Gartner Lee Limited

to: Sally Howson
from: Leslie Gomm
date: January 28, 2005
ref: 41013
re: **Terms of Reference for Hydrological Assessment of West Lake**

As per your request the following outlines the Terms of Reference for the Hydrological Assessment of West Lake as per Part C, Clause 4 of the Water Licence Number – NWB1ULU0008. A budget estimate is provided in Table 1.

Background

West Lake is located approximately 500 m east of the Ulu Camp and serves as a source of drinking water for the camp. The primary inputs to the lake are from surface runoff and a stream that enters at the south end through a boulder field (Figure 1). This stream originates from a small lake upstream of the road. Previous work carried out by RL&L indicated that this stream was intermittent and only flowed during the initial spring melt, however the stream was found to be flowing out of the culvert at the road crossing during a site visit in July 2004.

Objective

The objective of this hydrological assessment is to determine the potential environmental impact of the water withdrawal, and subsequent changes in lake water level from natural water levels.

Scope of Work

The following describes the various tasks that are required to complete this project. Where possible, the current baseline data collection programs and assessment work being carried out as part of the broader High Lake Project will be used to facilitate this study.

Task 1 – Review and Compilation of Existing Information

Collect and review relevant available information on the West Lake and the Ulu site. This will include a review of baseline information collected previously by RL&L as well as any recent information generated during the 2004 baseline sampling program and ongoing West Lake pumping record (from site personnel). This work is currently being carried out as part of the broader High Lake baseline program.

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Task 2 – Climate Data Compilation and Analysis

Collect, review and summarize local climate data generated from the climate station established at Ulu in June 2004. Collect, review and interpret climate data from regional climate stations, and through regional analysis and local site data, characterize the annual precipitation for Ulu including mean, wet and dry year cases. This work is presently being carried as part of the 2004 baseline work and will be updated based on additional data collected in 2005. It is assumed that a climate station will remain in operation at Ulu.

Task 3 - Bathymetry

Carry out a bathymetric survey of West Lake with a Garmin GPSMAP 230 Chartplotter / Depth Sounder . This data will be used to develop a storage-capacity relationship for the lake. This work will be carried out in conjunction with the fish and fish habitat assessment work described in Task 6.

Task 4 – Hydrological Data Collection

Establish a water level logger station in West Lake to provide a continuous record of lake elevation during the open water season. In addition, the elevation of West Lake and all lake inputs and outlets will be manually surveyed four times over the season. Flow measurements will also be taken where possible. This work will be done in conjunction with the 2005 hydrological baseline assessment work.

Task 5 – Water Balance

Based on the information provided from the tasks outlined above, a water balance will be developed for the lake based on mean, wet and dry year conditions. The water balance will provide resultant lake water elevations for the various cases including natural water level fluctuations.

Task 6 – Fish and Fish Habitat Assessment

Critical to the hydrological assessment is the impact of changes in lake water levels on fish habitat particularly in the shoreline areas. Fisheries assessment work carried out previously by RL&L determined that fish inhabit West Lake, specifically lake trout. As part of this study a fish and fish habitat assessment will be carried out to delineate fish species presence and important areas of fish habitat, including the shoreline areas. This work will be done in conjunction with ongoing baseline fisheries work.

Task 7 – Impact Assessment of Water Withdrawal

Upon completion of the tasks outlined above an assessment will be carried on the impacts of water withdrawal from West Lake, specifically the impact of changes in water levels from natural conditions on fish and fish habitat.

Task 8 – Preparation of Draft and Final Report.

The results of the outlined tasks will be summarized into a draft report for submission to Wolfden Resources Inc. for review. Once all comments are received a final report will be issued.

Implementation Schedule

It is proposed to carry out all field related work during the summer of 2005 and that a draft report will be issued in the fall of 2005.

LSG:lsg