THURBER ENGINEERING LTD.
GEOTECHNICAL ▪ ENVIRONMENTAL ▪ MATERIALS

October 4, 2011 File: 17-610-154

Urban Systems Ltd.
10345 105 Street N.W. #200
Edmonton, Alberta
T5J 1E8

Attention: Mr. Matt Brassard, P.Eng.

PROPOSAL FOR
GROUNDWATER SUPPLY AUGMENTATION AT
ASHMONT, ALBERTA

Dear Sir:

Further to discussions with Mr. Matt Brassard, P.Eng. of Urban Systems Ltd. (USL), Thurber Engineering Ltd. (Thurber) is pleased to submit this proposal and price estimate to carry out a two-part hydrogeological investigation for a groundwater license application of a pre-existing well at a higher pumping rate, and if necessary, installing an additional supply well.

1. BACKGROUND

Information supplied by USL indicates that the Town of Ashmont requires a licensed groundwater supply expansion from 3.8 L/s to as high as 11.6 L/s. USL has estimated 8 L/s for a 10 year projection and up to 13 L/s for a 20 year projection.

The pumping test[1] of the originally installed well (PW1) was carried out at 6.2 L/s, calculated a transmissivity of 153 m^2/day, and a 20 year sustainable yield (Q_{20}) of 24.9 L/s. The well was licensed by Alberta Environment (AENV) in 2002 at 3.8 L/s as a voluntary limitation to production.

[1] MLM Ground-Water Engineering Ltd. October 2002. "Exploration, Construction and Testing of Production Well PW1 for Hamlet of Ashmont", project 02C-579-1b.

Step testing by Thurber[2] has indicated that the well can sustain pump rates as high as 11.3 L/s without incurring drawdown below the top of the aquifer. However, apparent transmissivity has decreased from 153 m^2/day to 114 m^2/day. Available drawdown has decreased by changes in AENV March 2011 "Guide to Groundwater Authorization" (2011 Groundwater Guidelines) mandates, from 62 m (top of screen in 2002) to 29 m (top of aquifer in 2011).

1. SCOPE OF WORK

The scope of this work is to test PW1 at 7.4 L/s to provide information in support of an AENV groundwater license application by USL for increased production over the originally licensed 3.8 L/s capacity. In addition Thurber will provide pricing information for the location, installation and testing of an additional supply well with an observation well, if required.

To fulfill the objectives, Thurber's proposed scope of work will include work in two stages for the PW1 re-test and license application, and a similar two-staged work effort for an additional supply well.

Stage 1 - Desktop Study

- Format a desktop hydrogeological assessment, per AENV 2011 Groundwater Guidelines. This will include a field-verified well survey with information already compiled from Thurber's September 2011 report[3].

Stage 2: Field Investigation

- Conduct one pumping test at 7.4 L/s with 72 hours drawdown and up to 72 hours recovery (per AENV 2011 Groundwater Guidelines);
- For PW1, we will use the pre-existing observation well OW1, and if possible, the AENV regional monitoring well #2708E to conduct monitoring for distance drawdown effects;
- Collect groundwater samples at the beginning and finish of aquifer testing;
- Perform data reduction and analysis of the pumping test data, and evaluate the lateral impact of pumping;

[2] Thurber Engineering Ltd. September 16, 2011. "Draft Municipal Groundwater Evaluation Near Ashmont, Alberta (5-13-059-11 W4M)", project 17-610-154.

[3] Ibid reference 2

- If an additional groundwater supply well is required, we would co-ordinate the installation and development of one (1) pumping well, and one (1) observation well at a new site using an Alberta certified water well contractor. The new pumping well would require a separate desktop study and pumping test with water sampling, as described above; and

- Prepare a report documenting the well installation, the results, and interpreted yield for the well. The report will also include data required for groundwater supply permit application, per AENV 2011 Guide to Groundwater Authorization.

2. HYDROGEOLOGICAL INVESTIGATION METHODOLOGY

Thurber's hydrogeological investigation program will not address surface water, creek diversions, or treated sewage effluent as potential sources.

2.1 Stage 1 - Desktop Study

The desktop study will be a compilation and review of existing published information for the occurrence of groundwater within the area. Thurber will obtain and review readily available data for the area of interest including the AENV water-well and water quality data base, Alberta Geological Survey geological maps and reports, and Alberta Research Council hydrogeological reports. The evaluation will also include a review of the groundwater quality data in the area and a GWUDI assessment. Some of this information will be used from Thurber's September 2011 report[4].

A field-verified survey will be performed during Stage 1, as an inventory of descriptions and locations of water wells, springs, and dugouts within a 1.6 kilometre radius around the PW1 location.

Thurber will prepare a cross-section describing the hydrogeological conditions at the site. This information is typically used to refine the Stage 2 drilling program, and will be submitted with the increased rate license application for PW1 to update the GWUDI assessment and field-verified survey.

If an additional groundwater supply well is required, a full Stage 1 Desktop Study would be required to scope out a new location.

[4] Ibid reference 2

2.2 Stage 2 - Well Installation and Aquifer Testing Program

Thurber proposes to undertake a 72 hour pump test and 72 hour recovery test at the existing PW1 well. Thurber has assumed that discharge of the water does not require a permit or that the permit will be obtained by USL or the County of Saint Paul. Thurber will provide supervision of the pump test and monitor water levels in the wells. The set-up, start-up, shut-down, and take-down of the pumping test equipment will be performed by a water well drilling contractor. Time-drawdown data will be collected in both the pumping and observation wells using manual water level meters, and pressure transducer data-loggers.

Discharge during the pump test will be measured via a flow-meter.

A water sample will be collected near the start and finish of the constant rate discharge test and submitted for analyses, per AENV 2011 Groundwater Guidelines. We will also include additional analyses for: E. Coli, UV absorbance, electrical conductivity, and TOC. Field water quality parameters will include electrical conductivity, pH, temperature, dissolved oxygen and oxygen reducing potential.

2.2.1 Additional Groundwater Well (if required)

If an additional groundwater supply well is required, one 219 mm diameter water well and one 50 mm diameter observation well will be installed by a licensed water well drilling contractor under full time supervision of Thurber personnel at the new site. Based on a preliminary assessment of the region, Thurber has estimated that the water well and observation well will be installed to a depth of 130 m into the Beverly Channel aquifer.

Once the wells have been installed and developed, a new aquifer testing program will be undertaken. The purpose of the aquifer testing program is to estimate: the volume and quality of groundwater the well and aquifer can safely yield on a short-term basis and throughout the life of the project, the effect of pumping on neighbours wells, and the possibility of aquifer connections with surface waters.

3. SCHEDULE

Thurber has tentatively made arrangements with Lakeland Drilling Ltd. to perform the 72 hour pumping test for PW1 in mid-October.

4. REPORT

The results of the Stage 1 and Stage 2 program for testing PW1 will be presented in one draft report. Final reports will be provided within two weeks of receipt of review comments. We have budgeted for one electronic copy and four hard copies for the final report.

5. PRICE ESTIMATE

The price to conduct this hydrogeological investigation is summarized in Table 5.1 and does not include GST. The investigation, installation and testing of a new well, if required, is estimated to be on the order of $150,000 to $175,000, not including GST.

TABLE 5.1
PRICE ESTIMATE
GROUNDWATER SUPPLY AUGMENTATION AT
ASHMONT, ALBERTA

TASK	FEES	DISB	SUBS	TOTALS
Stage 1, Desktop Study				
Groundwater evaluation. Field Survey	$4,700	$1,100	$0	$5,800
Stage 2, Aquifer Testing Program (Prelim)				
1. 72 hr pump + 72 hr recovery test	$2,600	$6,800	$16,500	$25,900
water sampling at start and finish	$1,300	$600	$600	$2,500
2. Reporting, project management	$13,000	$1,100	$0	$14,100
Estimated Totals (excluding GST)	**$21,600**	**$9,600**	**$17,100**	**$48,300**

The price estimate is based on the understanding that;

- The sites are accessible to truck-mounted equipment;
- We have priced this estimate on the assumption that pumping test water can be discharged on the surface; and
- No allowance has been made for public meetings or meetings with AENV.

6. CLOSURE

We trust this proposal and price estimate meet with your present requirements. Should you have any questions or require additional information, please contact the undersigned at your earliest convenience.

Yours very truly,
Thurber Engineering Ltd.
Neal Fernuik, M.Sc., P.Biol., P.Eng.
Environmental Scientist/Principal

R. TerBerg M.Sc., P.Geol.,
Senior Hydrogeologist
/lg

Attachments

- Statement of General Conditions

THURBER ENGINEERING LTD.

STATEMENT OF GENERAL CONDITIONS

1. STANDARD OF CARE

This study and Report have been prepared in accordance with generally accepted engineering or environmental consulting practices in this area. No other warranty, expressed or implied, is made.

2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report which is of a summary nature and is not intended to stand alone without reference to the instructions given to us by the Client, communications between us and the Client, and to any other reports, writings, proposals or documents prepared by us for the Client relative to the specific site described herein, all of which constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. WE CANNOT BE RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

3. BASIS OF REPORT

The Report has been prepared for the specific site, development, design objectives and purposes that were described to us by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the document, subject to the limitations provided herein, are only valid to the extent that this Report expressly addresses proposed development, design objectives and purposes, and then only to the extent there has been no material alteration to or variation from any of the said descriptions provided to us unless we are specifically requested by the Client to review and revise the Report in light of such alteration or variation or to consider such representations, information and instructions.

4. USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT OUR WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS WE MAY EXPRESSLY APPROVE. The contents of the Report remain our copyright property. The Client may not give, lend or, sell the Report, or otherwise make the Report, or any portion thereof, available to any person without our prior written permission. Any use which a third party makes of the Report, are the sole responsibility of such third parties. Unless expressly permitted by us, no person other than the Client is entitled to rely on this Report. We accept no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without our express written permission.

5. INTERPRETATION OF THE REPORT

a) Nature and Exactness of Soil and Contaminant Description: Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature. Comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel, may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and the Client and all other persons making use of such documents or records with our express written consent should be aware of this risk and this report is delivered on the express condition that such risk is accepted by the Client and such other persons. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. Where special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.

b) Reliance on Provided Information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to us. We have relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, we cannot accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by us. We are entitled to rely on such representations, information and instructions and are not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.

(see over . . . .)

INTERPRETATION OF THE REPORT *(continued . . . .)*

c) Design Services: The Report may form part of the design and construction documents for information purposes even though it may have been issued prior to the final design being completed. We should be retained to review the final design, project plans and documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the report recommendations and the final design detailed in the contract documents should be reported to us immediately so that we can address potential conflicts.

d) Construction Services: During construction we must be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions to confirm and document that the site conditions do not materially differ from those interpreted conditions considered in the preparation of the report. Adequate field reviews are necessary for Thurber to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

6. RISK LIMITATION

Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause an accidental release of those substances. In consideration of the provision of the services by us, which are for the Client's benefit, the Client agrees to hold harmless and to indemnify and defend us and our directors, officers, servants, agents, employees, workmen and contractors (hereinafter referred to as the "Company") from and against any and all claims, losses, damages, demands, disputes, liability and legal investigative costs of defence, whether for personal injury including death, or any other loss whatsoever, regardless of any action or omission on the part of the Company, that result from an accidental release of pollutants or hazardous substances occurring as a result of carrying out this Project. This indemnification shall extend to all Claims brought or threatened against the Company under any federal or provincial statute as a result of conducting work on this Project. In addition to the above indemnification, the Client further agrees not to bring any claims against the Company in connection with any of the aforementioned causes.

7. SERVICES OF SUBCONSULTANTS AND CONTRACTORS

The conduct of engineering and environmental studies frequently requires hiring the services of individuals and companies with special expertise and/or services which we do not provide. We may arrange the hiring of these services as a convenience to our Clients. As these services are for the Client's benefit, the Client agrees to hold the Company harmless and to indemnify and defend us from and against all claims arising through such hirings to the extent that the Client would incur had he hired those services directly. This includes responsibility for payment for services rendered and pursuit of damages for errors, omissions or negligence by those parties in carrying out their work. In particular, these conditions apply to the use of drilling, excavation and laboratory testing services.

8. CONTROL OF WORK AND JOBSITE SAFETY

We are responsible only for the activities of our employees on the jobsite. The presence of our personnel on the site shall not be construed in any way to relieve the Client or any contractors on site from their responsibilities for site safety. The Client acknowledges that he, his representatives, contractors or others retain control of the site and that we never occupy a position of control of the site. The Client undertakes to inform us of all hazardous conditions, or other relevant conditions of which the Client is aware. The Client also recognizes that our activities may uncover previously unknown hazardous conditions or materials and that such a discovery may result in the necessity to undertake emergency procedures to protect our employees as well as the public at large and the environment in general. These procedures may well involve additional costs outside of any budgets previously agreed to. The Client agrees to pay us for any expenses incurred as the result of such discoveries and to compensate us through payment of additional fees and expenses for time spent by us to deal with the consequences of such discoveries. The Client also acknowledges that in some cases the discovery of hazardous conditions and materials will require that certain regulatory bodies be informed and the Client agrees that notification to such bodies by us will not be a cause of action or dispute.

9. INDEPENDENT JUDGEMENTS OF CLIENT

The information, interpretations and conclusions in the Report are based on our interpretation of conditions revealed through limited investigation conducted within a defined scope of services. We cannot accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or others who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.