PRIORITIES AND KEY INITIATIVES COMMITTEE – JANUARY 31, 2011

INFLOW INFILTRATION REDUCTION & LONG TERM WATER CONSERVATION STRATEGIES CITYWIDE

Recommendations

The Commissioner of Engineering and Public Works recommends:

1. That this report and associated presentation be received for information purposes; and

2. 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.

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. However, it is anticipated that additional resources and capital funding will be required in the future based on the recommendations of the joint Regional and Municipal Water and Wastewater Task Force. This will have an impact on future operating and capital budgets.

Communications Plan

One of the key mandates of the Strategies and related Task Force is to develop a comprehensive communications plan outlining the environmental benefits to residents, businesses and all other key stakeholders.

Purpose

The purpose of this report is to provide Council with an update on the status of the City's

participation in the joint Regional and Municipal Water and Wastewater Task Force, the development of the proposed strategies for inflow / infiltration reduction and long term water conservation, and associated implementation plans.

Background – Analysis and Options

What is Inflow Infiltration Reduction?

Inflow and infiltration (I/I) refers to water that enters the sanitary sewerage system as rainwater, snowmelt or groundwater. This can occur as a result of direct sources such as faulty manhole covers or roof leaders / foundation drains connected directly to the sanitary sewer system. Infiltration refers to groundwater that enters the system through cracks or faulty joints in the sanitary sewer pipes, manhole risers, etc. Significant extraneous water from inflow or infiltration within the sanitary sewerage system becomes a problem because it uses up conveyance capacity. This can result in backups and sewer overflows, increased conveyance and treatment costs, and a reduction in future serviceable population. Additional details including an illustration identifying inflow and infiltration sources in a typical residential subdivision are identified in Attachment No. 1.

Ministry of the Environment Conditions

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.

Regional and Municipal Water and Wastewater Task Force

In order to ensure the stringent MOE conditions associated with I/I reduction and water conservation are successfully met, a joint Regional and Municipal Task Force has been established. It is recognized that full participation by all local municipalities in I/I reduction and water conservation programs is essential to provide servicing capacity for continued growth and to comply with the MOE conditions of approval for the new Southeast Collector sewer.

On April 15, 2010, Regional and local municipal staff participated in the inaugural Inflow and Infiltration Reduction Task Force workshop. The City's Director of Public Works and the Director of Development / Transportation Engineering are designated members of the steering committee and represent the City on the Task Force. This first meeting identified a number of key initiatives necessary to guide the reduction of inflow and infiltration Region wide. Subject specific working groups were established and tasked with developing clear terms of reference to guide the work plans and to develop short, medium and long term objectives.

The Task Force has been charged with establishing the terms of reference for five main working groups to address the following Strategy components:

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

An organizational table of the Task Force, Steering Committee and subject specific working groups is included in Attachment No. 2.

On June 8, 2010 Council adopted the following resolution:

> *"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 joint Regional and Local Municipal Inflow and Infiltration Reduction Task Force have 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. The mandate of the Task Force has been expanded to include long term water conservation initiatives in addition to inflow and infiltration reduction. Accordingly, the joint Regional and Municipal Task Force is now referred to as the Water and Wastewater Task Force.

Joint I/I reduction and water conservation strategies along with detailed implementation plans are currently being finalized and will be completed and submitted to the MOE by March 31, 2011. The program will include reduction priorities, targets, timelines, tactics, initiatives and associated implementation costs. It is expected that the program will rely upon a full suite of inflow and infiltration reduction measures that are currently being tested through the Region's pilot programs. Accordingly, it is recommended that staff report back to a future Priorities and Key Initiatives Committee with the recommended final strategies and detailed implementation plans.

Inflow and Infiltration Reduction Strategy Components

The purpose of the Strategy is to identify and describe the recommended processes and implementation plans. The major headings will include:

- Overall Program Goals and Inflow and Infiltration Targets,
- Monitor and Analyze Flows,
- Investigate and Mitigate,
- New Construction and Capital Projects,
- Financial Management,
- Communication and Management,
- Reporting Inflow and Infiltration Reduction, and
- Continuous Improvement.

Further details pertaining to implementation and funding will be identified over the next few months. An independent peer review report of the final strategies is due to the MOE by March 31st of 2011.

Inflow and Infiltration Reduction to Date

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 smoke 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 I/I 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 I/I reduction for many years. Ongoing routine maintenance activities associated with I/I reduction include:

- Closed circuit (CC) TV inspections of sewer pipes;
- Smoke 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 through the Engineering Services Department to improve the overall condition of the City's sewer network which in turn reduces inflow and infiltration.

Developer Initiated Inflow and Infiltration Reduction

Development / Transportation Engineering Department staff has been approached by the development community with an innovative proposal to implement an enhanced I/I reduction project and associated field testing to identify and reduce sources of I/I entering the City's sanitary sewerage system. A pilot project of a similar nature is currently underway by the development community in the Town of Markham.

The proposed reduction in I/I will achieve a net improvement in risk reduction / management and enhance environmental protection and public safety. In return, it will allow for the allocation of servicing capacity to new development areas. Staff is currently reviewing the details of this proposal and will report back with specific recommendations.

Long Term Water Conservation Strategy

The proposed Long Term Water Conservation Strategy will detail specific conservation and efficiency programs that will be tested and approved by Municipal and Regional Councils. Once approved testing, implementation and continuous improvement will occur 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.

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.

Additional details identifying the components of the Long Term Water Conservation Strategy are included in Attachments No. 3 and 4.

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

MOE conditions of approval for the Southeast Collector Sewer Individual Class Environmental Assessment require that specific environmental sustainability targets related to I/I reduction and water conservation be achieved. This responsibility lies with both Regional and Local Municipalities. The distribution of additional servicing allocation capacity from the York Sewage / Water Supply Systems to local municipalities will be dependant upon the successful implementation of the proposed strategies discussed above.

Accordingly, it is imperative the Region and the City continue to work together to finalize the required strategies and move towards successful implementation in the near future.

Conclusion

Staff will continue to actively participate on the joint Regional and Municipal Water and Wastewater Task Force and will report back to a future Priorities and Key Initiatives Committee on the recommended strategies and associated implementation requirements.

The reduction of inflow and infiltration, together with long term water conservation 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.

Attachments

1. Inflow & Infiltration Reduction Strategy / Sources Diagram
2. Regional and Municipal Water and Wastewater Task Force
3. Long Term Water Conservation Strategy – 1/2
4. Long Term Water Conservation Strategy – 2/2

Report prepared by:

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Respectfully submitted,

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Director of Public Works

ATTACHMENT No. 1

INFLOW & INFILTRATION REDUCTION STRATEGY

York Region

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:

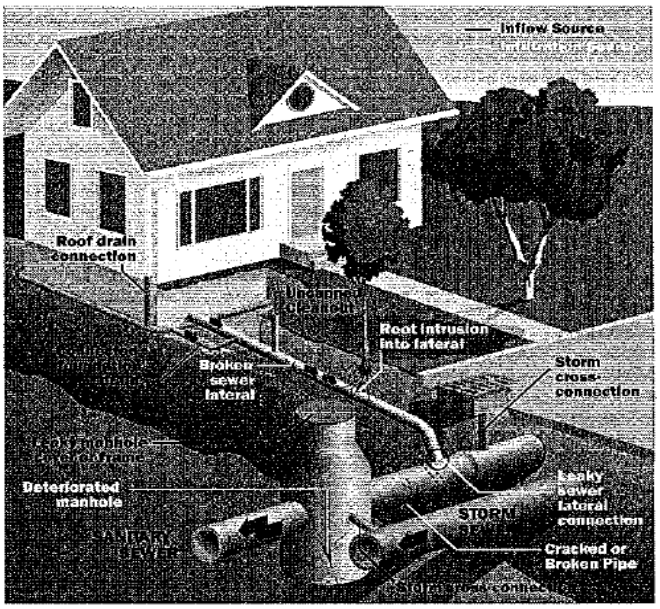
- yard
- roof and downspouts
- cross-connections with storm drains
- foundation drains
- manhole covers

Infiltration is groundwater that enters through holes and cracks in manholes, laterals and sewer pipes.

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.

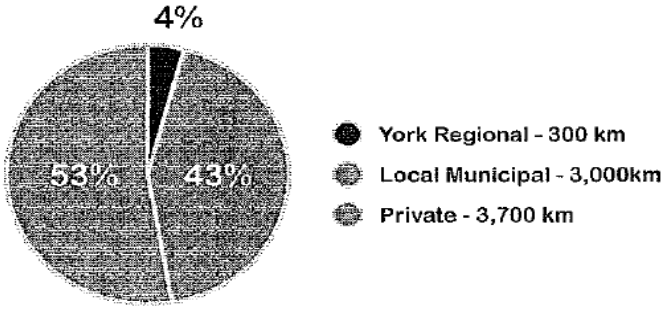
Excessive inflow and infiltration consumes sewer capacity for existing residents and future growth.

As sewage systems age it is more likely that inflow and infiltration will enter the collection system.



Source: Capital Regional District CRD, Victoria, B.C.

YORK DURHAM SEWAGE SYSTEM (YDSS) PROFILE

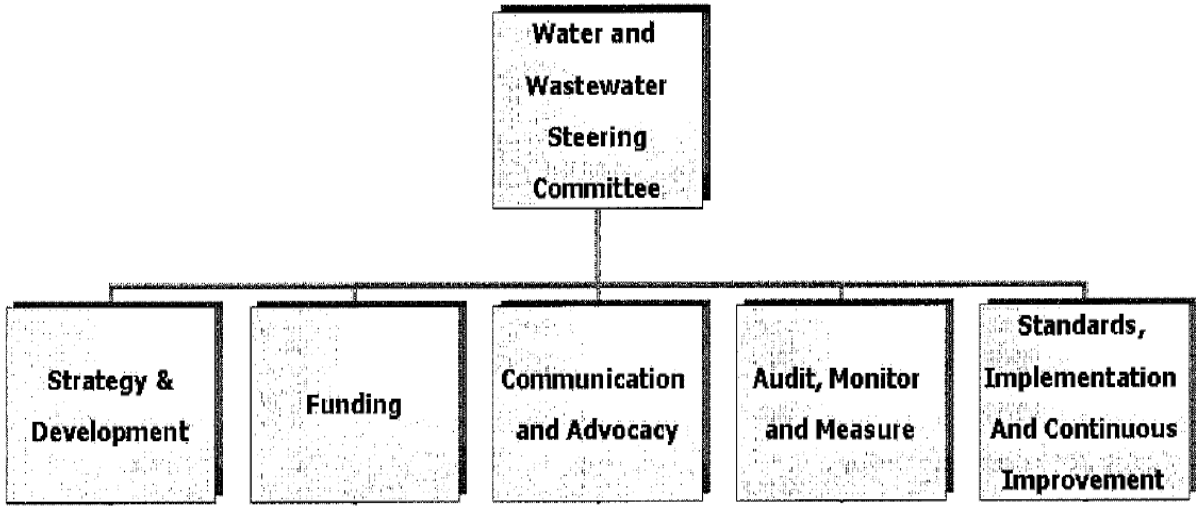


Approximately 7,000 km: Total length of sewage mains including public and private sewers and laterals. (December 2010)

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

ATTACHMENT No.2

Regional and Municipal Water and Wastewater Task Force



City's Steering Committee - Development/Transportation & Engineering Director Andrew Pearce and Public Works Director, Brian Anthony.

Other City staff from various departments are involved with other levels of the Task Force.

ATTACHMENT No.3

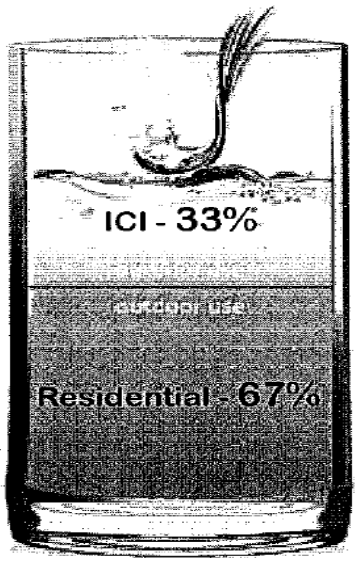
York Region

Long Term Water Conservation Strategy

Successful water conservation and efficiency programs focus on 3 areas to achieve reduction in water use:

1. Residential indoor
2. Industrial, commercial and institutional (ICI)
3. Outdoor

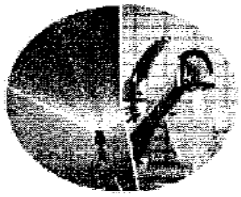
In York Region 67% of the water is used by residents and 33% is used by industry, commercial and institutional combined.



Hot, dry weather means more water is used outside. Each year between May and September there is a peak day(s) when water demand doubles.

- Water facilities are sized about 50% larger to accommodate this peak day demand
- Peak day water is the most costly water to provide

10 - 15%
of all water is used outdoors in the summer months



BUT water use
DOUBLES
on the peak days

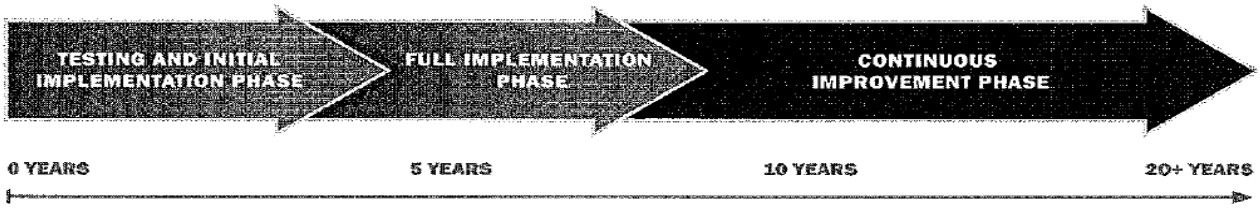
LONG TERM Water Conservation Strategy

ATTACHMENT No. 4

York Region

Long Term Water Conservation Strategy

New programs will be developed, tested and approved by Municipal and Regional Councils



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

LONG TERM Water Conservation Strategy