



OUT20/9373

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Dear Mr Rode

**Tahmoor South Coal Project (SSD-8445) –  
Second Amendment Report**

I refer to your email of 4 August 2020 to the Department of Planning, Industry and Environment (DPIE) – Water and the Natural Resources Access Regulator (NRAR) about the above matter.

DPIE Water acknowledges that the revised design will lessen impacts to water licensing, groundwater and surface water but notes that this will only be to a very minor degree. The project modifications and revised risk assessment do not alleviate the issues described in our previous advice regarding the Response to Submissions (RTS) (OUT20/2603) of 4 June 2020, and the majority of our earlier recommendations still apply.

With regard to the groundwater model, the proponent has satisfactorily updated the Groundwater Assessment (Appendix C) consistent with our recommendation relating to the RTS. However, the Groundwater Modelling Plan requires review.

Further detailed comments regarding the Groundwater Impact Assessment, the Groundwater Modelling Plan and recommendations in Table 1 are provided in **Attachment A**.

Any further referrals to DPIE - Water and NRAR regarding this matter can be sent by email to: [landuse.enquiries@dpi.nsw.gov.au](mailto:landuse.enquiries@dpi.nsw.gov.au).

Yours sincerely

Mitchell Isaacs  
Director, Office of the Deputy and Strategic Relations  
**Department of Planning, Industry and Environment: Water**  
14 September 2020

# ATTACHMENT A

## DPIE – Water and NRAR detailed comment and recommendations

### Second Amendment Report for the Tahmoor South Coal Project (SSD 8445)

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## 1. Groundwater

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DPIE – Water acknowledges the information in the revised Groundwater Assessment (Appendix C) - dated August 2020 indicate that there will be reduced groundwater impacts but only to a very minor degree.

As such, the project modifications and revised risk assessment do not alleviate the issues described in our previous advice (RTS submission - dated 4 June 2020, OUT20/2603).

Therefore the majority of the recommendations provided by DPIE – Water in our 4 June advice remain current. Please note Table 1 for a list of all relevant recommendations that we now recommend.

With regard to the groundwater model, the proponent has satisfactorily updated the Groundwater Assessment (Appendix C). However, the Groundwater Modelling Plan (GMP; Appendix M) prepared by SLR Consulting Australia Pty Ltd on behalf of SIMEC GFG in response to the DPIE-Water recommendation 2.2 (OUT20/2603) requires revision. Please note further explanatory comments are provided below in point 1.2.

### 1.1 Groundwater Impact Assessment

#### Water take

The proposed further project modifications will result in a modest, incremental decrease on the groundwater impacts of the project. The exclusion of the two south-western most longwalls from the mine plan will shorten the mine life by three years bringing a conclusion to mining in 2032 instead of 2035. The shortening of the mine life has the most material positive effect on groundwater impacts by reducing total groundwater take during the active mine life by an estimated 4,100 to 6,400 ML. Peak inflows however are not likely to change in any observable way.

#### Groundwater drawdown and bore impacts

The proponent presents an argument that the mine amendments will result in very small reductions in previous model predicted drawdown effects overall. This assertion is reasonable. Further, the proponent argues that the risk of drawdown impacts on bore users would be slightly lower with the recent amendments. Again, this is a reasonable assertion, but the degree of change is so small that there is likely to be no material difference from previous model predictions.

In the previous project configuration and groundwater impact assessment, the proponent identified groundwater users and bores potentially affected (incrementally) by the Tahmoor South proposal itself, and total cumulative impacts due to all mining in the area (largely Bulli Seams Operations). The potential impacts were considerable with multiple bores predicted to exceed the Level 2 minimal impact (2 m decline) consideration classification under the Aquifer Interference Policy (AIP) as follows:

Based on the proponent selected impact scenario:

- 52 bores > 2 m – Tahmoor South-only impact
- 228 bores > 2 m – all cumulative impact

Accounting for further model uncertainty:

- 73 bores > 2 m – Tahmoor South-only impact
- 264 bores > 2 m – all cumulative impact

In the Second Project Amendment Report, the revised groundwater risk assessment introduces a new concept to identify bore impact risks. Instead of the > 2 m Category 2 drawdown impact definition provided by the Aquifer Interference Policy, the proponent has devised a risk rating defined by the likelihood of a bore experiencing drawdown that would result in a “make good” claim by a bore user. The description of the risk assessment method is reproduced from the Second Amendment Report below:

| <b>Table 6.6 Risk of bore requiring ‘make good’</b> |  |  |
|---|--|--|
| <b>Risk rating</b>                                  | <b>Criteria</b>  | <b>Justification</b>   |
| High  | Above longwalls and pillars  | Groundwater drawdown (strata deformation) likely to cause effects on a bore above required ‘make’ good   |
| Moderate  | Model predicts a maximum drawdown greater than 10 m and within 1 km of a panel | A drawdown of greater than 30 per cent of available drawdown. Historical effects on a bore at Tahmoor North have required ‘make good’ is deliberately conservative |
| Moderate-low  | Model predicts a maximum drawdown  | Drawdown due to mining   |

This results in a predicted risk rating and count of bores likely to require “make good” tabulated below, again reproduced from the report. The second project amendment (second column) shows a marginal improvement in bore impact risk rating.

| <b>Table 6.7 Bores likely to require make good</b> |   |   |
|--|---|---|
| <b>Risk rating</b>                                 | <b>Number of bores, PAR (AECOM 2020b)</b> | <b>Number of bores, PAR (AECOM 2020a)</b> |
| High   | 11  |   |
| Moderate   | 6   |   |
| Moderate-low                                       | 3   |   |
| Low  | 32  |   |

This risk assessment framework is reliant on the experience of the operation of the nearby Tahmoor North coal mine where predicted wide-scale drawdown impacts of greater than 2 m on 75 bores has resulted in only two “make good” claims to date. The proponent argues that because most bores in the area are quite deep (> 50 m) and have large available drawdowns, 2 m, “or even 10 m” drawdowns would largely go unnoticed by bore users. The essence of the revised risk assessment is that a drawdown of 10 m, in the view of the proponent, is a more suitable impact threshold than the 2 m benchmark of the AIP.

This risk assessment put forward by the proponent still means that there is considerable risk of bores requiring make good. It highlights the importance of the proponent putting in place an adequate bore census, trigger action response plan and make good program.

We agree that the second project amendment will likely lessen the groundwater impacts of the project, but to a very minor degree. The project modifications and revised risk assessment do not alleviate the issues described in the previous advice provided by DPIE - Water, and the previous recommendations remain current.

## 1.2 Groundwater Modelling Plan

### ***Pre-approval Recommendation***

The Groundwater Modelling Plan (GMP) (Appendix M) prepared by SLR Consulting Australia Pty Ltd on behalf of SIMEC GFG in response to DPIE-Water's recommendation in the RTS contains useful information but overall requires revision. We recommend that the proponent revise the GMP according to the recommendations explained below. This includes the provision of an independent third-party review.

In summary, the GMP should be revised to:

1. show purposeful adherence of the overall modelling process and all its elements to best practice guidelines (currently Australian Groundwater Modelling Guidelines (AGMG) 2012 and subsequent explanatory notes).
2. reflect understanding of basic requirements in groundwater models. This can be achieved through provisions to ensure compliance of the new model with the requirements outlined in the AGMG 2012 model review checklists (Tables 9-1 and 9-2; pp 119–124).
3. follow the general workflow recommended in the AGMG 2012 (Figure 1-2, p 13) or similar, including frequent checks, modifications and feedback loops to earlier stages as may be required.
4. include provisions for progressive independent third-party reviews.
5. involve consultation with key stakeholders and reviewers throughout all stages, including the model planning stage.
6. clarify the model's:
  - a. intended use
  - b. objectives (can have main and sub-objectives)
  - c. target confidence level attributes and class according to AGMG 2012 recommendations
  - d. intended scale
  - e. intended exclusions, and
  - f. expected limitations.
7. clarify the intended inclusion of surface water in the model, specifically whether the groundwater model will be directly or indirectly coupled with a surface water model and whether the groundwater model will be used for surface water flow predictions.
8. include verification of the current model to identify areas of strength and areas of weakness in it. This is an essential step in the new model design. DPIE - Water notes that the proponent noted in reports and presentations that the model overestimates drawdowns, which in the proponent's opinion makes the model conservative. DPIE - Water seeks a more realistic model to enable well-informed decision making.
9. clarify intended method/s for checking the conceptual model. The AGMG 2012 regards conceptualisation to be an ongoing process.
10. stipulate a practical staged reporting strategy. As a minimum, reports are required following the conceptualisation and design stage, after the calibration stage, and after predictive modelling and uncertainty analysis as recommended in the AGMG 2012.
11. be considered as the first report on the model that is required within two years of the project determination.

12. allow for regular updating of the model and/or updating based on modelling results, data availability, changes in the project or statutory requirements.

### **Explanation**

In our response to the RTS (OUT20/2603), DPIE - Water requested 'a clear plan for a groundwater model re-build and calibration' prior to determination on the project. This is to enhance the possibility of transparent, inclusive, trustworthy, robust, fit-for-purpose modelling and regular model updates throughout the project's life.

DPIE – Water's advice included detailed recommendations for model improvements which have not been addressed in the GMP provided in the Second Amendment Report. The GMP should consider the recommendations made by DPIE - Water, other submitters, the revised report, and the latest independent review. Most importantly, the GMP must demonstrate the intention and ability to produce an updated model within two years from determination through a systematic process following established best practice, specifically, the Australian Groundwater Modelling Guidelines (2012) (AGMG 2012) and subsequent explanatory notes. The need for further updating will be determined following consideration of the results of the first model update, new data, and changes to the project.

The reviewed GMP provides useful thoughts that can be considered during the model update. However, it falls short of DPIE - Water's expectations. The purpose of the GMP must be to outline the modelling process rather than designing the updated model. The proponent's understanding of DPIE - Water requirements of the GMP presented in Section 2 requires revision. Within this context, the geology and hydrogeology information presented in Sections 4 and 5 is deemed unnecessary. The maps provided in Figures 1 and 2 and the potential changes in the model layers presented in Table 2 are also considered redundant.

Section 6 states that it '*discuss[s] the key components of the conceptual groundwater model.*' As noted above, the GMP is not required to present a conceptual model or report on planned changes in the current model. It is simply required to clarify the process of verification of the existing model including updating it with new data or as may be found necessary from other stages of the model being updated. DPIE - Water agrees that the conceptual model elements listed in Section 6.5 require review and believes that all aspects of the conceptual model require substantiation, including peripheral boundaries and effects from neighbouring operations.

Section 7 presents the numerical model implementation approach under three headings: (1) model development, (2) calibration, and (3) forecasting. The tasks under these headings correspond to Stages 3–7 in the groundwater modelling process described in the AGMG 2012. However, they are incomplete and lack looping between stages. The detailed information and discussion in Sections 7.1 will be useful during the actual model implementation but they should not be considered inclusive and should not prejudice the future model design. Section 7.7.1 notes that '*The conductivity and role of geological structures (i.e. faults) has been discussed in Section 6.1.*' However, Section 6.1 does not discuss the planned representation of structures like faults and dykes in the numerical model. It is noted that important aspects in the numerical model design and implementation have not been covered, including initial conditions.

Section 7.2 notes that parametric sensitivity will be checked for bed conductance parameters, e.g. for river, lake, and drain model cells. DPIE - Water clarifies that comprehensive sensitivity analysis including composite parametric sensitivity or parameter identifiability is required to enable focusing the model calibration efforts on the parameters for which the model is sensitive. The sensitivity analysis must include all aquifer property parameters (e.g. hydraulic conductivity and storativity parameters), boundary conditions (e.g. recharge), and peripheral boundary conditions (e.g. General Head Boundary conductance). The GMP must clarify intentions with regards to steady-state and transient model calibration, the calibration methods (manual and/or automated), the weighting (QA/QC) system for observed datasets, how the results of each calibrated model will be used to inform subsequent modelling stages and the project decision making.

Section 7.3 outlines the planned model predictions and uncertainty analysis, referencing appropriate best practice guidelines. It lists planned predictions and notes that there may be

more. However, it does not comment on possible use of particle tracking and zone budget calculations to determine the extent and magnitude of effects. The GMP does not allow for revisiting previous tasks/stages (looping) like the model conceptualisation or numerical implementation to enhance the model calibration if necessary.

Section 8 misinterprets DPIE - Water requirements and contradicts Section 7.3. It contemplates that the model development will end by recalibrating the model and reporting on it, i.e. no predictions. It seems to suggest that predictions will be carried out only when a requirement is identified. DPIE - Water clarifies that model predictions of fluxes, groundwater levels and changes in both are requested as part of the model update.

In conclusion, the current version of the GMP contains useful information, but it must be revised and subjected to independent third-party review before resubmitting to DPIE for review. This memo must be provided to the independent reviewer to clarify to them DPIE - Water expectations. The independent review should be included with the revised GMP. This request is in line with the AGMG 2012, which recommends progressive review and staged reporting. Planning constitutes the first modelling stage as stipulated by the guidelines. Consequently, the modelling plan represents the first report for the required updated model.

## 2.1 Recommendations

**Table 1 – DPIE Water recommendations in response to the 2<sup>nd</sup> Amendment Report**

| Number                 | Recommendation  | Reference   |
|------------------------|---|---|
| Prior to determination |   |   |
| 1                      | Groundwater drawdown, water user impacts – bore census, make good provisions, mitigation strategy and Trigger Action Response Plan as described in recommendation 2.1 of the DPIE Water RTS advice (OUT20/2603)   | RTS, OUT20/2603, recommendation 2.1               |
| 2                      | That the proponent revise the Groundwater Modelling Plan according to the recommendations described in s1.2 of this advice.   | This replaces recommendation 2.2, RTS, OUT20/2603 |
| Post determination     |   |   |
| 3                      | The project must obtain adequate Water Access Licences to account for both Surface and Groundwater take, prior to the take of any additional unlicensed water; and provide evidence of the additional Water Access Licence shares obtained (in accordance with the predicted water) to the Natural Resources Access Regulator | RTS, OUT20/2603, recommendation 1.1               |
| 4                      | The detailed design of the cores census is to be developed in consultation with DPIE Water and to the satisfaction of the DPIE Secretary  | RTS, OUT20/2603, recommendation 2.3               |
| 5                      | The proponent should rebuild the groundwater model within two years of project determination in accordance with the model rebuild plan.   | RTS, OUT20/2603, recommendation 2.4               |
| 6                      | The proponent should develop its Water Monitoring Plan in consultation with DPIE Water and to the satisfaction of the DPIE Secretary  | RTS, OUT20/2603, recommendation 2.5               |

|   |   |                                     |
|---|---|-------------------------------------|
| 7 | The proponent should undertake a geomorphology survey (baseline and post mining) of waterways overlying and within the 20mm line of subsidence for each longwall to complement monitoring of subsidence at each longwall, in consultation with DPIE Water | RTS, OUT20/2603, recommendation 3.1 |
| 8 | Surface water Trigger Action Response Plans are to be developed in consultation with DPIE Water as described in recommendation 3.2 in our RTS advice (OUT20/2603)   | RTS, OUT20/2603, recommendation 3.2 |
| 9 | Surface water monitoring to be undertaken as described in recommendation 3.3 in our RTS advice (OUT20/2603)   | RTS, OUT20/2603, recommendation 3.3 |

**END ATTACHMENT A**