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August 27, 2002

012-4063 (1100)

Pheidias Project Management Corp.
Suite 1660 – 1188 West Georgia Street
Vancouver, British Columbia
V6E 4A2

Attention: Mr. Oberto Oberti, B.Arch, M.Arch, M.A.I.B.C.

**RE: GROUNDWATER AVAILABILITY ASSESSMENT
PROPOSED CRYSTAL MOUNTAIN RESORT DEVELOPMENT
WESTBANK, BRITISH COLUMBIA**

Dear Mr. Oberti:

Golder Associates Ltd. (Golder) is pleased to assist Pheidias Project Management Corporation (Pheidias) with assessing water supply options at the proposed Crystal Mountain Resort development in Westbank, B.C. The objective of this assessment was to identify candidate aquifers in the area capable of sufficient quantities of groundwater to support the initial phase of the proposed resort development. The study was limited to a 'desk-top' review and included; a review of aerial photographs, topographic mapping and geologic mapping in the area.

1.0 SITE DESCRIPTION AND HYDROGEOLOGIC CONDITIONS

Crystal Mountain is located approximately 10 km northwest of Westbank, B.C. at an elevation of approximately 1200 m above sea level (masl). The ski area is situated in the northeast corner of the Jack Creek watershed (Figure 1). The proposed development at Crystal Mountain includes the construction of additional ski lifts, ski runs, and resort accommodations.



The proposed expansion would see the ski runs and lifts extend into the neighbouring watersheds. According to Pheidias, it is anticipated that the initial volume of water necessary to support the proposed Phase I, Stage I of development is approximately 66 m³/d (10 Imperial gallons per minute [Igpm]), with ultimate water supply volumes of approximately 1,100 m³/d (163 gpm) after Phase III has been completed.

Previous investigations (Golder, 2001) at Crystal Mountain have focused on the existing resort water well and on the current watershed area on the south side of Crystal Mountain (Jack Creek watershed). The existing water well at Crystal Mountain was drilled in 1991 and at the time of drilling, the well was flowing under artesian conditions. Overburden deposits were encountered in the upper 12 m of the borehole, consisting of mixed clay, sand and gravel till, underlain by bedrock to 67 m. Golder conducted a 46-hour pump test on this well in October, 2001 and based on the results of the pump test, the well was rated in the order of 3 Igpm to 5 Igpm. Golder recommended other groundwater resources be considered, including the watershed north of the resort (Powers Creek watershed).

Based on our experience and available information, the regional surficial geology in the area of Crystal Mountain Resort and Powers Creek consists primarily of glacial till and shallow bedrock. As such, it can be inferred that the creeks in the area are generally supported on fine-grained soils, having little interaction with the underlying groundwater table. Although Golder has not conducted any groundwater investigations as part of this assessment, the available information suggests that groundwater is generally encountered in the bedrock. The inferred regional direction of groundwater flow (based on topography) is towards the southeast, towards the valley bottom.

2.0 POWERS CREEK WATERSHED

Based on the limited size of the Jack Creek Watershed and the relatively low rating of the water supply well at the resort, Golder recommended investigating the nearby Powers Creek watershed. Powers Creek watershed is located north of Crystal Mountain Resort, with Mount Last dividing the Powers Creek and Jack Creek watersheds. Powers Creek watershed covers approximately 150 km² in area in total, with approximately 90 km² in area anticipated to recharge the watershed above the resort.

2.1 Previous Golder Investigations

Golder completed a geotechnical assessment of the proposed Bear Lake Water Supply System, summarized in our April 4, 2002 letter to the Westbank Irrigation District.

The field investigations included conducting a ground reconnaissance and seismic refraction survey along the proposed waterline alignment between Bear (Lambly) Lake and Westbank (shown on Figure 1). The geology along a portion of the proposed waterline alignment was described as follows:

- Bear (Lambly) Lake Area – up to 2.0 m of loose silty sand containing intermittent peat layers and variable gravel content, overlying dense silty sand and gravel (till)
- Bear (Lambly) Lake and Powers Creek (approximately 1 km west of North Powers Creek) – hummocky in appearance and consisting of loose to compact silt, sand and gravel to approximately 3 m to 7 m, overlying bedrock
- 1 km portion of Powers Creek before the confluence of Powers Creek and North Powers Creek – exposed bedrock and hummocky appearance, with silt, sand and gravel with cobbles and boulders at ground surface
- 1 km portion of Powers Creek downstream of the confluence of Powers Creek and North Powers Creek – mixed deposits of silt, sand and gravel up to 16 m thick, overlying bedrock.
- Jackpine Road – generally exposed bedrock, with pockets of silt, sand and gravel approximately 3.0 m thick.

2.2 Aerial Photograph and Topographic Map Review

Three potential areas were identified during the aerial photograph review as having the potential for an overburden aquifer. Overburden aquifers tend to be favored over bedrock aquifers as they frequently have higher yields and less mineralization. The areas are shown on Figure 1 and summarized below:

- Area 1 is located on the north side of Powers Creek, approximately 1.5 km from the forestry road, and potentially is underlain with sand and gravel.
- A possible outwash area (Area 2), however the presence of swamps in the area indicate that the surficial soils may not be permeable.
- A possible terrace, shown as Area 3.

Areas 2 and 3 are accessed along the forestry road leading to Lambly Lake.

One further area was highlighted as a result of the topographic map review. This location (shown as Area 4) is located on a plateau above Powers Creek, approximately 1 km downgradient of the confluence with North Powers Creek. While it is likely that this area would encounter relatively shallow bedrock, there are numerous linear features such as creeks that would suggest the bedrock is fractured in this area and may have sufficient yields for Phase I of the development.

2.3 Recharge Calculations

Rainfall data for Crystal Mountain Resort was not available during this review. As such, precipitation data from Brenda Mines, located approximately 20 km to the west of Crystal Mountain Resort, at an elevation of approximately 1,450 m (versus the Resort's elevation of approximately 1,200 m) has been used to assess potential recharge values in the area of Powers Creek watershed above the resort.

According to "*Canadian Climate Normals, 1961-1990, British Columbia*," the average total precipitation throughout the year for a weather station located at Brenda Mines is approximately 635 mm. In the glacial till and fractured bedrock ground surface of the mountains it is estimated that 1% to 5% of this precipitation will reach the regional groundwater system, with the remaining precipitation present as runoff or evapotranspiration. Based on the above precipitation estimate and the recharge rate for the three proposed areas is estimated to be:

| Proposed Area | Recharge Area | Recharge Rate (1% to 5%) |
|---------------|--------------------|--|
| Area 1 | 65 km ² | 1,140 m ³ /day – 5,680 m ³ /day (175 Igpm - 870 Igpm) |
| Area 2 | 25 km ² | 440 m ³ /day – 1,750 m ³ /day (70 Igpm - 330 Igpm) |
| Area 3 | 37 km ² | 650 m ³ /day – 3,230 m ³ /day (100 Igpm – 500 Igpm) |
| Area 4 | 80 km ² | 1,400 m ³ /day – 7,000 m ³ /day (310 Igpm – 1,550 Igpm) |

Based on the above recharge areas, the recharge rates of the bedrock groundwater at the three proposed locations are estimated to range from 440 m³/day (70 Igpm) to 7,000 m³/day (1,550 Imp. gal/min).

According to Pheidias, the initial volume of water necessary to support the Phase I, Stage I proposed development is approximately 66 m³/d, with ultimate water supply volumes of approximately 1,100 m³/d. The estimated water requirements for the resort generally fall within the estimated recharge range for Powers Creek for the four proposed well locations.

3.0 DISCUSSION AND RECOMMENDATIONS

Golder has completed a preliminary assessment of the water balance and geology of the Powers Creek watershed in order to find a suitable location for a water supply well to provide the water requirements for the proposed expansion of Crystal Mountain Resort.

This preliminary assessment has identified four candidate drilling locations within the Powers Creek Watershed that may allow construction of a water well(s) to yield sufficient water for the initial phase of the proposed resort development.

It appears that the volume of water available from recharge in the Powers Creek watershed is adequate at all areas for what is required by the initial phase of the proposed resort expansion. However, drilling of a test well and aquifer testing will be required to confirm the feasibility of groundwater supply at the proposed locations.

Golder recommends that Pheidias and Crystal Mountain Resort review the proposed locations relative to other development considerations. Following that review, a site reconnaissance should be conducted to determine the surficial geology of the proposed drilling areas and potential access limitations. Subsequent to the site reconnaissance, Golder recommends that a test well be drilled and the aquifer tested at the location determined most favorable based on the site visit.

4.0 CLOSURE

We trust the foregoing provides the information you require at this time. Should you have any questions or concerns, please contact the undersigned at your convenience.

Yours very truly,

GOLDER ASSOCIATES LTD.

WSO

for Darlene Atkinson, M.Sc.
Hydrogeologist

A. Orth

W. Scott Orth, M.Sc., P.Geo.
Associate, Office Manager

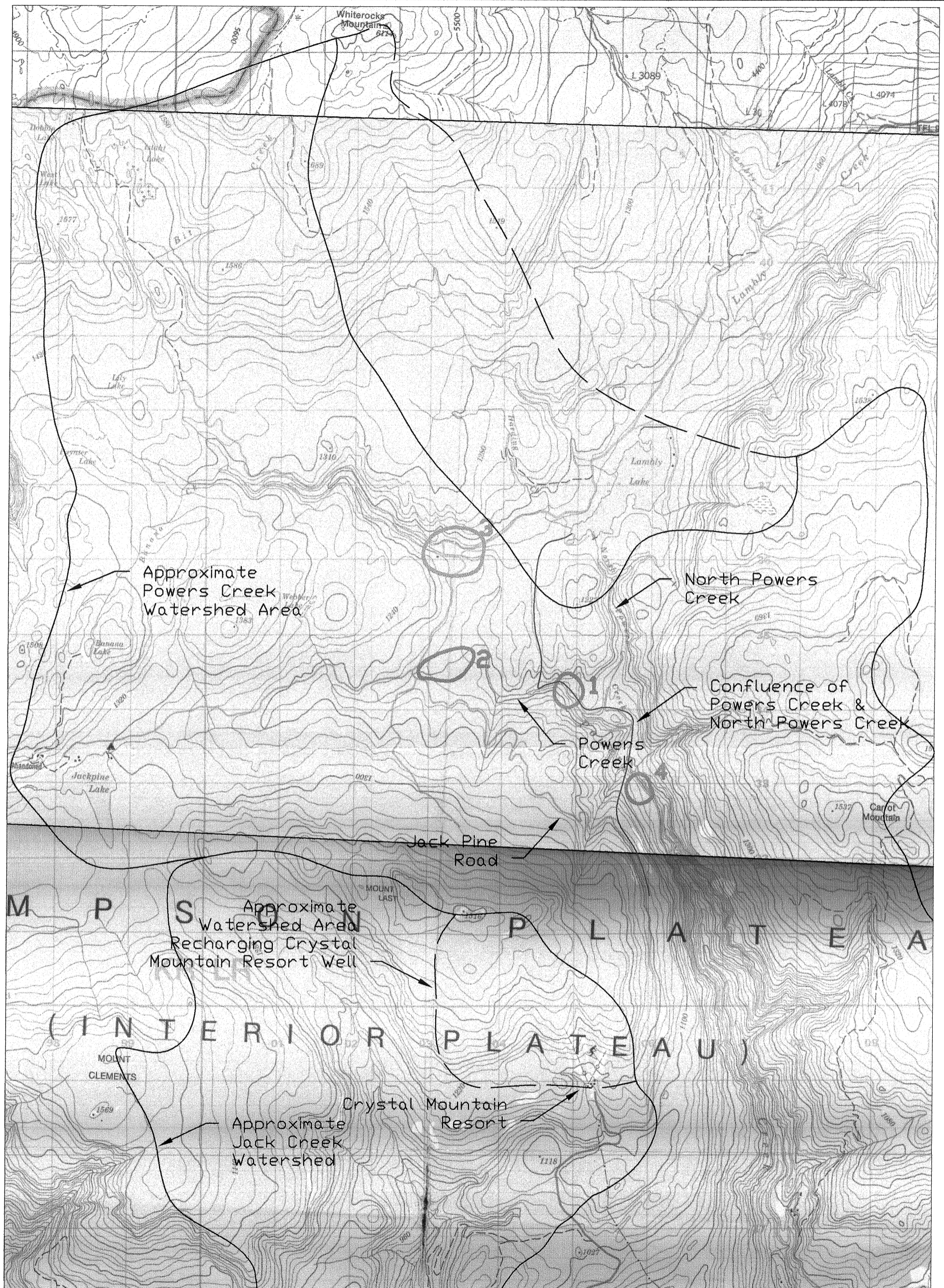
Attachment

cc: Ms. Psyche Brown, BCAL

Mr. Hillary Hettinga, RDCO

DA/WSO/jmf

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Forestry road
Approximate watershed boundary
Proposed well location based on review
Proposed pipeline route

1:50,000

Km 0 1 2 3

FIGURE 1

| | | |
|----------------------|----------------|----------|
| PROJECT No. 012-4063 | | |
| FILE No. | | Key Plan |
| REV | SCALE 1:50,000 | |
| DESIGN | DA | 08/06/02 |
| CADD | ML | 08/07/02 |
| CHECK | | |
| REVIEW | | |

Key Plan

PROJECT

Groundwater Availability Assessment
Pheidias
Crystal Mountain Development

