



02 June 2015

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Our ref: 22/16787
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Dear David

Airly Mine Extension Project Response to Submission from Pells Consulting

GHD Pty Ltd (GHD) provides the following response to the submission from Pells Consulting (Pells) on the Airly Mine Extension Project Environmental Impact Statement (EIS). This response addresses comments on the hydrogeological modelling of the Narrabeen Sandstone in Section 2.2 of the Pells submission.

Pells questions the statement in the EIS that the predicted drawdown in the Narrabeen Sandstone is 'negligible' and suggests that this may be attributable to issues with the modelling code MODFLOW-NWT. Pells also presents results from numerical modelling they have undertaken independently using SEEP/W and MODFLOW-NWT.

1 Conceptualisation

Based on continuous vibrating wire piezometer (VWP) data, piezometric pressure within the Narrabeen Sandstone is zero or negative at several monitoring locations (particularly ARP01 and ARP02A) reflecting the unsaturated conditions throughout most of this formation. Further, the open standpipes at ARP07 and ARP08 (screened within the Narrabeen Sandstone at depths of 120 m and 262 m below ground level respectively) have been consistently dry since installed. The lack of groundwater within the Narrabeen Sandstone layer is attributable to the extensive network of fractures throughout the strata, directing groundwater to seepage areas across the slopes of Mount Airly and Genowlan Mountain (GHD, 2015).

A water table occurs in the lower Narrabeen Sandstone layer just above the Permian strata, and groundwater contours are presented in Figure 3-3 of the Airly Mine Extension Project Hydrogeological Model Report (GHD, 2014). The Subsidence Assessment for the Airly Mine Extension Project predicts that there will be no fracturing of the Narrabeen Sandstone due to mining (Golder, 2014). Therefore, any drawdown within the Narrabeen Sandstone would only occur within the saturated zone just above the Permian strata and would be attributable to the vertical pressure gradient resulting from depressurisation of the Permian strata.

There are a number of issues with the modelling presented by Pells:

- The vertical pressure profile presented by Pells seems to suggest saturated groundwater conditions throughout the Narrabeen Sandstone, whereas the groundwater monitoring data and conceptual

model indicates unsaturated conditions and the absence of surface to seam groundwater connectivity.

- Details regarding model boundary conditions (such as the use of seepage faces) and the mining schedule adopted are not provided in the submission.

2 Model Results

Groundwater drawdown within the lower Narrabeen Sandstone as a result of the Airly Mine Extension Project has been predicted by the MODFLOW-NWT model and is presented in Figure 6-6 of the Hydrogeological Model Report (GHD, 2014). It is predicted that drawdown within the lower Narrabeen Sandstone (i.e. the saturated zone just above the Permian strata) may be up to 2 m by the end of mining at Airly Mine and would recover post-mining. Predicted drawdown in the vicinity of seepage areas is predicted to be in the order of 0.1 m. Therefore, it is not predicted that there would be any impacts on groundwater receptors or stream baseflow as a result of this predicted drawdown in the Narrabeen Sandstone.

References

GHD (2014). *Airly Mine Extension Project: Hydrogeological Model Report*.

Golder (2014). *Subsidence Predictions and Impact Assessment for Airly Mine*, Golder Associates, July 2014.

GHD (2015). *Airly Mine Extension Project Response to Submissions: Fault Zone Hydrogeology Assessment*, Letter report.

Sincerely



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