



October 13, 2006
WL07-1207

Bemoco Land Surveying Ltd.
#21, 7895 – 49th Avenue
Red Deer, Alberta
T4P 2B4

Attention: Mr. Bob Smitten

Dear Mr. Smitten:

RE: Revised Groundwater Potential Study, Proposed Phase 1, 22-Lot Residential Subdivision Development, SE-35-040-01-W5M, Near Bentley, Alberta

INTRODUCTION

Waterline Resources Inc. (Waterline) is pleased to present the results of the groundwater potential review for a proposed Phase 1, 22-lot residential development to be located in SE-35-040-01-W5M (the Site), northeast of Bentley, Alberta. The original groundwater potential study completed by Waterline in May 17, 2001¹ (May 2001 study) was completed for Mr. Ron Goehring in support of a 43-lot residential subdivision. Waterline was requested to review the May 2001 study and reconfirm the conclusions based on a revised Phase 1, 22-lot residential development.

INVESTIGATION GUIDELINES

This May 2001 study was completed in general accordance with the Province of Alberta Water Act and associated guidelines, and the 1994 AENV publication "Interim Guidelines For The Evaluation Of Groundwater Supply For Unserviced Residential Subdivisions Using Privately Owned Domestic Water Wells". These guidelines are recommended for use for unserviced residential subdivisions where the water supply will be provided by privately owned domestic water wells and, where the number of residential parcels within one quarter section is six or more.

As stated in the guidelines, the principle of sustainable development should guide the utilization of groundwater resources. Specifically, the guidelines state that: "the threat of groundwater shortages and contamination grows with the density of wells and their collective demand on the local groundwater resources". The guidelines also state that as a component of a General Municipal Plan, groundwater availability could be mapped and used as criteria for locating future unserviced residential subdivisions. In any area, continued development of the groundwater resource can ultimately exceed recharge of the aquifers causing groundwater mining, which can

¹ Waterline Resources Inc., May 17, 2001. Groundwater Potential Study. Proposed 43 Lot Subdivision, SE-35-040-01-W5M, Red Deer County, Alberta. Submitted to Ron Goehring.

result in decreasing water levels. A regional assessment would have to be completed by/for regulatory authorities in order to assess these impacts on the aquifer system. The results of this type of study should be adopted into groundwater management criteria for future use in locating and managing other developments within the County. This philosophy has been incorporated into the Water Act. The Water Act sets up the framework for the future development of "Water Management Plans" within defined watersheds. This approach is also consistent with AENV's move to a wellhead protection and integrated watershed management philosophy.

The Act also addresses household diversions directly under Section 23 (3) which states that a person residing within a subdivision on a parcel of land has the right to commence and continue the diversion of water only if *"a report certified by a professional engineer, professional geologist or professional geophysicist, as defined in the Engineering, Geological and Geophysical Professions Act, was submitted to the subdivision authority as part of the application for subdivision under the Municipal Government Act, and the report states that the diversion of 1,250 cubic metres of water per year for household purposes under section 21 for each of the households within the subdivision will not interfere with any household users, licensees or traditional agriculture users who exist when the subdivision is approved."*

Relevant to the proposed development in the subject area, the Act specifies that the diversion of 1,250 m³/year per household (household use as defined in the Act) for the proposed new undeveloped lots should not interfere with any household users, licensees or traditional agriculture users who exist when the subdivision is approved. Therefore, the objective of the re-assessment is to render a professional opinion, based on a review of original May 2001 study and more recently available information, whether the conclusions of the May 2001 study remain valid for the proposed 22 undeveloped Phase 1 lots.

Waterline's opinion presented herein is based on the assumption that existing domestic users in the area, and users at the proposed site will utilize less than or equal to 1,250 m³/year/lot obtained at a daily rate of less than or equal to (1,250 m³/year/lot ÷ 365 days) 3.4 m³/day/lot, or 753 imperial gallons per day per lot. The 1994 AENV publication "Interim Guidelines For The Evaluation Of Groundwater Supply For Unserviced Residential Subdivisions Using Privately Owned Domestic Water Wells" indicates that residential water needs are estimated to be 0.23 - 0.68 m³/day/person (50 - 150 imperial gallons per day per person). Therefore, a water consumption limit of 3.4 m³/day/lot is considered conservative for an average family.

AENV WATER WELL AND DIVERSION LICENSE DATABASE REVIEW

The AENV database lists a total of twentythree (23) water well records within approximately 1.0 km of the centre of SE-35-040-01-W5M. Information for all records is summarized, in tabular format, in Table 1 (attached). The records indicate that groundwater use in the area is primarily for domestic and agricultural consumption.

Limited duration well tests, completed by the drilling contractors, have been conducted in the range of 32 to 318 L/min (7 to 70 lgpm), with a calculated average test rate of 114 L/min (25 lgpm).

The Alberta Environment web site (<http://www3.gov.ab.ca/env/water/approvalviewer.html>) lists four water diversion registrations and licenses within 1.0-1.5 km of the development quarter section:

Document 00173965-00-00 BENTLEY/REGISTRATION/DOUGLAS & CINDY ROSE - F00173965 is held by Douglas & Cindy Rose, under the provisions of the *Water Act*. This registration is currently issued as of Mar. 21, 2002 and does not expire. (6,250 m³/year)

Document 00168296-00-00 BENTLEY/REGISTRATION/JAMES & EDNA LARSEN - F00168296 is held by James & Edna Larsen, under the provisions of the *Water Act*. This registration is currently issued as of May. 17, 2004 and does not expire. (6,250 m³/year)

Document 00026991-00-00 HAARSTAD, WR, 24570 is held by Harvey Haarstad, under the provisions of the *Water Resources Act*. This licence is currently issued as of Aug. 13, 1990 and does not expire. (1,364 m³/year)

Document 00178746-00-00 BENTLEY/REGISTRATION/MURRAY & TRUDY ODENBACH - F00178746 is held by Murray & Trudy Odenbach, under the provisions of the *Water Act*. This registration is currently issued as of Mar. 13, 2002 and does not expire. (6,250 m³/year)

ESTIMATED GROUNDWATER ALLOCATION

The total estimated groundwater use within approximately a 1 km radius of the proposed subdivision is 38,864 m³/year, including 18,750 m³/year (domestic use based on the 15 well records) and 20,114 m³/year (AENV registrations and licences).

The proposed 22-lot subdivision requires an additional groundwater allocation of 27,500 m³/year (1,250 m³/year/lot x 22 lots), or continuous diversion of 88.2 L/min (19.4 Igpm).

The total demand within approximately 1 km of the proposed 22-lot residential subdivision, including the water requirement of the development, is estimated at 66,364 m³/year or continuous production of 28 Igpm.

CONCLUSIONS AND RECOMENDATIONS

Based on a review of the original groundwater potential report and updated information for the area, the conclusions stated in the original May 2001 report remain valid. The May 2001 conclusions are restated as follows:

- "There is adequate information available from published reports and from the AENV water well database to assess the groundwater supply potential in SE1/4 35-40-1 W5M."
- "Bedrock and/or surficial aquifers underlying the proposed development site are capable of meeting the total water demand of 53,750 m³/year (22.5 Igpm) for the proposed 43-lot development (**revised to 27,500 m³/year for the proposed 22-lot residential subdivision development**). Based on existing information, it is Waterline's professional opinion that continuous diversion of 53,750 m³/year (**revised to 27,500 m³/year**) within the proposed undeveloped quarter section will not impact existing users. This conclusion

is based on the assessment of potential impacts on local aquifers while only considering present resource utilization and utilization proposed for the subject development. This conclusion assumes that existing and proposed users do not exploit the groundwater resource by excessive short-term use and maintain consumption within the residential water needs as presented in the Provincial Guidelines.”

- “Consideration should be given to developing a community water supply, either co-operative or private utility, in which a limited number of centrally located water wells are used to supply the necessary 53,750 m³/year (22.5 l/gpm) **(revised to 27,500 m³/year)** as opposed to individual wells. By developing a community supply, the stresses on the groundwater resource can more easily be managed, and the potential pathways in which shallow contamination can be introduced into the deeper aquifers will be reduced by reducing the number of wells.”

CLOSURE

The review is intended for submission to regulatory authorities in partial fulfillment of application requirements for subdivision under the Municipal Government Act. The present assessment should be combined with the results of any aquifer tests that may be completed in order to gain a more complete understanding of the site-specific aquifer conditions underlying the study area. This will allow for the data presented in this report to be updated, as necessary, and will serve to promote groundwater resource management and protection in the area for current and future users. It should also be noted that Waterline does not employ health care professionals, and any health related questions with regards to water quality and chemical parameter exceedances addressed in the May 2001 study should be discussed with the local health authority. The enclosed report should not be considered a “Water Management Plan” as defined in the Water Act, or a Phase 1 or 2 “Environmental Site Assessment” as defined in the Environmental Protection Act.

The findings presented in this report are based upon a review of published maps and reports, and information available from the AENV water well database. The work was carried out in accordance with generally accepted hydrogeological practices to meet the requirements set by the regulatory authority and the owners. No other warranty, expressed or implied, is made as to the professional services provided. Any use which a third party makes of this report, or any reliance on, or decisions to be made based upon it, are the responsibility of such third parties. Waterline accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Table 1: Reconnaissance Report for Site and Lands Within up to Approximately a 1.0 km Radius

| Well ID | W_M | TWP | RGE | SEC | LSD | DRILLING COMPANY | DATE COMPLETED M/D/YR | DEPTH (ft bGL) | USE | CHM | LT | PT | WELL OWNER | STATIC LEVEL (ft bTOC) | TEST RATE (lgpm) | CASING PERFS | |
|-------------------------|-----|-----|-----|-----|-----|---------------------------------|-----------------------|----------------|------------------|-----|----|----|---------------------------|------------------------|------------------|---------------|-------------|
| | | | | | | | | | | | | | | | | FROM (ft bGL) | TO (ft bGL) |
| 352816 | 5 | 40 | 1 | 36 | SW | ALKEN BASIN DRILLING LTD. | 11/12/1990 | 80 | Domestic | 0 | 7 | 0 | ISSTER, HANS | 20 | 40 | 60 | 80 |
| 361599 | 5 | 40 | 1 | 35 | 0 | UNKNOWN DRILLER | | | Domestic | 1 | 0 | 0 | ROSE, DOUGLAS M | | | | |
| 437562 | 5 | 40 | 1 | 25 | 13 | ERICKSON & KANGAS | 7/14/1967 | 137 | Domestic | 0 | 6 | 5 | ALBERTA WHEAT POOL | 38 | 8 | | |
| 440475 | 5 | 40 | 1 | 35 | SE | UNKNOWN DRILLER | | 80 | Domestic | 1 | 0 | 0 | MUMFORD, R.W. | | | | |
| 440479 | 5 | 40 | 1 | 35 | SE | UNKNOWN DRILLER | | 200 | Domestic | 1 | 0 | 0 | GOEHRING, RON | | | | |
| 442316 | 5 | 40 | 1 | 35 | SE | UNKNOWN DRILLER | | | Domestic | 1 | 0 | 0 | WILKINS | | | | |
| 442317 | 5 | 40 | 1 | 35 | 7 | WATER RESOURCES | 6/1/1971 | 10 | Observation | 0 | 4 | 0 | ALTA ENV #GL34 | | | | |
| 442318 | 5 | 40 | 1 | 35 | 7 | WATER RESOURCES | 6/1/1971 | 6 | Observation | 0 | 3 | 0 | ALTA ENV #GL35 | | | | |
| 442319 | 5 | 40 | 1 | 35 | 7 | WATER RESOURCES | 6/1/1971 | 10 | Observation | 0 | 3 | 0 | ALTA ENV #GL36 | | | | |
| 442320 | 5 | 40 | 1 | 35 | SW | ALKEN BASIN DRILLING LTD. | 8/9/1986 | 140 | Domestic & Stock | 0 | 12 | 0 | WILTON, ORVAL | 45 | 25 | 124 | 140 |
| 442321 | 5 | 40 | 1 | 35 | 5 | WATER RESOURCES | 6/1/1971 | 10 | Observation | 0 | 2 | 0 | ALTA ENV #GL30 | | | | |
| 442322 | 5 | 40 | 1 | 35 | 6 | WATER RESOURCES | 6/1/1971 | 10 | Observation | 0 | 2 | 0 | ALTA ENV #GL31 | | | | |
| 442323 | 5 | 40 | 1 | 35 | 6 | WATER RESOURCES | 6/1/1971 | 10 | Observation | 0 | 1 | 0 | ALTA ENV #GL32 | | | | |
| 442324 | 5 | 40 | 1 | 35 | 6 | WATER RESOURCES | 6/1/1971 | 10 | Observation | 0 | 2 | 0 | ALTA ENV #GL33 | | | | |
| 442338 | 5 | 40 | 1 | 36 | SW | ALBERTA WW SERVICE | 8/12/1976 | 100 | Domestic | 0 | 12 | 0 | JESCHKE, H. | 24 | 10 | | |
| 442341 | 5 | 40 | 1 | 36 | SW | HART DRLG LTD | 4/28/1979 | 120 | Domestic | 0 | 11 | 0 | WHITMAN, R. | | | 61 | 120 |
| 442343 | 5 | 40 | 1 | 36 | SW | UNKNOWN DRILLER | | 125 | Domestic | 1 | 0 | 0 | NOELLE, DIETER | | | | |
| 443867 | 5 | 40 | 1 | 36 | 12 | J.C. DRILLING | 2/14/1996 | 148 | Domestic | 0 | 8 | 25 | SIMPSON, BILL/FRED | 6.4 | 15 | 68 | 88 |
| 478907 | 5 | 40 | 1 | 35 | SE | UNKNOWN DRILLER | | 98 | Domestic | 1 | 0 | 0 | GORSKY, G. | 78 | | | |
| 478908 | 5 | 40 | 1 | 35 | SE | UNKNOWN DRILLER | | 140 | Domestic & Stock | 0 | 0 | 0 | GORSKI, G. | 60 | | | |
| 497825 | 5 | 40 | 1 | 35 | SW | TALL PINE DRILLING LTD. | 3/18/2001 | 190 | Domestic | 0 | 8 | 7 | DRUST FEED POTATOES FARMS | 126 | 25 | 175 | 190 |
| 499635 | 5 | 40 | 1 | 35 | SW | AERO DRILLING & CONSULTING LTD. | 11/2/2001 | 320 | Domestic | 0 | 15 | 21 | BAJEMA, KEVIN/CANDACE | 37 | 7 | 220 | 260 |
| 1060453 | 5 | 40 | 1 | 35 | 15 | ALKEN BASIN DRILLING LTD. | 10/4/2004 | 80 | Industrial | | | | MURPHY OIL/PD 621 | 10 | 70 | 40 | 60 |

| | | | | | | |
|---------|-----|--|-----|----|-----|-----|
| Minimum | 6 | | 6.4 | 7 | 40 | 60 |
| Maximum | 320 | | 126 | 70 | 220 | 260 |
| Average | 96 | | 44 | 25 | 107 | 134 |