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CONSULTANT SELECTION FOR ENGINEERING SERVICES MODEL SUPPORT

The Transportation and Works Committee recommends the adoption of the recommendations contained in the following report, August 26, 2004, from the Commissioner of Transportation and Works:

1. RECOMMENDATIONS

It is recommended that:

1. The Commissioner of Transportation and Works be authorized to engage the firm of Earth Tech Canada Inc. to provide consulting services in support of the Region's water and wastewater hydraulic models including operation and maintenance, as outlined in this report at an upset limit cost of \$200,000 for a period of one year with the ability to extend the services on an annual basis for a total period of three years.
2. The Commissioner of Transportation and Works be authorized to engage the firm of Earthfx Inc. to provide consulting services in support of the Region's groundwater management strategy, as outlined in this report, up to an upset limit cost of \$200,000 for the period of one year with the ability to extend the services on an annual basis for a total period of three years.
3. The Commissioner of Transportation and Works be authorized to approve the annual renewal of the service contracts with Earth Tech Canada Inc. and Earthfx Inc. after the first and second years to an upset limit not to exceed the amounts noted above.
4. The provisions of the Purchasing By-law be waived to allow the direct appointment of Earth Tech Canada Inc and Earthfx Inc. as per the above recommendations to commence upon acceptance by Council.

2. PURPOSE

The purpose of this report is to outline the rationale for acquisition of dedicated consulting services to carry out data management and modelling analysis assignments in support of York Region's water and wastewater planning efforts.

3. BACKGROUND

Predictive modelling is an essential business component of the Water Resources Planning section of the Water and Wastewater Branch. The types of models currently being developed and employed include hydraulic models to assess the capacity and operation of the water and wastewater systems and numerical groundwater flow models to better understand groundwater flow conditions and particularly to assess the effects of existing

or proposed water taking. These models represent significant investment, that if maintained effectively can provide long-term support and direction for the planning, construction, operation and maintenance of the Region's water and wastewater business.

While Regional staff are trained and familiar with the construction, operation and use of these models, work requirements to maintain model currency and to provide an effective and defensible analysis using the models typically exceeds the abilities of current staffing levels. This is particularly true in consideration of the complexity of the models, and the detailed analysis required in maintaining and supporting the model efforts. Private consulting firms typically have resources specifically trained in all aspects of maintaining and operating these types of models. Regional staff would be required to identify the scope of the intended modelling studies and to ensure that the appropriate analysis is being conducted.

The following sections provide an overview of the development and application of models currently available to York Region.

3.1 System Hydraulic Models

The Region has recently obtained hydraulic models of the Region's water systems that were developed by the Region's consultants for master planning and capacity analysis purposes. The Region will soon be obtaining a detailed hydraulic model of the wastewater systems. These models represent significant investment, that if maintained effectively can provide insight into the planning, operation and maintenance of the Region's infrastructure.

Regional staff has been involved in all of these modeling initiatives, but due to the system complexity and staff availability, the models, to date, have been maintained and operated by the Region's consultants.

3.1.1 Water System Hydraulic Model

A detailed hydraulic model of the water system was created by Earth Tech Canada Inc. for the City of Toronto and York Region as part of the Toronto-York Joint Optimization Study (JOS). This modeling tool was used to determine the optimal infrastructure program that will satisfy water demands in 2011 and 2031 for the Toronto and York combined system. This hydraulic model was also used in the Long Term Water Supply (LTWS) Master Plan Update to determine the Region's infrastructure requirements. New models were also created by Earth Tech Canada Inc. for the water systems in the satellite communities.

3.1.2 Wastewater System Hydraulic Model

A model of the York Durham Sewage System (YDSS) was initially created for the YDSS Master Plan 1997 and Master Plan Update 2002. It was recognized that this model had become outdated and that the application of a new model would provide the Region with a more reliable and integrated tool. In December 2003, the Region retained Earth Tech Canada Inc. for the development of a detailed dynamic hydraulic model for the Region's wastewater systems that is integrated with the Region's GIS.

3.2 Groundwater Management Tools

In 2001, York Region initiated work to develop a comprehensive groundwater management strategy. One of the key components of this strategy was to develop the appropriate tools for understanding and managing the groundwater resources. In early 2002, the Consulting Team of Earthfx Inc. and Gartner Lee Limited were contracted to develop the initial model with the final product being available to the Region and its partners in November 2003.

Subsequent to the initial availability of the model, there has been great support from the both the Conservation Authorities and the Ministry of Environment in the application of this tool to better assess groundwater impacts associated with both temporary and permanent water taking activities to the point that these agencies are accepting the validity of this model and consider it an important step forward in understanding potential effects of groundwater taking activities.

4. ANALYSIS AND OPTIONS

The Water Resources Planning section of the Water and Wastewater Branch is responsible for managing programs to ensure that existing water and wastewater systems can be maintained and to plan for growth of these systems. As such, there is a continual need to understand the capacity of existing systems and to be able to understand the effects of proposed changes.

The following sections summarize the need for the external services, the scope of external services requested, document the options available to provide these services and recommend the approach for acquiring services in the best interests of the Region.

4.1 Need For Services

Regional staff has been working closely with the consulting teams in the initial development of the various models. As these models are completed and applied to our system, it is critical that sufficient resources are made available to perform the tasks necessary to ensure that information is up to date and the models remain useful as application tools in support of the Region's water resources and capacity activities. To assist in bridging this gap, there is a need to continue using external services until such time as the staff compliment and skill levels are able to support the majority of the necessary functions at which point the need for consulting support will diminish. The specific need for assistance in support of hydraulic systems for water and wastewater services and for supporting the groundwater management initiatives are outlined in the following sections.

4.1.1 Hydraulic Systems Modelling

The hydraulic systems models are becoming an integral part of the management of water and wastewater capacity both for York Region and as a supplement to our primary service partners including the Region of Durham, Toronto and the Region of Peel. These models will further support our activities in the following areas:

- Better understanding of available system capacity.
- Improve management of available capacity through scenario analysis.
- Timely identification of bottle necks and service constraint issues.
- Provide operational support to test different modes of system operation.
- Improve timing of capacity allocation in conjunction with planning projections.

4.1.2 Groundwater Management Support

The groundwater management tools, and particularly the regional numerical groundwater flow model are an important step in providing York Region with the ability to effectively understand and manage water resources within its jurisdiction. Improving the current and future understanding and increasing the capability of the modelling activities requires continued investment which is warranted to ensure that these tools can be maintained, improved and applied effectively and defensibly. The groundwater management tools are required by York Region for the following tasks:

- Identifying the capacity of groundwater resources that can be used for municipal water supplies.
- Delineating capture zones and wellhead protection areas around municipal production wells.
- Identifying potential impacts associated with temporary water taking activities for large scale infrastructure projects.
- Understanding long term affects of existing regional water taking activities.

In addition to these tasks, the services of hydrogeologists experienced in applying numerical groundwater flow models are required to:

- Plan for use of the model in an appropriate, defensible, and effective manner.
- Undertake the modelling analysis.
- Undertake sensitivity studies to support the modelling analysis.
- Assist in interpreting the meaning of the modelling analysis.
- Defend the modelling analysis.

4.2 Scope of Required Services

The following sections outline the scope of services required to assist the Water Resources Planning staff.

4.2.1 Hydraulic System Modelling

Hydraulic models have achieved widespread acceptance as an essential tool in the planning and managing of urban infrastructure. Their uses are wide and varied. The Region will continue to maintain the hydraulic models in terms of day-to-day updates, however, there are a number of critical activities that should be undertaken under a general support agreement with external consulting support.

Water Modeling Activities

The scope of these activities would include but is not limited to the following:

- Assess impacts of deviations in the planned capital program.
- Assess impacts/requirements of accelerated development applications.
- Review and assess various operating scenarios.
- Demand projections and calculations.
- Ongoing staff training and support.

Wastewater Modeling Activities

The scope of these activities would include but is not limited to the following:

- Assess impacts of deviations in the planned capital program.
- Assess impacts/requirements of accelerated development applications.
- Assess inflow/infiltration rates.
- Review and assess various operating scenarios.
- Plan flow monitoring and rainfall monitoring programs.
- Continued assessment of flow attenuation and evaluation of system storage proposal for both Regional and local municipal systems.
- Ongoing staff training and support.

4.2.2 Groundwater Management Support

The assignments required by Water Resources Planning staff focus on services related to maintaining and improving tools necessary for effective groundwater management.

The Water Resources Protection section has participated in the development of the York Region Groundwater Information Management System based on the SITEfx data model which was developed by Earthfx Inc. The services required to maintain and improve this groundwater management tool include:

- Solving problems encountered with existing tools.
- Implementing planned improvements to the tools.
- Providing general support services to Regional staff, including network adaptations.
- Assisting in ensuring that new information can be added, or re-integrated.
- Assisting in ensuring that information can be distributed as required.
- Updating geological understanding to incorporate new information.
- Assisting in preparing output from the tools as required.

- Conducting sensitivity analysis to understand the limits and accuracy of the model tools.
- Defining process and requirements for use of the groundwater management tools.

4.3 Procurement of Services

As previously noted, the consulting firms of Earth Tech Canada Inc. and Earthfx have been instrumental in the development of the water and wastewater models and the groundwater model respectively. It would therefore be beneficial to continue to retain these consultants for an extended period of time to provide additional support services until such time as the Region has the necessary resources to manage these tools internally. This approach is recommended for the following reasons:

- Current staff resources and skill levels are not sufficient to immediately provide the support necessary to ensure that the models are updated, modified and applied at a consistent level required to ensure reliability and accuracy of the required outputs.
- Continuing with consultants who are familiar with the model will result in a lower risk of misinterpretation of the model and provide a higher level of consistency in the reliability and defensibility of the model outputs.
- Fragmenting the required support services introduces risks of a protracted handover period and risks of misapplication of the model as staff cope with managing small unrelated assignments for each modelling activity identified as needs arise.
- Negotiating multi-year assignments is contemplated in the purchasing by-law.

Proceeding through a competitive process could result in retaining inadequately skilled resources. Considering that model development is a relatively specialized service, there are not that many firms that would have the background knowledge or resources to provide the support required by the Region. Should proposals be requested through a competitive process, there is also the possibility that the consultants involved in the regions current models would become sub-consultants or joint proponents with other firms. This has occurred in recent projects where there has been a modelling component and has resulted in increased coordination efforts. The net effect of a competitive process for this particular application would result in increased time for consultant selection, potentially increased costs, and a risk that inappropriate services could be selected.

It is therefore recommended that the requirements of purchasing by-law to obtain competitive quotes be waived to permit the Commissioner of Transportation and Works to directly retain the firms of Earth Tech Canada Inc. and Earthfx for a three year period to support staff in the continued maintenance and application of the hydraulic and groundwater models.

5. FINANCIAL IMPLICATIONS

The need to retain the proposed consultants is to ensure that the models that have been created for the Water Resources Planning group can be updated, maintained and applied in a manner that provides the highest confidence to the stakeholders that are relying on this information.

Considering the request to waive the purchasing by-law to permit direct assignment to the two preferred consultants, staff is also proposing cost control measures that will ensure the Region is obtaining the highest value for funds expended.

In proposing a stepped three year term, it is expected that the Region will gain the most benefit from the services provided based on the level of consistency and understanding the consultant will have through this close association. Also, staff will be in a better position by working closely with the consultants through this period which will further increase the effectiveness of the knowledge transfer that will be required as regional staff move towards assuming the ultimate responsibility of maintaining and applying these models. This close working relationship will also aid in assuring that the Region is receiving value as staff will be able to regularly assess the level of service being provided.

It is also proposed that these service agreements be reviewed on an annual basis to reaffirm the required services and the level of effort being requested. This will provide an additional level of assurance that the services continue to meet the Region's needs as staff move through the knowledge transfer process.

From a staffing perspective, it is expected that regional staff will ultimately assume the primary model support role. However, the actual level of effort that will be required and the extent to which services can be performed internally have not been fully explored. These needs will be assessed as staff continue through the process and additional staff support will be requested as the need is identified.

5.1 Water and Wastewater Model Support

Based on the desired work plan and in consultation with Earth Tech Canada Inc, the upset limit for the required consulting services will not exceed \$200,000 per year per model. There is sufficient funding identified in the 2004 and the 2005 budgets.

5.2 Groundwater Management Support

Based on the desired work plan and in consultation with Earthfx Inc, the upset limit for the required consulting services will not exceed \$200,000 per year. There is sufficient funding identified in the 2004 and the 2005 budgets.

6. LOCAL MUNICIPAL IMPACT

A comprehensive understanding of the water, wastewater and groundwater systems will benefit the local municipalities through processes such as capacity management, well development and service delivery.

7. CONCLUSION

Recent events associated with capacity issues and the Region's impact on groundwater resources has heightened the need to continue development of the appropriate tools to manage groundwater resources and the water and wastewater systems.

To achieve the most cost effective and productive outcome, it is recommended that the purchasing by-law requirement of obtaining multiple bids be waived and that the two firms that have been key in developing the modelling tools be retained for a period of three years to assist the Region in ongoing support, maintenance and application of these tools.

It is recommended that Earth Tech Canada Inc. be retained to support both the water and wastewater modelling requirements for an upset limit of \$200,000 per year per model for a period of one year with the ability to extend the services on an annual basis for a total period of three years.

It is recommended that Earthfx Inc. be retained to support the groundwater modelling requirements at an upset limit of \$200,000 per year for a period of one year with the ability to extend the services on an annual basis for a total period of three years.

Funding for these assignments have been included in the 2004 and the 2005 budgets.

The Senior Management Group has reviewed this report.