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### **INFLOW AND INFILTRATION REDUCTION PROGRAM ANNUAL REPORT**

**The Environmental Services Committee recommends the adoption of the recommendation contained in the following report dated February 15, 2012, from the Commissioner of Environmental Services.**

#### **1. RECOMMENDATION**

It is recommended that:

1. The Regional Clerk circulate this report to the Clerks of the local municipalities and the Director, Central Region, Ministry of the Environment.

#### **2. PURPOSE**

The purpose of this report is to update Regional Council on the Inflow and Infiltration Reduction Program and the annual report required by 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.

#### **3. BACKGROUND**

The 2001 York Durham Sewage System Master Plan update specifically identified extraneous flow reduction as a significant design consideration for all York Durham Sewage System projects. Although advances in inflow and infiltration reduction have been significant to date, a considerable amount of additional work is now underway. In February and March 2011, Regional and local Councils approved the Inflow and Infiltration Reduction Strategy that focused on the following commitments:

- Develop and maintain the Strategy including the programs, goals and interagency 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 document inflow and infiltration reduction expenditures and flow reduction measures

- Continue to work together in a collaborative manner over the life of the Strategy and commit appropriate staffing and financial resources toward implementation of the Strategy based on a business case analysis

**Water and Wastewater Steering Committee, including representatives from all local municipalities, is working collaboratively to implement the Strategy**

The Region formed the Water and Wastewater Steering Committee in April 2010 to successfully develop a comprehensive Strategy that addresses the Minister's Conditions. The Steering Committee is comprised of representatives from all nine local municipalities and the Region and is responsible to review inflow and infiltration issues and formulate the overall direction for development and implementation of the Strategy. York Region and the local municipalities are working collaboratively to implement various activities and resource the work required by their respective organizations to drive program implementation. All 10 municipal partners have committed to identifying and addressing the financial requirements for the 20 year horizon and the long term period beyond.

**4. ANALYSIS AND OPTIONS**

**Inflow and infiltration reduction will require comprehensive flow monitoring program**

Through 2012 to 2015, permanent flow monitoring devices will be installed to audit flows throughout the Region and will leverage the 2008 to 2011 pilot monitoring program in terms of equipment, data and standard practices. The flow data collected on a permanent basis will help determine inflow and infiltration volumes for audit and reporting purposes. A Request for Proposal to develop the permanent flow monitoring program, including flow monitor selection, procurement, installation and monitoring was released in February of 2012.

Most local municipalities do not currently have formal flow monitoring programs. However, as the audit program is developed and implemented, it may be required to begin isolating critical areas. Markham has purchased 4 monitors for their system and is evaluating flows on a smaller basin level.

**The Region's all-pipe sewage model provides detailed system flow analysis**

Adequate continuous real time flow and rainfall data are essential to ensure an all-pipe model is a reliable and functional tool to support reduction programs. York Region has developed an all-pipe sewage model for the York Durham Sewage System including the portion in Durham Region. The model will be used to:

- Support the York Region Wastewater Master Plan and ten-year capital programs

- Support system wide operational strategies including real time control
- Support the Inflow and Infiltration Reduction Program to identify areas of high inflow and infiltration as well as to quantify inflow and infiltration reduction as remedial works are carried out

### **Inspection and assessment programs successful in pinpointing sources of inflow and infiltration**

Inspection for inflow and infiltration flow reduction is a component of the Regional and local ongoing condition assessment and asset management programs. The Region's current closed circuit television program undertakes inspection of the trunk sewer network on a 10 year cycle, based on sewer condition rating. In 2011, the closed circuit television program inspected a total of 23.9 km of trunk sewers and 0.5 km of siphons. In 2012 the program will be inspecting 25 km of trunk sewers. Annual inspections cover approximately 10% of the trunk system.

The following local municipalities have ongoing inspection programs in place:

- Vaughan, 210 km closed circuit television in 2011
- Markham, 132 km closed circuit television in 2011
- Newmarket, 8.25 km closed circuit television in 2011
- King, 1.8 km closed circuit television in 2011
- Aurora, 33 km closed circuit television in 2011, 500 manholes inspected
- Richmond Hill, 130 km, closed circuit television in 2011

### **Development funded investigation and remediation efforts tied to allocation and proven reductions**

In May 2011, the Region, Town of Markham and Upper Unionville Inc. signed a tri-party agreement for reducing inflow and infiltration within the Town of Markham. Upper Unionville Inc. agreed to reduce inflow and infiltration within the municipality in exchange for advanced wastewater servicing allocation to support a new residential development at the northeast corner of Kennedy Road and Sixteenth Avenue. An implementation plan for inflow and infiltration reduction was developed by Upper Unionville Inc. and reviewed by the Region and Town. Remediation works are currently underway. The Region will determine eligible capacity for assignment based on proven inflow and infiltration reduction through remedial work performed by the developer and reviewed by the Region and Town.

Opportunities include:

- Developer funding of the project at no cost to the Region or the Town
- Quick commencement of work with readily available resources from the developer
- Acquiring project experience that can be used for other inflow and infiltration reduction projects in the Region
- A reduction in inflow and infiltration and peak sewer flows

This opportunity has been provided to all Regional local municipalities and resolutions have also been passed in the Towns of Aurora and Richmond Hill and the City of Vaughan to participate in the program.

**Local remediation pilot projects will provide inflow and infiltration reduction and determine effectiveness of reduction technologies**

A comprehensive Sanitary Sewer Evaluation Study of sanitary sewers and manholes located within local municipal systems was completed in 2010. Remediation projects were proposed for the eight projects categorized as the highest priority catchments in terms of inflow and infiltration. Remediation will include relining of approximately 12 km of mainline sewer, 162 point and surface repairs and 375 manhole rehabilitations.

The project was divided into two construction phases. Phase 1 includes rehabilitation work of four catchments in Aurora, Newmarket (2) and Richmond Hill. Commencement of this phase began in January 2012. Phase 2 includes rehabilitation work of four catchments in East Gwillimbury, Georgina (2) and Whitchurch-Stouffville. Commencement of this phase will begin in Q2 2012. Completion of the project is expected by Q4 2012.

Local municipalities have also been completing rehabilitation work which should improve system performance and assist in the reduction of inflow and infiltration. Work includes:

- Vaughan, 10 manholes relined in 2011
- Whitchurch-Stouffville, 1.16 km of sewer relined, 2 manholes repaired in 2011
- Markham, 1.22 km of sewer relined in 2011
- Newmarket, 1.76 km of sewer relined, 5 manholes repaired in 2011
- Aurora, 5 km of sewer relined, 20 manholes repaired/relined in 2011
- Richmond Hill, 2 km of sewer relined in 2011

**York Region's 10-year Capital Program identifies \$45M investment that supports flow reduction**

Through the Region's Infrastructure Management Program, inflow and infiltration issues within the Regional trunk sewers are also identified and remediation works planned. Currently there are a number of locations planned for remediation and this remediation will occur in the Regional trunk system over the next three years to reduce inflow and infiltration, including portions of the York Durham Sewage System (YDSS). Approximately \$45 million will be required over the next 10 years for Regional sewer rehabilitation across the entire sewer system, including remediation and upgrades to the existing South East Collector after completion of the new Southeast Collector.

### **Communication, education and advocacy have developed key relationships to support the Program**

The Strategy was developed through a collaborative approach including initiatives with multi-sector steering committees including representatives from the Ontario Concrete Pipe Association, Greater Toronto Sewer and Watermain Contractors Association, BILD, consulting engineers, regulatory agencies and municipalities. The work examined numerous sources of information on inflow and infiltration reduction including worldwide best practices employing lifecycle based approaches. Through a sequence of programs at the Regional and local municipal level, inflow and infiltration will be reduced to optimize the system for new flow and growth within the Region as well as addressing social and environmental demands.

As part of continued consultation with industry stakeholders, several presentations on the Inflow and Infiltration Reduction Strategy have been given by the Region to illicit comments on the Strategy. Presentations have been given to the Ontario Concrete Pipe Association, Building Industry and Land Development Association, the Municipal Engineers Association, National Water and Wastewater Benchmarking Initiative, Ministry of the Environment and the South East Collector Advisory Committee. As representatives for the Municipal Engineers Association, Regional staff sit on the Plant Prequalification Committee held through the Ontario Concrete Pipe Association. This Committee drives the acceptance and testing requirements for concrete product manufacturers in Ontario and also resources an audit program to monitor production certificates and compliance with performance thresholds. Participation has garnered excellent discussion around product performance and enhanced testing.

### **Improved standards and guidelines will facilitate efficiency in new development**

The York Region Sanitary Sewer Inspection, Testing and Acceptance Guidelines outline procedures and minimum requirements for inspection, testing and acceptance of new sanitary sewer systems commissioned in York Region and the nine local municipalities. The Guidelines were developed in conjunction with Regional staff, local municipalities and industry experts. The Guidelines have been finalized and were distributed to the nine local municipalities for implementation in October 2011.

As part of the ongoing commitment to the Strategy, the next phase of work will address improved standards for municipal development including subdivision agreements and site plan approvals. Specific areas to be addressed include the control of inflow during construction and the timing of connections prior to occupancy and/or full build out. To this end, a consultant has been retained to assist with data collection and review in Q1 2012. To date the following municipalities have used the new guidelines to commission new developments and the remaining municipalities have committed to do so through the Strategy approval:

- Whitchurch-Stouffville, two developments
- King Township, four developments
- Markham, sixteen developments

### **Significant achievements in the first year of implementation**

The Inflow and Infiltration Reduction Strategy recommended a target flow volume reduction at the Southeast Collector Trunk Sewer of 71 ML within a 24-hour period under a 25-year storm event, with approximately 40 ML to be achieved through inflow and infiltration reduction and the balance through water conservation initiatives by 2031.

In order to accurately quantify inflow and infiltration reduction, it is essential to install flow meters near the location of remediation works and collect data before and after construction to carry out comparison analysis. Regional staff have been coordinating with local municipal staff to install flow meters at required locations for all new remediation projects including the pilot projects noted in this report and are carrying out analysis on projects as flow data becomes available. To date, three catchments have complete pre and post construction flow data to enable staff to quantify the inflow and infiltration reduction. Reduction efforts have occurred in another eight catchments from 2008 to 2011, however post monitoring to quantify volumes is not complete and will not be available until late 2012.

The above will be included in the first Annual Report to the Ministry of Environment and as more flow data becomes available in other catchments, it will be reported accordingly in subsequent Annual Reports. Although the reduction only represents 2% of the 20 year requirement, it is significant to note that the Strategy was just finalized in March of 2011 and approved by the Ministry of Environment in October 2011. To see reductions this early in the process is very promising. Also, given that the Strategy was only endorsed by Regional and Local Councils in 2011, the first full year of resource planning and budgeting starts in 2012. The program will pick up significant momentum in this first year of implementation and further and greater reductions are expected in the future.

### **Link to Key Council-approved Plans**

The Inflow and Infiltration Reduction Program has direct links to the Regional 2011 to 2015 Strategic Plan. More specifically, the Strategic Priority Area focussing on continued delivery and sustainability of critical infrastructure, stipulates a key objective is to identify and leverage capacity available in existing infrastructure to complete the build-out of developing communities. A key indicator of success for this objective is the decrease of inflow and infiltration in Regional and local systems.

## 5. FINANCIAL IMPLICATIONS

The Inflow and Infiltration Reduction Strategy funding model has been approved based on the following key funding principles:

- 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. An initial funding target of \$100 million over 20 years has been established. This equates to an annual investment of \$5 million per year across the Region for inflow and infiltration reduction.
- 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
- 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 prioritized based on the most effective application to achieve the desired inflow and infiltration improvements as quickly as possible.

Funding for required Regional inflow and infiltration reduction work has been included in the approved 2012 capital budget.

## 6. LOCAL MUNICIPAL IMPACT

### **All Local municipalities have endorsed the Inflow and Infiltration Reduction Strategy**

Local municipal staff have been involved in development of the Inflow and Infiltration Reduction Strategy through participation in the Water and Wastewater Steering Committee. Local municipal Councils have endorsed the strategy to fulfill the conditions of approval for the Southeast Collector Trunk Sewer Individual Environmental Assessment. Continued participation by all local municipalities is required to meet Ministry requirements and ensure successful implementation of the strategy.

### **Successful implementation of this program will require inflow and infiltration reduction from private property**

Eliminating infiltration from the public sewers while ignoring the private infrastructure will compromise the Region's efforts to reduce infiltration into the Southeast Collector Trunk Sewer and fall 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 will be a key discussion of the Steering Committee in 2012 and will be critical to achieving continued inflow and infiltration reductions over and beyond the Regional and local municipal systems. Local municipalities will play a lead role in consulting with

residents, facilitation of work on private property and improving performance of new private infrastructure.

### **Local bylaw enforcement required for lateral inspections and remediation on private property**

To ensure access to the private portion of the sewer network, local municipalities will need to ensure that their respective bylaws include provisions such as right of entry or inspection that will allow for access by the municipality or their contractors. These bylaws are required to provide access to private property for all related work, including installing cleanouts, liners or new pipe as well as conducting closed circuit television work on laterals. By moving forward with bylaw development, the Region and local municipalities can:

- Create a strong program of communication and technical assistance to help homeowners design an alternative discharge method for flows, including disconnection programs
- Establish a clear policy regarding responsibility for cost of repairs including subsidy or grant programs for rehabilitation of laterals and property piping
- 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 thereafter periodically inspect repairs/disconnections. Consider time of resale inspections or certification programs.
- Establish a strong public outreach and education component so that the public is aware of the problem and the benefits of inflow reduction

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

The following local municipalities have been doing lateral inspections and repair in their systems:

- Aurora, 200 laterals inspected
- Whitchurch-Stouffville, 4 laterals inspected and replaced
- Newmarket, 80 laterals inspected, 15 laterals replaced
- Vaughan, 477 laterals inspected, 35 laterals repaired
- Richmond Hill, 177 laterals inspected and repaired



## **7. CONCLUSION**

York Region and local municipalities have joint responsibility to implement the Inflow and Infiltration Reduction Strategy. The Region and local municipalities are also required to further define and implement activities necessary to ensure the Strategy is continually maintained, enhanced and implemented. This work has commenced and will continue as a sustained program. The Strategy will be updated as data is collected, new information is learned and new technology becomes available.

Through development and implementation of this Strategy, the Region and its local municipalities have demonstrated leadership in inflow and infiltration reduction within the water and wastewater industry.

On March 31, 2012, York Region will submit to the Ministry of the Environment and the Southeast Collector Advisory Committee an annual report detailing progress on implementing the Strategy including inflow and infiltration reduction.

For more information on this report, please contact Daniel Kostopoulos, Director, Capital Planning and Delivery at (905) 830-4444, Ext. 5070.

The Senior Management Group has reviewed this report.