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CONSULTANT SELECTION FOR INFLOW AND INFILTRATION AUDIT AND FLOW MONITORING PROGRAM

The Environmental Services Committee recommends the adoption of the recommendation contained in the following report dated April 20, 2012, from the Commissioner of Environmental Services.

1. RECOMMENDATIONS

It is recommended that:

1. AECOM be engaged to undertake a York Region and local municipal system-wide inflow and infiltration audit and wastewater flow monitoring program at a fee of \$2,989,928.98, excluding taxes.

2. PURPOSE

This report seeks Council authorization to retain consulting services to develop a comprehensive inflow and infiltration audit and wastewater flow monitoring program as required by Condition 8 of the Southeast Collector Individual Environmental Assessment. This program will continuously audit wastewater flows throughout the Region as part of the Inflow and Infiltration Reduction Program and Strategy.

The Region's Purchasing By-law requires Council authorization to award a Request for Proposal over \$500,000. In this case, the recommended proponent's bid is over \$500,000.

3. BACKGROUND

York Region and its local municipalities are committed to reduce existing and future inflow and infiltration

The Inflow and Infiltration Reduction Program will optimize the operation and lifecycle of both existing and future wastewater infrastructure, better positioning the Region to maintain sustainable services over the long term.

A considerable amount of inflow and infiltration reduction work is underway as required by Condition 8 of the Southeast Collector Individual Environmental Assessment. In February and March 2011, Regional and local municipal Councils approved the Inflow

and Infiltration Reduction Strategy, which was developed in partnership with local municipalities.

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

Table 1 provides a breakdown of the inflow and infiltration reduction program and component timelines.

Table 1
Inflow and Infiltration Reduction Program Component Timelines

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

Flow monitoring is essential for auditing extraneous flow to the wastewater system by the Region and local municipalities

In the absence of comprehensive wastewater flow monitoring and a municipal billing program derived from wastewater flows, determining and managing deficiencies in the wastewater system is very difficult.

A permanent audit and flow monitoring program will reveal deficiencies in the wastewater system and will support state of infrastructure information so that rate models can be properly developed to recover true costs for current and future Regional and local mitigation. Quantifying extraneous flows in the system will identify the cost burden for conveyance, treatment and new infrastructure from unnecessary flows. A continuous

audit and flow monitoring program will promote transparency and accountability for asset management of the wastewater system, both Regionally and locally.

System performance plays a key role in growth management and data generated from the audit and flow monitoring program will be used to inform the capacity assignment process and potential system constrictions.

In 2008, Regional and local municipal inflow and infiltration reduction programs focused on identifying and assessing sources and areas contributing to high rates of inflow and infiltration that warranted further investigation and development of a permanent approach to control extraneous flows. Approximately 25 per cent of the wastewater system was monitored through 122 temporary flow monitoring locations across the Region. Seventy-seven locations were identified as medium to high priority areas. Twenty-six were subsequently selected for sanitary sewer evaluation studies, resulting in inflow and infiltration remediation work now underway.

Regionally funded remediation projects identified through evaluation studies will support success of the audit and flow monitoring program

Sanitary sewer evaluation work, completed in 2009, identified the need for inflow and infiltration remediation projects. Eight of the inflow and infiltration remediation projects proposed are currently under construction and are expected to be completed in late 2012. Remediation includes relining of approximately 12 km of mainline sewers, 162 point and surface repairs and rehabilitation of 375 maintenance access points in the Towns of Aurora, Newmarket, Richmond Hill, Whitchurch-Stouffville, East Gwillimbury and Georgina. Further remediation work will be identified late in 2012 for implementation in late 2013 and 2014.

To measure results achieved from the above remediation program, a three-year flow monitoring program started in October 2009 and will conclude in Q3 2012. This monitoring work includes 40 flow meters and eight rain gauges currently installed in Regional and local sewer systems in various locations to monitor flows before and after remediation works.

The intent of this regionally funded program is to assist the Region and local municipalities on wastewater system evaluation and remediation tools and techniques that will be used once the audit and flow monitoring program is implemented. As deficiencies in the system are found, the Region and local municipalities will have the capability and knowledge to respond. These tools and techniques will be refined over time so that system management can become more robust.

Further knowledge will be generated through the development funded inflow and infiltration pilot projects, whereby developers agree to reduce inflow and infiltration within respective municipalities in exchange for advanced wastewater servicing allocation to support new residential development. This opportunity is available to all local municipalities. Local municipal Council resolutions to participate in the program

have been passed in the Towns of Markham, Aurora and Richmond Hill and the City of Vaughan.

Management of inflow and infiltration and wastewater system performance requires an audit and flow monitoring program

A systematic and permanent inflow and infiltration audit and flow monitoring program across the Region and local municipalities is identified as a key component of the Inflow and Infiltration Reduction Strategy and was also identified through an Industry Best-in-Class Review. It is also a requirement of Condition 8 of the Southeast Collector Trunk Sewer Individual Environmental Assessment.

Implementation of this program will include identifying the type, location and number of permanent flow monitoring devices required to support the monitoring program. An estimated \$2.5 million will be required for the capital cost of the monitoring devices, over and above the costs proposed for the work required in this report.

Due to the complexity and size of the Region's wastewater system, the entire sewer service area (York Durham Sewage System and stand-alone systems) has been divided into a series of increasingly smaller audit basins that would allow for analysis, rehabilitation and auditing to occur in reasonably sized geographic areas. Over 270 audit basins have been identified with an expectation for over 300 once the initial stage of the project is complete. Flow data at this level is required on a permanent basis through an audit and monitoring program to determine inflow and infiltration volumes. Local municipalities and the Region will be responsible to mitigate poor performance in the wastewater system and fund the means to do so.

Through 2013 to 2015, permanent monitoring devices will be installed to audit flows throughout the Region and will leverage the 2008 to 2012 monitoring program in terms of equipment, data and standard practices. Flow and rainfall data collected on a permanent basis will help determine inflow and infiltration volumes for audit and reporting purposes as well as determine poor system performance and remediation opportunities. The data will support the all-pipe hydraulic sewage model used for growth management, asset management and planning purposes.

Continuous monitoring of dry weather flow and wet weather events are critical to a successful program

A permanent inflow and infiltration audit and wastewater flow monitoring program is necessary for auditing, reporting purposes and managing system performance. It will provide the information necessary to audit flow changes in the Regional system in specific areas due to:

- Growth
- Asset Management

- Increased inflow and infiltration
- Inflow and infiltration reduction following remedial works

Flow monitoring and data analysis during dry and wet weather conditions help identify areas subject to excessive inflow and infiltration and indicate deficiencies in the wastewater network. Additionally, wet weather flows can be highly variable depending on seasonal groundwater table fluctuation, snow pack, and soil moisture conditions. Continuous flow monitoring is necessary to reveal these variations and monitor actual reductions with inflow and infiltration over time.

Ongoing flow monitoring activities are required throughout the course of implementing the strategy to accurately measure volumetric inflow and infiltration reductions and meet the 40 megalitres per day reduction target. This target, in combination with the Long Term Water Conservation Strategy objectives and targets, aligns with the 10 per cent flow reduction target contemplated in the Southeast Collector Trunk Sewer Individual Environmental Assessment.

Proposed long term audit and flow monitoring program consists of three inter-dependent stages

This report seeks authorization to proceed with a comprehensive permanent inflow and infiltration audit and wastewater flow monitoring program. This program will provide real-time data necessary for auditing flows throughout the Region, identifying potential sources of inflow and infiltration, reductions, minimizing system risk and maximizing capacity by fully leveraging existing infrastructure.

Data collected will provide valuable information essential for maintaining the Region's all-pipe hydraulic sewage model, evaluating system performance, long term capacity planning and wastewater system renewal programs.

In order to meet the objectives in a timely, effective and cost efficient manner, the proposed program has been divided into three inter-dependent stages:

- 1) Review, update and expand audit basin (catchment) delineation maps to capture all nine local municipalities
- 2) Develop long-term audit and flow monitoring strategy
- 3) Initiate permanent monitoring equipment installation, maintenance and support program

Wastewater flow monitoring and rainfall monitoring locations will be installed in three phases over the first two years of the program. The existing inventory of flow meters will be used initially to increase the number of basins being audited. Additional flow metering technologies may be needed to meet requirements of the program beyond the equipment currently owned by the Region depending on site characteristics and hydraulics.

Appropriate technology for each audit basin will be considered, which optimizes the long term monitoring requirements against the annual operation and maintenance costs. Real time data acquired through telemetry and links to Supervisory Control and Data Acquisition (SCADA), where appropriate, will also be considered to minimize maintenance costs.

Upon completion of the two year and potentially third year of program support, Regional staff will review the program support requirements in terms of management, operation, maintenance and resourcing and provide recommendations on proceeding with internal resources or external vendors. An internally managed program will likely require further staffing.

4. ANALYSIS AND OPTIONS

Three consulting firms responded to the Request for Proposal

In accordance with the Region's Purchasing By-law, consultants were invited to submit proposals for the assignment through a Request for Proposal (RFP 12-20) that was advertised in the *Daily Commercial News*, electronically on *Biddingo.com* and the Region's Bids and Tenders website. The following three consulting firms submitted proposals for this assignment.

- AECOM Canada Ltd.
- Cole Engineering Group Ltd.
- Stantec Consulting Ltd.

The Request for Proposal detailed the scope of work required, which included the following services:

- Audit basin delineation
- Flow and rainfall monitoring strategy
- Flow and rainfall monitoring support program
- Project management

Proposals evaluated using the two-envelope system

Proposals were evaluated using the two-envelope system with technical and financial information submitted in two separate envelopes. The overall proposal score was evaluated based on a weighting system; a maximum of 80 points for the technical/management proposal and a maximum of 20 points for the financial proposal. Technical/management proposals were evaluated prior to any knowledge of financial information.

The Region's proposal evaluation team reviewed the three technical/management proposals based on the following criteria:

- Experience of proponent, proposed team and project manager for Regional and similar projects
- Proposed key staff and project manager's qualifications and training
- Project understanding and methodology
- Project management approach and deliverables
- Proponent's policies for quality assurance and quality control processes, health and safety, environmental management and traffic control
- Similar project references
- Value added services and innovative concepts

To be considered for award, proponents must achieve a minimum technical score of 60 per cent (48 points out of the potential 80) to have the financial portion of the proposal considered. If a proponent does not achieve this minimum technical score, their financial proposal is returned unopened. Technical and financial results for each proponent are summarized in Table 2 below.

Table 2
Consultant Proposal Evaluation Summary

Consultant	Technical Score (Out of 80)	Financial Score (Out of 20)	Total Score (Out of 100)	Cost per Technical Point (\$)	Total Fee (\$) (excluding taxes)
AECOM Canada Ltd.	55.5	20	75.5	\$53,921.17	\$2,989,928.98
Cole Engineering Group Ltd.	64.9	11.5	76.3	\$80,498.07	\$5,220,300.00
Stantec Consulting Ltd.	45.6	N/A	N/A	N/A	N/A

Evaluation summary revealed AECOM as the successful proponent

The firm with the highest total score was Cole Engineering Ltd. Since the total score achieved by AECOM was within five points of the highest total score, a "dollar cost methodology" calculation was completed, as required by the Purchasing By-law. Results of this calculation, as shown in Table 2, determined that the proposal submitted by AECOM represents the best overall value to the Region. AECOM is currently working for the Region on a flow measurement project in the YDSS and has assisted the Region with developing the YDSS "all-pipes" hydraulic model and implementing flow control gates. The proposals from both Cole and AECOM met the technical requirements however, Cole's higher cost was related to significantly higher proposed level of effort required to physically collect, organize and analyze the data.

Subsequent interviews held with both technically qualified proponents confirmed their comprehensive understanding of the scope and commitment to perform and provide required project deliverables for the quoted fee.

Supplies and Services Branch has reviewed the evaluation summary and has issued their internal report confirming that AECOM be recommended as the successful overall proponent to undertake the consulting and support services to carry out a long term rainfall and wastewater flow monitoring program for up to three years.

Link to key Council-approved Plans

Establishing an inflow and infiltration audit and flow monitoring program throughout the Region will ensure the implementation and success of the Inflow and Infiltration Reduction Strategy and will provide flow data in more specific municipal catchment areas to identify performance gaps. Reducing inflow and infiltration in Regional and local systems aligns with the Region's 2011 to 2015 Strategic Planning objectives of continuing to deliver and sustain critical infrastructure, as well as identifying and leveraging capacity available in existing infrastructure to complete the build-out of developing communities. Successful implementation of the Inflow and Infiltration Reduction and Monitoring Program is a Ministry of the Environment requirement in the Southeast Collector Trunk Sewer Individual Environmental Assessment conditions of approval.

5. FINANCIAL IMPLICATIONS

The fee for the proposed work is \$2,989,928.98, excluding taxes with a forecasted total project cost of \$5.5 million, including the supply of new monitoring equipment. There is adequate budget in the 2012 Capital Program for this program, with a total project budget authority of \$9.6 million.

Based on competitive pricing within the financial proposal submitted by AECOM and industry standards, the fee for the proposed work represents value for money for this project.

Assessment of long term resource requirements for ongoing maintenance and monitoring of rainfall and wastewater flow monitoring equipment will be developed during initial implementation of the program. Additional Regional staffing and resources will likely be required to install, monitor and maintain the monitoring devices and manage the audit program following completion of this assignment if determined as the preferred approach going forward.

Cost savings through optimized asset management and capacity management programs

Ministry of the Environment requirements, the Best-in-Class Industry Review and the inflow and infiltration program results all confirm that a permanent audit and flow monitoring program is an essential component for proper management of the Region's wastewater collection system. This monitoring will identify wastewater system performance gaps, as well as verify the reductions achieved through remediation works.

The expenditure to create this audit and flow monitoring program will create value through the following:

- Quantify wastewater flows and inflow and infiltration being generated from individual local municipalities and individual audit basins within each municipality and the Region
- Indication of deficient infrastructure, private property storm to sewer connections and required asset management program improvements
- Understanding of localized system capacity constraints that will effect growth and development and impact the capacity assignment process
- Capacity constraints and opportunities system-wide
- Clear indication of localized wastewater flows to support and potentially drive wastewater billing at true cost
- System-wide data for modelling and real-time behaviour to drive risk and opportunity management
- Significant capital, operating and maintenance cost savings through optimized asset management and capacity management programs

Through the Inflow and Infiltration Reduction Strategy, York Region and local municipalities have committed to a \$100 million investment in inflow and infiltration reduction over the next 20 years. This \$5 million per year commitment from water and wastewater rates will be used for monitoring, investigations, capital rehabilitation and reserve building for future use. Funding will be reviewed every five years against the Inflow and Infiltration Reduction Strategy to ensure performance goals are being achieved and that funding is adequate. Where inflow and infiltration can be reduced to create capacity in the system and offset the need for new infrastructure, development charge funding will be used to fund these related reduction works.

The audit and flow monitoring program will support required expenditures and ensure funding is utilized to support system optimization goals. Reductions will be balanced with new infrastructure to ensure the lowest cost possible to achieve system capacity for growth and system management. Investment in the audit and flow monitoring program is necessary to meet the overall objectives of the strategy and conditions of the Southeast Collector Trunk Sewer project.

6. LOCAL MUNICIPAL IMPACT

The combined Regional and local municipal wastewater collection system is comprised of over 3000 kilometres of pipe network, with a majority of the system in the jurisdiction of the local municipalities. Although Regional funding is provided for this program, the majority of the flows will be monitored within the local system.

The audit and flow monitoring program will provide municipal specific wastewater flow data to support local and Regional efforts at determining high risk areas for further investigation and support local growth management and asset management programs. This program will also clarify the relationship between water consumption and wastewater contributions in local and regional systems.

Local municipal staff has been involved in development of the Inflow and Infiltration Reduction Strategy to ensure local objectives are met as part of the strategy and are key partners in the proposed program. Local municipal Councils have endorsed the strategy to fulfill the Ministry of the Environment's conditions of approval. Continued participation by all local municipalities is required to meet Ministry requirements and ensure successful implementation of the strategy.

7. CONCLUSION

A permanent inflow and infiltration audit and flow monitoring program is necessary to reveal variations in flows and manage system performance. It will provide data necessary for calibration of the Regional all-pipe hydraulic sewage model and support growth optimization, asset management and inflow and infiltration reductions, as a result of remedial works. The program is critical to the success of the overall Inflow and Infiltration Reduction Strategy which was required by Condition 8 of the Southeast Collector Trunk Sewer Individual Environmental Assessment.

Three proposals were received and evaluated in accordance with the Region's Purchasing By-law. The proposal from AECOM represents the best overall value to the Region and it is recommended that the assignment be awarded to AECOM at a fee of \$2,989,928.98 excluding taxes.

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

The Senior Management Group has reviewed this report.