONS

The recommendations in the Long Term Water Conservation Strategy came out of the best-in-class review and the assessment of the opportunities and constraints for water conservation and efficiency in York Region.

- **Provincial Legislation and Regulations** – For the province and its regional and local municipalities to truly be leaders in water conservation and efficiency it is imperative that the legislative and regulatory framework to support such programming be in place.
 - The Ontario Building and Plumbing Code should be modified to require water efficient appliances and fixtures
 - The sale of 13-litre toilets should be banned
 - Standardized water use data collection, reporting and billing should be a requirement for all municipalities and utility providers
 - Public reporting of water use and water savings data should be required.
- **Regional-Municipal Co-operation** – In order to address the complexities associated with a two-tier municipal structure it is recommended that the:
 - Region seek the endorsement of the LTWCS by the local municipal councils;
 - Water and Wastewater Steering Committee comprised of Regional and local municipal staff help direct and facilitate co-ordination and co-operation between relevant regional and municipal departments for the delivery of the strategy; and,
 - MOE provides a clear statement to local municipalities and their utility providers to furnish water use data in a format to be specified by the Region.

Soft Path – In order to address the potential constraints associated with the Soft Path approach it is recommended that implementation planning for the LTWCS program components employ Soft Path accounting practices and that there is on-going monitoring and updating of the methodology as required.

Water System – To address the constraints associated with the Regional-Municipal water supply system, it is recommended that the Region utilize the Regional-Municipal Water and Wastewater Steering Committee to facilitate co-ordination of planning, leakage detection, asset management, flushing programs and other system related matters.

9.1 Annual Monitoring and Reporting

York Region has established monitoring and reporting protocols and has undertaken on-going monitoring of its Water for Tomorrow conservation initiatives. Under the LTWCS, the Region will build on the existing monitoring program and employ additional metering, measuring and reporting mechanisms. Annual progress reports will be submitted to the MOE for their review and public reporting of water use savings and associated activities will also be carried out on an annual basis.

9.2 Updating the Long Term Water Conservation Strategy

The LTWCS will be implemented over a 40-year timeframe, therefore regular updating of the strategy will undertaken every five years to ensure it remains current and reflects any changes in provincial policies, programs and regulations; water using technologies and processes; climate; water resources and ecosystem health; building practices; and water pricing and associated accounting practices.

10. CONCLUSION

York Region has a proven record of water conservation and efficiency programs spanning more than a decade. This strategy expands on existing Regional plans, strategies and programs and sets the stage for innovative and jurisdiction-leading water conservation and efficiency programming for the next 40 years.

A peer review of the LTWCS by water conservation experts and program managers from leading jurisdictions across Canada and the United States has been undertaken. The comments and feedback received from the peer reviewers has been incorporated. The final, peer reviewed strategy will be submitted to the Ministry of the Environment for review and approval.

Roll out of the strategy will begin with the development of detailed implementation plans, including full cost-benefit analysis, ROI assessments, technology evaluations and resource assessments for the identified program components.

Long Term Water Conservation Strategy
Public Engagement - September - October 2010

List of Attendees

Chippewas of Georgina Island

Members of the Public

- Residents of Georgina
- Residents of Newmarket
- Residents of Richmond Hill
- Residents of Markham
- Residents of Thornhill
- Residents of East Gwillimbury
- Public School Students, Newmarket
- High School Students, Newmarket

Non-Government Organizations

Alliance for a Better Georgina
Ducks Unlimited
Eek Farms
Holland Marsh Grower's Association
Ladies of the Lake Conservation Association
North East Sutton Ratepayers Association
ReWilding Keswick Creeks Project
Save the Maskinonge
Social Service Network
The Moraine for Life
Transition York
Windfall Ecology Centre
Women's Centre of York Region
York Region Environmental Alliance
York Region Federation of Agriculture
York Simcoe Naturalists

Development Community

IBI Group
Metrus Development
Schaeffers Consulting Engineers

Educational Institutions

Seneca College
York Catholic District School Board

Other Associations/Organizations

Lake Simcoe Region Conservation Authority
Toronto Region Conservation Authority
CTC Source Water Protection Committee
PRO F&E Ltd
Lallibrook Consulting

Local Government

- City of Vaughan
- Regional Municipality of York
- Town of East Gwillimbury
- Town of Georgina
- Township of King
- Town of Markham