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Groundwater Investigations for South Lakeside Area - Williams Lake

At the request of the Land Management Branch, a review of available groundwater data in the South Lakeside Area near Williams Lake has been prepared by W. S. Hodge under my supervision. A copy of this review is attached, and a brief summary of the data with recommendations for future groundwater development is given as follows.

There is a lack of groundwater information within the specific site areas presently being considered. However, sufficient data is available in adjacent areas to afford some understanding of the general groundwater prospects. The area is primarily underlain by a thin drift cover overlying bedrock. The drift is comprised mainly of glacial till with minor sand and gravel. Fluvial deposits of sand and gravel also occur around Bond Lake and extend north and south of the lake. Thickness of the drift probably varies, but may be less than 20 feet over the topographically high areas with greater thicknesses occurring in the valleys. Scattered bedrock outcrops comprised of Tertiary volcanic and sedimentary rocks (shale) occur along the northwestern margin of the area. Apart from good prospects within the sand and gravel deposits near Bond Lake, general prospects within the drift are not favourable. Wells located in fractured and shattered bedrock have been reported to yield as much as 10 to 12 gpm northwest of the development area. The main groundwater potential therefore lies within the fluvial outwash deposits and/or fractured zones in the bedrock.

Limited water quality data in the region suggest groundwaters are generally hard with total dissolved solids moderately high, locally in excess of 1000 mg/ℓ. Field analyses suggest groundwaters vary from calcium-magnesium bicarbonate to sodium bicarbonate type waters.

Although individual wells capable of yielding quantities sufficient for residential requirements (1 to 10 gpm) may be located in the area and some prospects exist within the fluvial outwash deposits for wells yielding in excess of 10 gpm, the ultimate safe perennial yield of the region will depend on the quantity of rainfall that can infiltrate to the aquifers and the ability of the aquifer materials to store and transmit this water. In order to avoid mining the aquifers, annual withdrawal rates should not exceed

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the natural recharge rate. In some instances, however, groundwater withdrawals may induce additional recharge which normally may not have taken place, thereby increasing available water supplies.

It is difficult to determine the annual groundwater recharge rate for the area, but a rough estimate can be made assuming ten to twenty percent of the average annual precipitation of 15 inches infiltrating over the area of 2,500 acres. This recharge quantity corresponds to a rate of 200 to 400 USgpm on an annual basis. Based on a daily consumption of 500 Igals per lot, for example, suggests 475 to 960 lots might be serviced by groundwater. Using the above figures as a guideline, three alternatives for developing wells in the area might be considered. These would be:

1. locating a small number of high-producing wells to serve large groups of residential lots.

2. locating moderately producing wells (10 gpm) which could serve small individual subdivisions (say 30 residential lots).

3. locating individual wells on individual lots.

Wells to satisfy the first alternative might be located in the sand and gravels near Bond Lake. A test drilling and aquifer testing program is required to prove the potential of this aquifer and feasibility of well construction in this area. Utilization of a few large production wells would entail a water supply system. The advantage of this system would be in servicing a large number of residences on relatively small lots with some possibilities for meeting additional demands of light industry. The second alternative requires test drilling and pump testing to locate moderately producing wells in fractured bedrock. This may be more of a "hit and miss" method of groundwater development. Adequate pump testing is required to estimate the yield of bedrock wells for subdivision approval where establishment of a Water Utility may be contemplated. The final alternative of drilling wells on individual lots suggests from 100 to 400 lots might be developed based on a minimum capacity of 1 to 2 gallons per minute per well. This would imply that lot sizes might range from 6 to 25 acres each. The main disadvantages of this alternative are the resultant high density of wells in the area, possible well interference problems and problem of assuring that an adequate groundwater supply can be reasonably located on each lot.

In areas where groundwater is being considered or is developed as the major source of water supply, a program of groundwater monitoring should be included in planning programs. This can be accomplished by establishing observation wells equipped with water level recorders to document long-term water level fluctuations in an area. Where there is a high concentration of wells, for instance, observation well records are critical for determining whether an aquifer is being depleted and to what extent wells may be interfering with one another.

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Since the safe perennial groundwater yield of the area is dependent upon estimates of recharge, methods of groundwater development, and other factors, it would be best to proceed with land development in phases if groundwater is considered for water supplies. An example would be to prove up groundwater supplies south of Bond Lake where the best prospects are and then design a development based on the yields available. Similarly, development of individual subdivisions, depending on moderately producing wells, should proceed only on proven groundwater supplies. Provision should be made for the establishment of observation wells where development proceeds. Approximate costs for drilling and pump testing a 150-foot, 8-inch diameter well would be about $6,000. Recording equipment for an observation well would amount to an additional $1,000 above the drilling costs.

An alternative to developing groundwater in the South Lakeside Area would be to pump water from wells located on Scout Island. An exceptionally thick sand and gravel aquifer occurs under Williams Lake and presently supplies the immediate requirements of the town. Estimated cost of delivering 200 gpm to the South Lakeside Area, however, would be $135,000.

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