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TO:	CHAIR AND MEMBERS CIVIC WORKS COMMITTEE MEETING ON MAY 26, 2014
FROM:	JOHN BRAAM, P.ENG. MANAGING DIRECTOR ENVIRONMENTAL & ENGINEERING SERVICES AND CITY ENGINEER
SUBJECT:	FOX HOLLOW SWM FACILITY NO. 1 – INCREASE IN CONTRACT VALUE (ES3020-FH1)

RECOMMENDATION

That, on the recommendation of the Managing Director Environmental & Engineering Services and City Engineer, the following actions **BE TAKEN** with respect to the Fox Hollow SWM Facility No. 1 – South Cell and Woodlot Berm clay cut-off wall works:

- a) The Fox Hollow No. 1 SWM Facility – South Cell and Woodlot Berm (Tender T13-77) contract value with Bre-Ex Limited **BE INCREASED** by \$502,202 to an upset limit of \$2,417,312 excluding HST in accordance with Section 20.3 (e) of the Procurement of Goods and Services Policy;
- b) the consulting fees for Stantec Consulting Ltd. **BE INCREASED** by \$63,931 to a new upset limit of \$1,817,342.50 excluding HST in accordance with Section 15.2 (g) of the Procurement of Goods and Services Policy due to additional design, tender and contract preparation and administration works associated with the storm/drainage and stormwater management servicing works in the Fox Hollow Development Area;
- c) the financing for the project **BE APPROVED** in accordance with the “Sources of Financing Report” attached hereto as Appendix “A”; and
- d) the Civic Administration **BE AUTHORIZED** to undertake all the administrative acts that are necessary in connection with this work

PREVIOUS REPORTS PERTINENT TO THIS MATTER
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- CWC – February 3, 2014 – Appointment of Consulting Engineer for Inspection, Contract Administration and Engineering Services Associated with the Construction of the Fox Hollow SWM Facility No. 1 – South Cell and Woodlot Berm (ES3020-FH1)
- CWC – November 12, 2012 – Fox Hollow Development Area Stormwater Management Facilities Nos. 1 and 3
- CWC – June 19, 2012 – Phasing of Stormwater Management Facilities
- CWC – December 19, 2011 – Fox Hollow Development Area Stormwater Management Facility #2 Depressurization Wells and Groundwater Works
- BNEC – October 31, 2011 – Contract Award – Tender No. T11-62 - Fox Hollow Community SWM System (Heard Drain) and Trunk Sanitary Sewer (ES5236)
- BNEC – August 15, 2011 – Fox Hollow Development Area Stormwater Management Facility #2 Depressurization Wells and Groundwater Works
- BNEC – May 2, 2011 – Contract Award – Tender No. T11-40, Fox Hollow Development Area Stormwater Management Facility No. 2 Construction Contract (ES3019)
- BNEC – Feb 14, 2011 – Contract Award – Tender No. T11-13, Fox Hollow Development Area Stormwater Management Facility No. 2 Site Preparation Contract (ES3019)
- ETC – May 10, 2010 – Appointment of Consulting Engineer for Engineering Services for Functional and Detailed Design of Fox Hollow Community Storm/Drainage, Stormwater Management and Sanitary Trunk Sewer Servicing Works.

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ETC – April 12, 2010 – Schedule C Municipal Class Environmental Assessment Addendum for Storm/Drainage, Stormwater Management and Sanitary Servicing for the Fox Hollow Development Area

PC – October 19, 2009 – Storm/drainage, Stormwater Management and Sanitary Trunk Sewer Servicing Works for Fox Hollow Development Area

ETC – June 1, 2009 - the appointment of a consultant for the Functional Design of Fox Hollow Community Storm/Drainage, Stormwater Management (SWM) and Sanitary Trunk Sewer Servicing Works (ES3018 ES5236) Fox Hollow Trunk Sanitary Sewer.

ETC – September 11, 2006 – Municipal Class Environmental Assessment Report Recommendations for Proposed Storm/Drainage and Stormwater Management Servicing Works for Fox Hollow Development Area

ETC – June 13, 2005 – Approval of the Appointment of the Consulting Engineer for the Municipal Class EA, Schedule ‘C’ Study for Storm/Drainage and SWM servicing works for Fox Hollow Development Area

ETC – March 25, 2002 – Approval of the Completion of the Functional Drainage and SWM Master Plan for Fox Hollow Community Plan

ETC – February 26, 2001 – Approval of the Appointment of the Consulting Engineer for Functional Drainage and SWM Master Plan for Fox Hollow Community Plan

BACKGROUND

Purpose

The City’s Procurement of Goods and Service Policy requires Council approval for amendments to contracts. The Fox Hollow No. 1 SWM Facility – South Cell and Woodlot Berm contract requires an amendment due to the discovery of the soil conditions that were inconsistent with the geotechnical and hydrogeological reports and tender documents (location map is shown in Appendix B). This report also seeks approval to increase the consulting engineering fees associated with the storm/drainage and SWM servicing works in the Fox Hollow Development Area.

Context

In general, the change in scope consists of the following key items:

- Additional dewatering in order to lower groundwater levels to the approximate clay till/gravel interface to permit construction of the clay cut-off wall;
- Additional sub-excavation to permit construction of the extended cut-off wall to variable depths of approximate 263.5 m to 264 m to key into the native clay till (exact depth to be determined);
- Additional clay placement to address the added volume of the wall below the anticipated termination depth.

DISCUSSION

The following subsections provide further insight into the design and tender of the clay cut-off wall, construction completed to date and a cost estimate of the additional work based upon input from the Contractor.

Functional/Detailed Design - Geotechnical and Hydrogeological Assessments

As part of the functional and detailed design stage for the project, the City undertook the required geotechnical and hydrogeological assessments needed to characterize the soil and groundwater conditions to support the design, tender and approvals requirements for the Fox Hollow Development Area.

With respect to the south cell of the Fox Hollow No. 1 SWM Facility, the initial field work associated with the geotechnical investigation commenced in 2010 and included the advancement of several boreholes within the general area of the Fox Hollow Nos. 1, 2, and 3 SWM facilities. Following revision to the design of the originally proposed No. 1 facility which

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resulted in dividing this facility into three cells (South, North and Woodlot), a further geotechnical investigation was carried out in June 2011 at which time three additional boreholes were drilled within the proposed area of the south cell of the SWM Facility.

Based on the results of the *Geotechnical Investigation – Stormwater Management Facility No. 1 Fox Hollow West Development Area, London, Ontario* (dated August 2013) and *Hydrogeological Assessment – Stormwater Management Facility No. 1S Fox Hollow Development Area, London, Ontario* (dated August 2013), the following observations and recommendations were noted:

- Highly variable soil conditions consisting of surficial topsoil, silts, sands, sand and gravel, clayey silt and clayey silt till were encountered throughout the entire development area;
- The inferred subsurface conditions in the vicinity of the south cell of the facility were based on the encountered stratigraphy obtained from boreholes advanced within the immediate area. These boreholes generally encountered surficial deposits of sand interbedded with sand and gravel overlying clayey silt till at elevation 266.9m to 268.8m;
- Groundwater elevations were noted as variable depending on location and seasonal conditions, but were anticipated to be higher than the proposed permanent pool elevation for the facility;
- Due to the elevated groundwater levels and in accordance with the requirements of the Ministry of the Environment (MOE), a cut-off wall was recommended to effectively isolate the groundwater regime from the SWM facility;
- Temporary construction dewatering would likely be required to permit construction of the facility, cut-off wall, and related works and would require a Category 3 application to the MOE for a Permit to Take Water (PTTW); and
- Based on a desktop review of available information acquired through the various subsurface investigations, site reconnaissance, door-to-door water well survey, and ongoing water well level monitoring program, the hydrogeological report estimated the proposed dewatering rates required to allow for construction. This estimate was based on the anticipation of encountering the clayey till stratum at the proposed base of the facility, which coincided with the results of the borehole investigation.

A Category 3 Permit to Take Water (PTTW) application was subsequently prepared and included a copy of the hydrogeological assessment. This initial application noted a maximum water taking of 1,960,000 L/day and typical water taking volume (average) of 1,740,000 L/day based on the assumed soil and hydraulic characteristics noted from the work undertaken to date, with additional allowance for precipitation events.

Detailed design including completion of the tender documents for the south cell and woodlot berm was completed in December 2013. The design drawings and specifications noted the construction of a clay cut-off wall to the approximate depth to clay stratum as provided in the geotechnical and hydrogeological reports which were also provided as part of the tender as information.

Tender and Construction

Tenders for the above-noted project closed on Wednesday, January 15, 2014 from prequalified contractors. In total, eight (8) prequalified contractors were invited to submit a tender for the work. Of the contractors approved for prequalification, a total of seven (7) tenders were received, with one tender disqualified in accordance with Clause 18 Exclusion of Tenderer in Litigation of the Information to Tenderers.

Based on a review of the tender submissions, Bre-Ex Ltd. (Bre-Ex) provided the lowest compliant tender. However, during review of tenders, it was noted that the Contractors price for dewatering was significantly lower than the majority of the other bids received and the pre-tender estimate for this item.

Given the soil stratigraphy in the area and anticipated groundwater levels as noted in the geotechnical and hydrogeological reports, the extent of dewatering was considered a significant component of the work plan. As previously noted, dewatering is required in order to allow for construction of the facility and installation of the clay cut-off wall which was a requirement of the Environmental Compliance Approval (ECA) from the MOE for the project to effectively isolate the groundwater regime from the facility. Therefore, further clarification was requested from Bre-Ex prior to award of the project. Information provided by Bre-Ex noted that the Contractor would dewater the site by means of sump pumps to the anticipated levels noted and up to the rates as provided in the PTTW which was provided to all tenderers by addendum and the

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contractor provided assurances that their dewatering approach was valid and appropriate. Well points would be used only should the sump pumps prove to be incapable of sufficiently dewatering the area to the depth anticipated.

On that basis, on January 16, 2014, the Contract for the construction of the above noted project was awarded to Bre-Ex in accordance with the City's Procurement of Goods and Services Policy under the City's Administrative Approval process as the value of the tender (\$1,915,110 including contingency, excluding HST) was under three (3) million dollars.

During excavation of the facility, it was noted that the actual depth to the clay till stratum was highly variable from the west to east limit, with localized "pockets" of both shallow and deep clay noted. These irregular deep pockets have also resulted in challenges in dewatering due to the increased thickness of the overlying saturated granular deposits. In total, an approximate elevation variance of 7 m vertically across approximately 126 m horizontally was observed from west to east to the clay till, with the shallower depths noted along the west limit.

While the discovery of the higher clay stratum along the west side of the facility has resulted in little to no efforts to construct the clay cut-off wall in this area, excavation along the east end has, to date, encountered the clay till at approximate elevations of 263.5 m to 264 m compared to the anticipated deepest depth of 266.9 m noted during the borehole investigation. In addition, the increased layer of saturated granular overburden has resulted in potential dewatering efforts exceeding the maximum daily level as noted in the PTTW issued with the tender.

The City and their consultants met on site with Bre-Ex to review the work completed to date and to assess the soil conditions. A sump pump was excavated in order to witness the infiltration rate into the sump as well as to establish the actual groundwater level in the immediate area compared to levels measured at the time of the previous investigations. Based on this site meeting, the following was noted:

- The actual dewatering rate required to address construction of the clay cut-off wall at deeper depths will likely exceed the original PTTW maximum daily volume;
- The depth to clay stratum is considerably more variable than observed by the boreholes advanced during the geotechnical investigation;
- Cobbles and coarse grained sands were noted in areas and likely contribute to higher permeability rates and dewatering rates;
- While the existing methodology consisting of sump pumps was effective for minor dewatering to allow for construction of the clay cut-off wall to the depths anticipated, it is not appropriate for deeper depths and the contractor is not able to modify their approach to deal with the changed circumstances.

Therefore, the placement of deep wells was determined to be the preferred strategy for dewatering at the increased flow rates and depths noted due to the actual soil conditions encountered which varied significantly from the initial subsurface investigation results along the north and east ends of the site.

Permit to Take Water (PTTW) Amendment

A revised PTTW was submitted and approved by the MOE on April 2, 2014 allowing up to 4,640,000 L/day of dewatering. This maximum water taking is more than twice the maximum taking originally assumed.

Proposed Work Plan

The formal request to Bre-Ex for the contemplated change to reflect the need to construct the clay cut-off wall to the deeper depths was issued on April 2, 2014. An initial response from Bre-Ex was received on April 4, 2014 and forwarded to the City for review. In this response Bre-Ex requested that, due to the various unknowns at this time, a lump sum or unit price to complete this work cannot be provided. Rather, they request that the work be undertaken on a Time and Material basis, and subject to the following:

- Time and Material construction would relate to the dewatering, excavation, and installation of the clay cut-off wall below 267.2 m (per the tender documentation);
- The remaining portion of the clay cut-off wall construction above 267.2 m would be completed at the unit rates provided in their tender submission.

On April 15, 2014 Bre-Ex submitted a cost breakdown for dewatering works and related excavation and clay cut-off wall placement. The submission included a proposed dewatering plan consisting of the advancement of twenty (20) deep wells and five (5) monitoring wells to address the anticipated site conditions noted during construction. Additional work related to excavation and clay cut-off wall placement was not estimated, but noted to be completed on a time and material basis due to the unknown conditions previously identified.

Due to the fact that the Contractor cannot at this time provide a lump sum cost related to the additional work, the City has undertaken an assessment of the potential costs to undertake this work. Table 1 and 2 provides a breakdown of the following:

- Estimated cost to undertake the dewatering work; and
- Estimated cost for additional excavation and construction of the clay cut-off wall to the deeper depths noted.

With regards to the dewatering cost, the estimate assumes advancement of all twenty (20) deep wells as per the Contractors work plan and additional work to accommodate the dewatering contractor. In determining the cost estimate for the additional excavation and wall placement, Stantec reviewed the production rate to date with Bre-Ex for placement of portions of the north and south clay cut-off wall, and adjusted accordingly to address the increased effort/time for sub-excavation, trench box placement, and clay placement. Although the estimate provided in Table 1 and 2 is intended to be a “worst case” estimate, it should be noted that due to the highly variable conditions, actual costs may vary from those provided herein.

Table 1 – Opinion of Probable Cost for Dewatering

Additional Work Tasks	Approximate Additional Cost
Dewatering	
• Mobilization/Demobilization and Development of Well Plan	\$8,675
• Monitoring Wells (5 in total @ \$1,574.40 per well) including installation and decommissioning per O.Reg. 903	\$7,872
• Deep Wells (20 in total @ \$9,980 per well) including installation and decommissioning per O.Reg. 903 ¹	\$199,600
• Estimated Pump Cost (including monitoring of discharge, and based on estimated 14 days @ \$600/day)	\$8,400
• Estimated Cost to Address Well Drilling Refusal (assume 10 hrs)	\$3,000
• OPS Mark-Up	\$12,530
Construction of Access Road (for drilling equipment, required along north and east edge of site), including relocation of fill and re-installation of storm MH	\$57,500
Supply and Use of Generators for Well Pumps, including estimated labour, fuel, and maintenance (assume three wells per 15kw generator for 7 generators and 14 days of continuous operation)	\$74,250
Estimated Subtotal	\$371,827

Table 2 – Opinion of Probable Cost for Additional Excavation and Clay Cut-Off Wall

Additional Work Tasks	Approximate Additional Cost
Subexcavation, trench box placement, clay placement (includes estimate of labour rates, equipment, and rentals, and excludes credit for work at or above the anticipated clay stratum level)	\$94,750
Standby Time (includes estimated cost to date and assumed start of May 12 th (based on estimated 25 days)	\$35,625
Estimated Subtotal	\$130,375

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Note:

1. Cost based on proposed dewatering strategy provided by Bre-Ex by Double Diamond. Actual work plan would include staging of well placement to reduce as much as possible the number of wells advanced.
2. All work in Table 1 and 2 to be completed as a single Change Order.

Therefore, the total estimated cost is \$502,202 (excluding HST) based on advancement of twenty (20) deep wells.

This staging of works may allow for the possible reduction of wells, subject to actual site conditions encountered. As an estimate, assuming only ten (10) deep wells are advanced, the total cost would reduce to approximately \$354,000 not including HST. Although lower, this value would still exceed the total contract value. Therefore, the estimated range of cost for this additional work is **\$354,000 to \$502,202** not including HST based on the assumptions noted.

The contingency for this project was \$225,000 and, despite some savings of approximately \$40,000 on line items that may not be utilized, the anticipated costs will exceed the approved contract value.

While the Contractor has stated that they have no intent to claim additional costs for overhead due to any delay, there may be further costs as a result of added mobilization/demobilization, standby costs, and loss of production. To date, Bre-Ex has not issued a formal commencement of these incurred costs and Stantec has communicated regularly with them to address other works on site that can commence in order to minimize downtime. At present, most equipment has been removed from site to reduce as much as practical any additional costs to the contract. The costs noted in Table 2 are intended to reflect our estimate of potential costs for the period noted. Further delays may result in additional claims.

Consulting Assignment Cost

Given the extended period of time that has been required to implement the entire storm/drainage and SWM servicing works associated with the Fox Hollow Development Area such that it aligns with development need, additional efforts by Stantec Consulting Ltd. and their geotechnical sub-consultant Golder Associates have been required.

Additional funding is requested to be allocated for this project to cover the consulting fees for supplementary design, contract preparation, contract administration and post-construction monitoring activities required by the permit to take water, environmental compliance approval and requirements associated with the Addendum to the Municipal Class Environmental Assessment.

As a result, it is recommended to increase the consulting fees by \$63,391 to a new upset limit of \$1,817,342.50 (excluding HST) in accordance with Section 15.2 (g) of the Procurement of Goods and Services Policy. The overall consulting assignment encompasses the fees for all the engineering related to Fox Hollow Facilities 1, 2, 3, 4 and the Heard Drain since 2011.

CONCLUSIONS

The scope of work for this contract requires an amendment in order to allow for additional dewatering work and excavation/construction of the clay cut-off wall to deeper depths. The additional work will be undertaken on a time and material basis with the intent to minimize cost through coordination and cooperation of all parties at the time of the work, similar to the method undertaken during construction of Fox Hollow No. 2 SWM facility.

On this basis, staff recommends that the Fox Hollow No. 1 SWM Facility – South Cell and Woodlot Berm (Tender T13-77) contract value be amended to an upset limit of \$2,417,312 not including HST, in accordance with Section 20.3 (e) of the Procurement of Goods and Services Policy.

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PREPARED BY:	REVIEWED AND CONCURRED BY:
BERTA KRICKER, M.ENG., F.E.C., P.ENG. MANAGER OF STORMWATER MANAGEMENT UNIT	EDWARD SOLDI, P. ENG. DIRECTOR, ROADS AND TRANSPORTATION
RECOMMENDED BY:	
JOHN BRAAM, P. ENG. MANAGING DIRECTOR, ENVIRONMENTAL & ENGINEERING SERVICES & CITY ENGINEER	

May 21, 2014

Attach: Appendix "A" – Sources of Financing
Appendix "B" – Location Map