



THURBER ENGINEERING LTD.

May 11, 2015

File: 115-5359

Village of Bawlf
Camrose

Attention: Ms. Tracy M Stewart
Acting CAO

**PROPOSAL
VILLAGE OF BAWLF –SEWAGE LAGOON
GROUNDWATER ASSESSMENT AND MONITORING PROGRAM**

Dear Madam:

Further to our recent telephone and email correspondence, Thurber is pleased to submit this proposal to carry out a groundwater assessment and monitoring program to assess if the Village of Bawlf's Sewage Lagoon ("Lagoon") is leaking.

It is a condition of this proposal that Thurber's performance of its professional services will be subject to the attached Statement of Limitations and Conditions.

1. BACKGROUND

The Lagoon is located approximately one kilometer southwest of village of Bawlf. Thurber's 2014 report¹ indicated that the Lagoon may be leaking but could not be confirmed due to winter conditions of the assessment and lack of monitoring wells around the Lagoon. The Alberta Government's Code of Practice for Wastewater Systems² also requires a long term monitoring system to be established for wastewater lagoons.

2. METHODOLOGY

In order to assess potential leakage from the Lagoon and to establish a long term groundwater monitoring program, we propose the following phased approach:

- Phase 1 - Hydrogeological Desktop Study and Site Reconnaissance
- Phase 2 - Hydrogeological Program.

2.1 Phase 1- Hydrogeological Desktop Study and Site Reconnaissance

The hydrogeological desktop study will consist of collecting and interpreting available published geological maps, reports, data and air photographs of the Lagoon site and surrounding area in

¹ Thurber Engineering Ltd., December 9, 2014, *Bawlf Existing Sewage Treatment Plant Assessment of the Existing Lagoon Conditions*

² Code of Practice for Wastewater Systems Using a Wastewater Lagoon. September 2003. Alberta Government.



order to identify geomorphologic features and surface hydrogeological conditions. The assessment will also make use of the old lagoon's plans provided by Ms. Tracy Stewart.

The Site and surrounding area reconnaissance will be completed before proposing well locations around the Lagoon. Results of the Phase 1 study will be used to formulate the Phase 2 study

2.2 Phase 2- Hydrogeological Program

The hydrogeological program has been divided into two components. The first component is a site investigation for the lagoon leakage and the second component is establishing a long term groundwater monitoring program, if required.

2.2.1 Lagoon leakage investigation

We are proposing to drill and install five (5) monitoring wells; four to a depth of about 6 m and one to a depth of 15 m below the existing ground surface adjacent to each side of the Lagoon. The deeper well will be installed adjacent to one of the shallower wells in order to assess vertical groundwater gradient.

The boreholes used to install the wells will be drilled using a track-mounted drill rig equipped with solid and hollow flight augers mobilized from Edmonton. Thurber will provide full time observation and field logging using Thurber's drilling inspectors.

Sloughing and water levels will be monitored during drilling. Machine slotted 50 mm diameter Schedule 40 polyvinyl chloride (PVC) and solid casing will be installed in all wells to allow for monitoring of groundwater levels and groundwater sampling. Each well would be fitted with a one meter lockable metal casing protector that would be installed at ground surface. We have also made an allowance for the wells to be surveyed to geodetic x and y coordinates and elevations.

We are also proposing to conduct slug tests in three of the wells for the purpose of providing insitu hydraulic conductivity values. Groundwater samples will be obtained approximately two to three weeks after well installation and the slug tests will take place during water sampling.

As part of the lagoon leakage investigation we will collect 11 sets of the water samples. Water samples will be taken from each of the five wells, the lagoon cells (3), creek (1) and drainage trench (1). One duplicate water sample will also be taken as part of the quality assurance/quality control program. Water samples will be analyzed for the following parameters;

- Routine Potability
- Total Kjeldahl Nitrogen
- Chemical Oxygen Demand
- Total and Fecal Coliforms.



2.2.2 Long term groundwater monitoring

Alberta's Code of Practice for Wastewater Systems stipulates that a monitoring well cannot be spaced more than 100 m apart. Given the size of the existing Lagoon an additional seven (7) monitoring wells would be required to be installed. Installation of the wells would be to a depth of approximately 6 m and would be similar in construction as the lagoon seepage assessment wells.

Groundwater sampling would be for the same parameters as outlined in Section 2.2.1

3. ANALYSES AND REPORT

The report will include the results of the field investigation and will present the following:

- Desktop study summary
- Subsurface conditions
- Monitoring well logs and groundwater levels
- Groundwater flow direction
- Groundwater analytical testing
- Conclusion and Recommendations.

4. PRICE ESTIMATE

The estimated price to carry out this project is presented on Tables 4.1 attached and does not include GST. Thurber's invoice will be based on time and materials of our professional and technical staff as per the attached 2015 Schedule of Rates.

5. SCHEDULE

We are available to undertake this investigation as soon as authorized. We propose to have a conference call upon completion of the hydrogeological desk-top study and then after assessment of the groundwater chemical analyses from the five lagoon leaking wells. A final report will be provided approximately two to three weeks after completion of the groundwater and laboratory testing.



6. CLOSURE

We trust this proposal meets with your approval. If you have any questions or require further information, please contact us at your convenience.

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

Butorac Milan

Milan Butorac, B.Sc., P. Geol.
Project Hydrogeologist
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Attachments

- Statement of Limitations and Conditions
- Thurber 2015 Schedule of Rates



**TABLE 4.1- PRICE ESTIMATE
VILLAGE OF BAWLF SEWAGE LAGOON -HYDROGEOLOGICAL ASSESSMENT**

	FEES	DISB.	SUBS	TOTALS
1. PHASE 1 – Desktop Study				
Desktop Study & Site Reconnaissance	\$2,500	\$800		\$3,300
Subtotal	\$2,500	\$800		\$3,300
2. PHASE 2 - Hydrogeological Investigation				
2.1 Lagoon Leakage Investigation				
Drilling 5 Monitoring Wells	\$2,600	-	\$16,000	\$18,600
Groundwater Testing, chemical analyses and well surveying	\$1,800	\$1,000	\$4,000	\$6,800
Project coordination, analysis and reporting	\$7,000	\$800		\$7,800
Subtotal	\$11,400	\$1,800	\$20,000	\$33,200
2.2 Long Term Groundwater Monitoring				
Drilling Additional 7 Monitoring Wells	\$2,500	\$500	\$15,500	\$18,500
Subtotal	\$2,500	\$500	\$15,500	\$18,500
TOTAL ESTIMATE DESKTOP & 2.1	\$13,900	\$2,600	\$20,000	\$36,500
TOTAL ESTIMATE DESKTOP, 2.1 & 2.2 (GST excluded)	\$16,400	\$3,100	\$35,500	\$55,000

- Prior to drilling, we will contact Alberta One Call to locate any existing underground utilities.
- The price is based on a one mobilization/demobilization to site for the drilling program. We have assumed that site is accessible to a track-mounted auger drill rig mobilized from Edmonton. No allowance has been included for any access preparation or site clearing if required.
- The drill cuttings will be left on site and will be neatly piled around the well installation.
- Groundwater sampling and slug tests will occur approximately two to three weeks after well installation as a separate mobilization/demobilization. If the wells are dry or limited water is available a separate mobilization/demobilization has not been accounted for.
- We have not made an allowance to retain a private locator to locate utilities on private land. We can provide this service, if required, at an additional cost.
- Decommissioning of monitoring wells has not been included. No allowance has been included for any standby charges beyond our control.



STATEMENT OF LIMITATIONS AND CONDITIONS

1. STANDARD OF CARE

This Report has been prepared in accordance with generally accepted engineering or environmental consulting practices in the applicable jurisdiction. No other warranty, expressed or implied, is intended or 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 Thurber by the Client, communications between Thurber and the Client, and any other reports, proposals or documents prepared by Thurber for the Client relative to the specific site described herein, all of which together 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. THURBER IS NOT 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 Thurber by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the Report, subject to the limitations provided herein, are only valid to the extent that the Report expressly addresses proposed development, design objectives and purposes, and then only to the extent that there has been no material alteration to or variation from any of the said descriptions provided to Thurber, unless Thurber is specifically requested by the Client to review and revise the Report in light of such alteration or variation.

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 THURBER'S WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS THURBER MAY EXPRESSLY APPROVE. Ownership in and copyright for the contents of the Report belong to Thurber. Any use which a third party makes of the Report, is the sole responsibility of such third party. Thurber accepts no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without Thurber's 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 the Report is delivered subject to 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. If 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 Thurber. Thurber has relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, Thurber does not 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 Thurber. Thurber is entitled to rely on such representations, information and instructions and is not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.
- c) Design Services: The Report may form part of design and construction documents for information purposes even though it may have been issued prior to final design being completed. Thurber should be retained to review final design, project plans and related documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the Report's recommendations and the final design detailed in the contract documents should be reported to Thurber immediately so that Thurber can address potential conflicts.
- d) Construction Services: During construction Thurber should be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions in order 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. RELEASE OF POLLUTANTS OR HAZARDOUS SUBSTANCES

Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause the escape, release or dispersal of those substances. Thurber shall have no liability to the Client under any circumstances, for the escape, release or dispersal of pollutants or hazardous substances, unless such pollutants or hazardous substances have been specifically and accurately identified to Thurber by the Client prior to the commencement of Thurber's professional services.

7. INDEPENDENT JUDGEMENTS OF CLIENT

The information, interpretations and conclusions in the Report are based on Thurber's interpretation of conditions revealed through limited investigation conducted within a defined scope of services. Thurber does not 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.

Schedule of Rates - 2015

Professional Services

Hourly Rate

Professional 7 (Chief Engineer & Specialist)	\$265
Professional 6	\$240
Professional 5	\$210
Professional 4	\$190
Professional 3	\$165
Professional 2	\$145
Professional 1	\$125

Technical Services

Hourly Rate

Technician 6	\$150
Technician 5	\$130
Technician 4	\$115
Technician 3	\$105
Technician 2	\$95
Technician 1	\$80

Disbursements

Office Disbursements (communications, printing, engineers local travel, cameras, handheld GPS)	8% of Fees
External Disbursements	Cost plus 10%
Rental vehicles where off-road use is required	Cost plus 25%
Subconsultants	Cost plus 10%
Company Vehicle Use	\$65/day + \$0.65/km
Specialized Field Equipment	Project Specific Rates
Colour Printing and Plotting	\$3.50/ft ²

Notes

- A 15% premium on the above rates will be charged for overtime when technician field work is requested on Saturdays, Sundays and Statutory Holidays.
- Fees and disbursements will be invoiced monthly. Payment is due within 30 days of the invoice date.
- Interest at 1.5% per month will be charged on overdue accounts.
- These rates do not include G.S.T.