

Our ref: OUT23/15734

Gen Lucas  
Department of Planning and Environment  
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27 September 2023

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Subject: **Ulan Coal Mine Expansion Modification (MP08\_0184-Mod 6) – Response to Submissions**

Dear Gen Lucas,

I refer to your request for advice sent on 16 August 2023 to the Department of Planning and Environment (DPE) Water about the above matter.

The proponent is proposing a modification (MOD 6) to Project Approval 08\_0184 to extend and/or widen some of the currently approved longwall panels in the Ulan Underground and Ulan West mining areas. The aim of the modification is to extract additional coal within existing mining lease and exploration licence areas.

DPE Water has reviewed the response to submissions document. DPE Water has concluded that the supplied information does not provide enough confidence in the impacts to groundwater predicted by the model in the modification area. This uncertainty is greatest where mining is proposed under shallow groundwater and connected surface water sources. In these areas there is potential for irreversible impacts on Mona Creek (a fourth-order watercourse) and on the Mona Creek alluvium.

Based on the information provided, DPE Water does not support additional mining under the Mona Creek alluvium. The key issues with the groundwater model relate to the adequacy of hydrogeological conceptualisation, model calibration, and discrepancies between observed and modelled data.

DPE Water has recommendations to be addressed prior to determination. These include:

- amending the mine plan to remove the longwall sections under the Mona Creek alluvium/colluvium
- updating the groundwater model for the project site
- reassessing the impacts on groundwater and connected water sources.

Please see Attachment A for detailed recommendations and explanations.

Department of Planning and Environment

Should you have any further queries in relation to this submission please do not hesitate to contact DPE Water Assessments at [water.assessments@dpie.nsw.gov.au](mailto:water.assessments@dpie.nsw.gov.au)

Yours sincerely,

A handwritten signature in black ink, appearing to be "Lynn Tamsitt".

Lynn Tamsitt  
A/Chief Knowledge Officer  
**Department of Planning and Environment: Water**

## Attachment A

### Detailed advice regarding the Ulan Coal Mine Expansion Modification (MP08\_0184) – Response to Submissions

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#### 1.0 Water Licensing

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##### 1.1 Recommendation – Post determination

The proponent should complete further investigation to ensure sufficient water entitlement can be held in water access licences to account for the maximum predicted water take for each water source. Any additional entitlement must be held prior to take occurring. Otherwise the development should be scaled to match the current entitlement held.

##### Explanation

The proponent has not provided an assessment of the ability to obtain the additional required entitlement in the Sydney Basin MDB Groundwater Source. There is limited trading history in this water source. This may represent a risk to acquiring additional entitlement.

The proponent should also not rely on carry-over as the key strategy to account for the predicted increase in water take. Carry-over only applies to the unused allocation of water from year to year, not on the whole entitlement.

#### 2.0 Groundwater Modelling

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##### 2.1 Recommendation – Prior to Determination

The proponent should update the groundwater model to include the following:

- the latest observation data
- latest changes in mine configuration
- a calibration using all available datasets, including the governmental groundwater monitoring network
- an independent peer review.

The proponent must also ensure that the groundwater model meets the requirements of the following guidelines:

- *NSW minimum groundwater modelling requirements for SSD/SSI projects (DPE 2022)*
- *Australian Groundwater Modelling Guidelines (2012).*

##### Explanation

DPE Water has significant concerns about the use of pre-2020 data to calibrate the groundwater model. The error range of the modelled impacts is  $\pm 50$  m. This provides a low level of confidence when assessing the project's risk and compliance with government policy.

The last Ulan Coal Complex model calibration used data collected up until 2019. This raises the following issues:

- More recent monitoring data suggests that the conceptual model should be revised, particularly the model's representation of perched water.
- Some perched water may not need to be included in the main model.
- Some recent monitoring data indicate there may be a need for local-scale modelling in addition to the regional-scale model.

These issues must be considered when revising the conceptual model for the project and associated hydrogeological system.

The proponent has used outlier datasets that do not represent the system for model calibration. Model calibration and performance assessment must only be carried out using representative datasets.

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The model must be updated to reflect the latest changes in the mine configuration and operations. It must also include newly collected data that represent recent project impacts.

Only one observation from each government monitoring bore in the area has been used in model calibration. Future model updates must use all available groundwater data, including the entire dataset from the government groundwater monitoring network.

The model calibration report does not show clear evidence of robust sensitivity analysis and parameter identifiability assessment. These assessments are required to ensure that the model calibration focuses on the most important parameters in the model. Adequate sensitivity analysis is also required to validate the suitability of the no-flow boundaries placed at the periphery of the model. More suitable alternatives must be considered if the model shows sensitivity to these boundary conditions.

## **2.2 Recommendation – Prior to Determination**

The proponent should provide an assessment of the need for local scale models to improve understanding of the impacts from mining. An example where this needs to be considered is where features such as localised fracture zones or perched aquifers were not captured by regional modelling.

### **Explanation**

The model is unable to capture areas of localised faulting or localised impacts on features such as perched aquifers. The proponent should assess the need for localised modelling in key areas, such as Jurassic or alluvium/colluvium formations.

## **2.3 Recommendation – Prior to Determination**

The proponent should provide a copy of the peer review report that is referenced and summarised in Appendix C of the Groundwater Impact Assessment (Appendix 8 of the modification report).

### **Explanation**

Appendix C of the Groundwater Impact Assessment (Appendix 8 of the Modification Report) is titled Peer Review Comments. However, the peer review report itself was not presented.

## **3.0 Groundwater Impact Management**

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### **3.1 Recommendation – Prior to Determination**

The proponent should amend the mine plan to remove the proposed longwall sections that pass under Mona Creek and the Mona Creek alluvium/colluvium.

### **Explanation**

DPE Water does not support additional mining under the Mona Creek alluvium. This is due to uncertainty about impacts, and the risk of reducing water availability and water quality to connected water sources. These water sources include the Talbragar Alluvial Water Source and the Upper Talbragar River Water Source.

From the documentation provided, DPE Water does not have confidence that the proponent has adequately conceptualised:

- the potential connectivity of the shallow groundwater system to the mining impact zone resulting from subsidence and fracturing
- the potential impacts on the connected water sources.

There is a significant risk that aquifer drawdown and water take from Mona Creek and the associated colluvial/alluvial aquifer will exceed modelled predictions. This conclusion is based on the following Information:

- The error range of the modelled impacts can exceed  $\pm 50$  m. This provides a low level of confidence in the predicted impacts to the shallow aquifers. An error range as large as this could
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represent a risk of irreversible impact to surface water and shallow aquifers, including the alluvial aquifer.

- The proposal has identified impacts that exceed those previously assessed under the current approval (e.g., in the Jurassic strata).
- The overburden depth at the location of the impacts in the Jurassic strata is significantly greater than the overburden depth at the location of the Mona Creek alluvium.

There is also a long-term risk to water quality due to water from the coal seam mixing with the shallower alluvial/colluvial aquifers. This is based on the predicted post-mining groundwater mounding and fracturing from mine workings that could connect to the surface in the vicinity of the Mona Creek alluvium.

### 3.2 Recommendation – Prior to Determination

The proponent should characterise the mining impacts, and any flow on effects, on any potentially affected shallow and/or perched aquifers and surface water systems. It is recommended that:

- the impacts are assessed against the minimal impact considerations of the NSW Aquifer Interference Policy
- the impact assessment is based on an updated groundwater model, as detailed in Recommendation 2.1 above
- the proponent address the discrepancy between the observed water level (~15 m) and modelled saturated thickness (0.71 m) at monitoring bore PZ10B
- the proponent considers installing additional monitoring bores to improve the understanding and conceptualisation of the shallow aquifer systems.

### Explanation

Based on the information provided to date, additional investigation is warranted in the Jurassic Pilliga and Purlawaugh formations in the vicinity of the mine. The model conceptualisation, including the potential impacts and likelihood of dewatering these strata, is not clear enough to give DPE Water confidence that the potential impacts have been identified and can be appropriately managed by the proponent.

The proponent needs to demonstrate whether the dewatering of the Jurassic strata – and any flow on effect – meets the AIP requirements.

In addition, any further discussion must address the discrepancy between the observed levels of the water column in the bore (~15 m) and the modelled saturated thickness (0.71 m). For example, the response to submissions states the following:

- *“PZ10B is a monitoring bore that has been constructed in the Jurassic sediments above the Ulan Underground footprint. The bore is approximately 46m deep, giving the base of the bore an elevation of 468.23 mAHD. The monitored water levels have varied from 474 to 483 mAHD... the model predicts that the water level will decline approximately 25 m by the end of mining. The timing of the predicted water level decline is imminent...”*
- *“From a model perspective, the saturated thickness at PZ10B is approximately 0.7 m, meaning it does not register as greater than a 2 m drawdown in the Jurassic sediments.”*

Installing additional monitoring bores may be warranted to improve understanding and conceptualisation of shallow aquifer systems. DPE Water notes the proponent’s prior commitment to investigate PZ10B, including a camera inspection.

**End Attachment A**

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