coffey geotechnics
SPECIALISTS MANAGING THE EARTH

Coffey Geotechnics Pty Ltd ABN 93 056 929 483
8/12 Mars Road Lane Cove West NSW 2066 Australia
PO Box 125 North Ryde NSW 1670 Australia
T (+61) (2) 9911 1000 F (+61) (2) 9911 1001
www.coffey.com.au

Fax Transmission By email

To	**Tony Burg**	From	**Robert Turner**
Company	**Clifton Coney Group**	Date	**20 November 2006**
Pages	**1 of 2**	Reference	**GEOTLCOV23056AA-AR**
Subject	**Proposed Dam Site, Wolgan Valley**		

As requested this communication provides advice in relation to the proposed dam site for the Wolgan Valley resort project.

In October 2006, Coffey Geotechnics Pty Ltd (Coffey) conducted preliminary geotechnical investigation for the proposed dam site for the Emirates Wolgan Valley project. The proposed dam site is located about 2km west of the proposed resort site on the southern side of Wolgan River Western Arm. The dam will be located between two low knolls (about 250m apart) and will submerge a narrow valley associated with a non-perennial tributary stream to Wolgan River.

The field investigation comprised four boreholes near the dam alignment and abutments and 15 test pits upstream of the dam in the potential borrow area and submerged footprint of the dam. Laboratory testing and development of a geotechnical model that considers all the investigation data is in progress. Our investigation is in progress and further investigation is recommended to finalise our assessment.

For your submission to NSW Planning, we understand that you require some details regarding the dam site in regard to the permeability of the subsoil and the interaction between the natural groundwater regimes and the dam construction.

Our borehole located at about the centre of the proposed dam wall alignment borehole encountered soft/loose alluvium to 8m depth. Groundwater inflow occurred from 2.5m depth. Below 8m depth the soil grades to residual clay and rock. In contrast, boreholes near the abutments encountered mainly stiff to hard clay for the full depth to rock at about 8m depth. Groundwater was deeper (5m to greater than 8m).

The test pits in the proposed dam storage footprint exposed mainly clay soils. Further upslope (beyond the dam footprint) the soils became more sandy near the surface and clayey at depth. Groundwater inflows occurred at varying depths, usually as perched flows over less permeable strata.

Because of the high permeability of some of the substrata beneath the central portion of the proposed dam, the preliminary design includes a 3m deep clay cut-off to the more clayey soil horizons beneath the dam to reduce water losses.

To provide material for dam embankment construction, excavation will occur in the dam storage area. This excavation may intersect the water table at some locations, and may expose local areas of higher permeability soil that will require construction of clay lining to reduce water losses.

The dam is expected to have little impact on groundwater conditions in the area apart from localised influences around the area of impoundment and immediately down-gradient from the dam wall. Groundwater levels during investigation were logged at 1.5m to greater than 3.5m below ground surface in the vicinity of the proposed dam wall and proposed impoundment footprint.

Up-gradient from the dam, groundwater was usually encountered in test pits at depths ranging from 1m to 2.5m (at the time of investigation) may be locally shallow in the ephemeral gully, considering the nature of the vegetation. Water level rise to ground surface could occur at the fringe of the impoundment.

The Wolgan River is a short distance downstream from the proposed dam location. In the intervening ground, groundwater levels may fall in response to dam construction due to cut-off of a component of natural groundwater flow. At the time of investigation no seeps were apparent in this area. A groundwater bore drilled near the edge of the alluvial deposits did not encounter groundwater above rock level (but this well was not developed or monitored after drilling).

Monitoring of groundwater levels in standpipes installed during geotechnical investigations will provide an opportunity to assess groundwater conditions following dam construction. This will allow identification of changes to groundwater levels and provide a basis for mitigation measures should this prove necessary. In Coffey's view groundwater impacts arising from construction of the proposed dam would be small in magnitude and would be localised to the immediate vicinity of the dam.

For and on behalf of Coffey Geotechnics Pty Ltd

Robert Turner

Principal Geotechnical Engineer