

**#0102**

**Groundwater Feasibility Assessment  
DeGroat property: SW-33-39-02-W5M**

Submitted to:

**Richard DeGroat**

Prepared by:

**Groundwater Exploration & Research Ltd**  
March 2001

March 9, 2001  
File No: 0102

Richard DeGroat  
#300, 509 8 Avenue SW  
Calgary, AB.  
T2P 1G1

**RE: Proposed Subdivision of the DeGroat  
property at SW-33-39-02-W5M**

In accordance with the Water Act that came into effect January 1, 1999; there is a requirement to submit technical data to the subdivision authority as part of the application for subdivision. Enclosed find our letter report which addresses a groundwater supply feasibility of the DeGroat property at SW-33-39-02-W5M in the County of Lacombe.

**Background Information**

The subject property is located at the northwest corner of Sylvan Lake, just north of the Sylvan Lake Natural Area. The property is +/-27.92 hectares [69 acres] in size and occupies the north half of the SW-33 quarter section. There is an intent to create up to 44 country residential parcels, each approximately +/-0.61 hectares [1.5 acres] in size.

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This report addresses an assessment of the groundwater feasibility of finding sufficient volumes of groundwater to sustain the proposed 44 lot subdivision. The Phase 1 assessment, outlined in the AEP June 27, 1994 guideline document, should evaluate the following five criteria:

- [1] the potential of one or more aquifers to provide a sufficient supply of groundwater to meet the needs of any existing development and proposed unserved residential subdivision within a quarter section during peak demand periods and over the long term;
- [2] the extent to which each aquifer is continuous beneath the proposed development area;
- [3] the potability of each aquifer's water in its current state considering its natural quality and possible existing anthropogenic contamination;
- [4] the feasibility of treating groundwater if needed;
- [5] the susceptibility of each aquifer to potential contamination (particularly from private sewage disposal systems).

Criteria [3] and [4] are more adequately addressed once a well has been drilled and a flow test completed.

## **Geomorphic/Geologic Setting**

Much of the land in the area of the SW-33 quarter section is gently rolling with a surface regional slope southeastward toward Sylvan Lake. The slope of the land steepens somewhat as the lake is approached. The elevation change across the SW-33 quarter section is up to 15 meters [Sylvan Lake 83 B/8; 1:50,000 topographic map sheet] based on contour interval spacing. Across the block of nine quarter sections the elevation change is up to 30 meters

The bedrock in the area [Hamilton, Price & Langenberg, 1999: Geologic Map of Alberta; 1:1,000,000] is mapped as the Paskapoo Formation of continental origin. The Paskapoo Formation consists of grey to greenish-grey, thick bedded, calcareous, cherty sandstone; grey and green siltstone and mudstone; with minor conglomerate, thin limestone, coal and tuff beds. Water bearing units in the Paskapoo Formation are generally lenticular in geometry and of limited lateral extent.

Tokarsky [1971: Hydrogeology of the Rocky Mountain House area, Alberta; Alberta Research Council, ESR 71-3] map the area as having a groundwater potential of 654 to 3273 m<sup>3</sup>/day [100-500 Cgpm]. A surface water divide is mapped to the west of the property along the western edge of Section 32. The regional flow direction is east north-east.

## **Pertinent Regulations**

Country residential subdivision and groundwater supply is regulated by Section 21(2) and Section 23(3) of the Water Act and stated as follows:

### **Section 21(2):**

**Subject to subsection (3) and section 23 and any exemptions specified in the regulations, a person who owns or occupies land under which groundwater exists**

- (a) has the right to commence and continue the diversion of the groundwater for household purposes, and**
- (b) may not obtain a licence for the diversion of the groundwater for household purposes.**

**[note:** As defined in the Water Act, “household purposes” means the use of a maximum of 1250 cubic meters of water per year per household for the purposes of human consumption, sanitation, fire prevention and watering animals, gardens, lawns and trees].

### **Section 23(3):**

**“If, after this Act comes into force, a subdivision of land of a type or class of subdivision specified in the regulations is approved under the Municipal Government Act, a person residing within that subdivision on a parcel of land that adjoins or is above a source of water described in section 21 has the right to commence and continue the diversion of water under section 21 only if**

- (a) 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 the subdivision under the Municipal Government Act, and the report states that the diversion of 1250 cubic meters 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, and**
- (b) the diversion of water for each of the households within the subdivision under section 21 is not inconsistent with an applicable approved water management plan.**

Water Regulation [AR 205/98]

**9(1) Subject to subsection (2), a type of subdivision of land for the purposes of section 23(3) of the Act is a subdivision that results in 6 or more parcels in a quarter section or in a river lot.**

In essence, Sections 21(2) and 23(3) of the Water Act ask two basic questions:

- [a] Is there sufficient water to satisfy the maximum requirement of 1250 m<sup>3</sup>/year for existing plus proposed lots within a given quarter section?
- [b] Will the allocated volume of water for each proposed lot result in a significant adverse effect on neighbouring wells and licensed users existing at the time of subdivision application?

### **Groundwater Well Data**

A survey of groundwater well data in SW-33 and the surrounding 8 quarter sections of land was undertaken utilizing available information from Alberta Environment's groundwater database file. The presence of Sylvan Lake eliminates at least three quarter sections in which no water wells are present. A total of 18 well records were available for review, including 2 well records from the SW-33 quarter section.

The water well data has been analyzed on the assumption that the water well driller completed wells in the bedrock at the first occurrence of sustainable flow. This concept is applicable notwithstanding changes in topographic relief. A summary of available water well information is summarized in Table 1, appended to this report.

- [1] Well depths vary significantly from 3.1 to 57.9 meters over the block of nine quarter sections. The variability in well depth exceeds the maximum topographic relief of 7.5 meters across the site, indicating that the water bearing zones are not continuous across the immediate area. As a result, a conceptual aquifer model which entails a discontinuous “layer-cake” of hydrostratigraphic units is applicable.
- [2] Preliminary flow estimates vary from 13.1 to 261.8 m<sup>3</sup>/day over the regional nine block section with a geometric mean of 54.5 m<sup>3</sup>/day.
- [3] The variability in well depth implies that water-bearing zones are multi-story throughout the geologic section. The “layer-cake” hydrostratigraphic geology can be summarized based on 15 meter depth increments using either the bottom of the perforated zone or the total depth of the well. The relationship between depth of completion and flow estimates are tabulated as follows:

<b>Depth Increment (m)</b>	<b>Number of Wells</b>	<b>Flow Estimate (m<sup>3</sup>/day)</b>
0-15	1	19.6
15-30	4	54.5
30-45	8	59.0
45-60	2	65.5

- [4] The above data indicates that the majority of water well are completed at depths between 15 and 60 meters. Based on layer-cake hydrostratigraphic geology, the block of nine quarter sections has a cumulative production potential of 179.0 m<sup>3</sup>/day to depths of 60 meters. Limited information is available for wells deeper than 60 meters, and this zone remains a potential target for future exploration.
- [5] There are 2 existing parcels in the SW-33 quarter section, one of which is the DeGroat property and the other the Sylvan Lake Natural Area. There is an intent to create up to 44 country residential lots. The Water Act, under section 21(2) allocates a maximum of 3.42 m<sup>3</sup>/day [753 Cgpd/lot] to each existing and proposed parcel of land, for household use. The total groundwater requirement is therefore 150.5 m<sup>3</sup>/day [44 parcels x 3.42 m<sup>3</sup>/day] which is less than the total cumulative production potential of 179.0 m<sup>3</sup>/day within the upper 60 meters of the geologic profile. Theoretically, there are sufficient water reserves to service up to 44 additional parcels. The two wells within the SW-33 quarter section have a cumulative production potential of 130.9 m<sup>3</sup>/day which is slightly less than the total groundwater requirement of 150.5 m<sup>3</sup>/day. Site specific conditions may vary from localized regional conditions.

It is recognized that the short term tests given on the water well records may not be indicative of longer term pump tests and sustainable flow rates. However, site-specific wells and flow testing will be required in order to substantiate adequate groundwater reserves.

[6] The water well data was also reviewed to determine if a drop in regional groundwater table was evident with increased country residential subdivision. The geometric mean non-pumping water level data, for the block of nine quarter sections, are tabulated as follows:

<b>Decade</b>	<b>Number of Wells</b>	<b>Non-Pumping Water Level (m)</b>
1960's	2	5.9
1970's	5	20.0
1980's	2	9.9
1990's	7	7.0

With the exception of the 1970's decade, the regional water level has shown a slight decline ending with an overall increase in regional water level during the 1990's when the greatest number of wells were drilled.

Based on the evaluation criteria [AEP: June 27, 1994], there exists more than one water bearing zone; and the zones are not continuous beneath the quarter section. This conclusion is based on the variability in well depth, completion interval and preliminary flow estimates.

Water well records within the SW-33 quarter section indicate overburden deposits that vary from 5.2 to 6.1 meters in thickness. When the overburden thickness exceeds 3 meters, this depth of overburden is generally sufficient to accommodate septic fields. In accordance with subdivision regulations, site-specific percolation tests should be undertaken to confirm the suitability of the overburden material for septic field disposal.

### **Summary of Findings**

Based on a feasibility assessment of existing water well information, the following conclusions have been drawn:

- [1] The proposed 44 lot residential subdivision would have a total water requirement of 150.5 m<sup>3</sup>/day [44 lots x 3.42 m<sup>3</sup>/day per lot]. Even though the expected groundwater consumption for cottage use would be considerably less than the 3.42 m<sup>3</sup>/day, Alberta Environment has no provision within the Water Act to assign a lower consumptive use for seasonal and occasional use such as is typically associated with recreational property.

- [2] Based on existing water well flow test information within a block of nine quarter sections, there is a cumulative groundwater potential of 179.0 m<sup>3</sup>/day within the upper 60 meter depth. This cumulative groundwater potential exceeds the requirement of 150.5 m<sup>3</sup>/day. There is, therefore, adequate potential groundwater reserves to serve the proposed 44 parcels of land in the SW-33 quarter section based on existing information.
- [3] The groundwater supply for the proposed 44 country residential lots can be obtained from wells completed within varying depth intervals up to 60 meters.
- [4] It is possible to decrease the groundwater requirement if consideration is given to a communal well. Under provisions of a licenced communal well the volume assigned to each lot is only 1.82 m<sup>3</sup>/day rather than the 3.42 m<sup>3</sup>/day assigned as a statutory right under the Water Act for individual wells.
- [5] In addition to individual wells, an option exists for a communal well, in which case the water requirement would be 80.1 m<sup>3</sup>/day [12.2 Cgpm].
- [6] It is suggested that an exploratory test well be drilled on the property to ascertain the volumes of water available and depths of water-bearing intervals.

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## **Closure**

If you have any questions or comments regarding the assumptions and conclusions drawn in this groundwater feasibility assessment, contact the undersigned at your convenience. It should be noted that the assessment of potential groundwater availability is not a guarantee, but rather an indication of the probability of securing a sustainable groundwater supply. Site-specific well testing is required to confirm an adequate groundwater supply. Thanking you for the opportunity to have been of service, we remain,

Respectfully yours,  
**Groundwater Exploration & Research Ltd**

Bob Nowak; Ph.D., P.Geol.  
Groundwater Geologist

# Appendix

**Table 1**  
**Summary of Groundwater Well Data**

<b>Location</b>	<b>Landowner</b>	<b>Date Drilled</b>	<b>Td/Npwl (ft)</b>	<b>Flow Estimate</b>	<b>Completion Interval (ft)</b>
<b>TP20, R29</b>					
NW-10	Bester	Jul 89	90/43	7 Cgpm/2 hrs	60 - 90
NE-10	Medallion Sausage	Jul 81	150/60	20 Cgpm/3 hrs	130 - 150
NE-10	Foster	Nov 78	70/20	20 Cgpm/2 hrs	50 - 70
NE-10	Medallion Sausage	Jul 81	235/40	3.5 Cgpm/5 hrs	60 - 80 & 215 - 235
NE-10	Foster	Nov 71	170/na	na	130 - 150 & 155 - 170
SW-10	Snider	Feb 86	250/135	25 Cgpm/4 hrs	na
NE-09	Evans	Dec 74	135/na	na	129-135
NE-09	Evans	Apr 93	140/80	8 Cgpm/1.3 hrs	120 - 140
NE-09	Evans	Apr 93	75/21	>16 Cgpm/1.3 hrs	55 - 75
NE-09	Evans	Nov 74	75/42	18 Cgpm/6 hrs	na
NE-09	Rourke	Jul 89	125/63	15 Cgpm/2 hrs	35 - 50 & 85 - 115
NE-09	Evans	Oct 73	113/66	12 Cgpm/2.3 hrs	87 - 113
NE-09	Evans	Jan 73	81/30	7 Cgpm/5 hrs	na
NE-09	Evans	Apr 79	100/50	10.5 Cgpm/3 hrs	75 - 95
NE-09	Henrickson	Jun 87	164/125	9 Cgpm/3 hrs	125 - 163
NE-09	Evans	Dec 74	60/20	5 Cgpm/6 hrs	51-60
NE-09	Evans	Nov 74	60/23	8 Cgpm/6 hrs	54-60
NE-09	Evans	Nov 74	90/62	12 Cgpm/6 hrs	77-90
NE-09	Evans	Nov 74	90/35	12 Cgpm/6 hrs	80-90
NE-09	Evans	Nov 74	105/35	9 Cgpm/2 hrs	86-105
NE-09	Evans	Oct 88	132/21	6 Cgpm/2 hrs	25 - 70 & 98 - 121
NE-09	Evans	Jun 89	150/25	4 Cgpm/2 hrs	35 - 60 & 85 - 100 & 120 - 140
SE-15	Pinecrest Foods	Sep 82	120/40	20 Cgpm/4 hrs	80 - 120
SE-15	Pinecrest Foods	Oct 83	90/40	20 Cgpm/3.3 hrs	50 - 90
SE-15	Brown	Jul 62	117/60	8 Cgpm/2 hrs	na
SE-15	Pinecrest Foods	Jul 83	50/25	55 Cgpm/24 hrs	30 - 50
SE-15	Brown	Jan 63	76/43	22 Cgpm/1 hrs	na
SW-15	Pederson	Feb 95	200/40	3.2 Cgpm/4.1 hrs	40 - 60 & 80 - 100 & 160 - 200



