

November 15, 2003

File No.: 424-001 (102)

Bemoco Land Surveying Ltd.
21, 7895 49th Avenue
Red Deer, Alberta

Attention: Mr. Bob Smitten

Re: Proposed Subdivision - (Bergeson)
S.E. 1/4 Sec. 15-41-26-W4

Find attached simplified soils logs for three (3) test holes completed on the site of a potential future subdivision located in the S.E. 1/4 Sec. 15-41-26-W4. The holes were completed in an attempt to satisfy conditions stipulated by Lacombe County as part of a subdivision application.

It is our understanding that the pending subdivision application is for the subdivision of one (1) lot from an existing 26 acre parcel. It is also our understanding that there is existing development on the parcel and that the existing development lies within the boundary of the lot to be subdivided. Further, it is understood that Lacombe County requested percolation and water table testing in an effort to evaluate the suitability of the remainder of the parcel for future subdivision. Consequently, two (2) boreholes were completed in areas which may be subdivided in the future but which are not being contemplated for subdivision at this time and where access could be gained. One borehole was completed near the existing development to ensure the suitability of soils for the lot which is the subject of the current subdivision application. An existing multi-lot subdivision is located directly west of the subject site.

Boreholes were completed in August, 2003 under the supervision of Mr. Alf Walker (WNM Engineering Ltd.). As stated previously three (3) test holes were completed using a truck mounted 150mm (6") auger.

In general, soils in the two (2) boreholes near the north boundary of the property were consistent and homogeneous. Between 200 mm (8") and 300 mm (12") of topsoil was noted. Silty sands were found beneath the topsoil layer to a depth of about 3.0 metres. Hole No. 2 was completed in a sandstone layer at the 3.0 metre mark while Hole No. 3 was completed in a stiff silty clay. It should be noted that the holes were located in areas of lower surface elevation, reasonably close to a natural wetland on the north boundary of the property and in shallow bedrock.

Hole No. 1 was completed on ground of higher elevation. Soils characteristic observed in Holes No. 2 and 3 (moist silty sand) were found at a deeper depth. Where the moist silty sand was found at a depth of approximately 300 mm (1') in holes 2 and 3, the moist silty sand was found at about 1.8 metres (6') in hole 1. Soils above the moist silty sand in Hole No. 1 were dry.

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The "Variable Time Interval Refill Method" of determining soil percolation rates was used. Test holes were completed using a 150mm (6") diameter auger to a depth of 0.90 metres (3'). In addition to completing test holes for percolation testing, observation holes were completed to a depth of 3.0 metres (10') in two (2) of the holes drilled and to a depth of 6.0 metres (20') in one hole.

Percolation Testing

Three (3) sites were tested for percolation rates in the S.E. 1/4 Sec. 15-41-26-W4. The percolation rates calculated from measured data were compared to the acceptable range of rates published by Alberta Environment. The procedure followed in determining the percolation rates included:

- o Completing test holes to a depth of 0.9 metres (3') using a 150mm (6") diameter bore;
- o Filling the test holes with water immediately after drilling and leaving the holes to pre-soak overnight;
- o Re-filling each hole the following day and measuring the drop in water elevation over a timed interval until a constant rate of drop is recorded over three (3) consecutive time intervals.

Results of our testing is provided in the table below for each of the test holes and as numbered on the enclosed drawing.

Estimated Percolation Rate by Test Hole (Adjusted for Hole Size Variation)

Hole Number:	H1	H2	H3
Percolation Rate (min/cm):	2.68	4.69	5.26

All of the tests indicated a measured percolation rate which fell within the range stipulated by Alberta Environment (2.0 to 23.6 minutes per centimetre). The type of soil encountered in the three (3) test holes was consistent and it is believed that the soils encountered are typical for the balance of the lands which may be subject to future subdivision. It is apparent that the soils will vary slightly as potential building sites move from lower elevations to higher elevations and that drier building sites will be encountered at the higher elevations. Percolation rates will increase as development moves to higher elevations but should still fall within the range stipulated by Alberta Environment.

Water Table Evaluation

At each percolation test hole site, and approximately 3.0 metres offset from the percolation test hole, an additional hole was drilled to a depth between 3.0 metres (10') and 6.0 metres (20'). Soil logs were recorded noting approximate soil classifications and other observations. The recorded logs are appended to this letter.

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Water was encountered in two (2) of the test holes drilled and at shallow depth. It should be noted that the water encountered was in the two (2) test holes located north of the existing building site (away from the lot which would be created by the current subdivision application) and in areas of relatively low elevation. Further, the holes were near the natural wetland which straddles the north property boundary and shallow bedrock was encountered in one of the holes.

The test hole drilled near the existing building site was completed in a location which was much higher than the site of Hole No. 2 and 3. Water was not encountered to a depth of 6.0 metres (20'). It is anticipated that if future subdivision of the lands proceeds, additional water table testing may be required to establish suitable building sites for future lots. In general, however, it appears that water table depth increases as location moves from north to south and away from the natural wetland to higher elevations.

DISCUSSION

Percolation Testing

Soil classifications over the tested area were generally consistent. Although the soils encountered during the investigation are generally considered suitable for sewage disposal fields, it is anticipated that each building site may will be subject to future testing, if and when the lands are subdivided and building is permitted. Such testing is necessary for the design and construction of site specific sewage disposal facilities. It is also anticipated that ground water will not be an inhibiting factor in the construction and operation of the sewage disposal fields.

While the preliminary testing indicated that the area soils are suitable for sewage disposal fields, the results of the testing are not absolute. Where future site specific testing may reveal that the soils are not suitable for sewage disposal fields, alternative treatment methods, acceptable by Alberta Environment standards, can be used. As outlined in the Environmental Guidelines for the Review of Subdivisions in Alberta (Alberta Environment) proposed rural residential subdivisions can be divided into two (2) groups:

- Those with soils of a moderately permeable nature and the household water supply Sodium Absorption Rate not exceeding 8. In this case it is recommended that a septic tank and disposal field be used on each lot;
- Those with soils with soil conditions and/or a proposed household water supply which are not suitable for a septic tank and disposal field. In this case the use of a septic tank and treatment mound should be considered.

In other words, where percolation testing indicates soils have permeability suitable for septic tanks and disposal fields, this type of sewage treatment and disposal should be used. Where percolation testing indicates that soils are not suitable, septic tanks and treatment mounds should be installed and constructed.

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In general, it is apparent that the soils in and around the proposed subdivisions are suitable for construction of sewage disposal fields. The design and construction of the most suitable facility should be undertaken by a qualified professional on a site by site basis. It is necessary that, at the time of construction, the contractor hired to construct the sewage disposal system complete additional testing to confirm the suitability of the disposal filed site and to construct the system most suitable for the site.

Water Table Testing

Test holes completed to determine the depth of ground water indicated that ground water may be a concern for residential development in areas of lower elevation and where the building site is located near natural wetland areas. Prior to construction of individual residences, it is advisable to complete additional investigations on a site by site basis to ensure that our general observation holds true at all sites.

Where potential future lots are located on higher elevations and, in particular around the existing building site, groundwater should not be a limiting factor for residential construction. Prior to construction of individual residences, it is advisable to complete additional investigations on a site by site basis to ensure that our general observation holds true at all sites. Where ground water elevations are high, specialized construction practices may be used to enhance the site and make it suitable for residential construction (i.e. importing fill to increase the distance between footings and groundwater or construction of shallow foundations).

CONCLUSIONS

WNM Engineering Ltd. does not anticipate that development in the area will be inhibited by conditions which prevent construction of homes or sewage disposal systems. Site specific conditions may demand special precautions as a result of soils which may be unsuitable for traditional sewage disposal fields or of locally perched ground water, but in general it is our opinion that the site is suitable for development.

WNM Engineering Ltd.

Bill Manning, P.Eng.

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