

## Advice to decision maker on coal mining project

### IESC 2013-038: Bulga Optimisation Project – Expansion

<b>Requesting agency</b>	The Australian Government Department of the Environment
<b>Date of request</b>	19 December 2013
<b>Date request accepted</b>	23 December 2013
<b>Advice stage</b>	Assessment

#### Advice

The Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (the Committee) was requested by the Australian Government Department of the Environment (the Department) to provide advice on the Bulga Optimisation Project in New South Wales.

This advice draws upon aspects of information in the Preliminary Documentation, together with the expert deliberations of the Committee. The project documentation and information accessed by the Committee are listed in the source documentation at the end of this advice.

The Bulga Optimisation Project is located in the Hunter Valley of New South Wales, approximately 12 km southeast of the township of Singleton, 4 km southeast of Bulga Village and 4 km north of the village of Broke. The project is proposed to be undertaken within the catchments of Wollombi Brook and Loders Creek, both of which are tributaries of the Hunter River.

The Bulga Optimisation Project involves extending the life of the existing Bulga open cut coal mining operations for a further 21 years, with ongoing rehabilitation to continue for approximately two years following the completion of mining. The proposed project involves the extraction of approximately 200 Million tonnes of Run of Mine (ROM) thermal coal utilising the highwall and auger open cut methods. Mining is proposed to occur at a rate of approximately 12.2 Million tonnes per annum (Mtpa) with approximately 20 Mtpa of ROM coal to be processed by the Coal Handling and Preparation Plant (CHPP). The excess coal processed by the CHPP would be gathered from the existing coal storage facilities and through the extraction of coal from an existing approved underground mine.

The Committee, in line with its Information Guidelines<sup>1</sup>, has considered whether the proposed project assessment has used the following:

Relevant data and information: key conclusions

The proponent has provided a site water balance that presents detailed data and information on the site water use over the life of the proposed project. However, relevant data or information has not been provided in relation to the proposed project's contribution to cumulative impacts to regional surface water (Wollombi Brook and Loders Creek catchments) and regional groundwater (Wittingham Coal Measures).

A detailed description and analysis of the interconnectivity of hydrogeological units, including interactions between surface and groundwater within the groundwater model area, has not been clearly defined. A baseline assessment of aquatic and terrestrial water dependent ecosystems has not been provided.

#### Application of appropriate methodologies: key conclusions

The Preliminary Documentation contains various assessments and reports that provide an indication of the potential impacts of the proposed action and a general overview of the proposed monitoring and mitigation measures. The proponent has utilised a groundwater model that is of moderate to high complexity, which appears to have performed well in predicting impacts under the current extractive regime. However, the groundwater model has not undergone sensitivity analyses on input parameters or been peer reviewed. Whilst there is data for some surface water quality variables, monitoring does not include contaminants such as toxic metals, major cations and anions.

#### Reasonable values and parameters in calculation: key conclusions

The groundwater model developed for the proposed project has been calibrated using data obtained from an extensive monitoring bore network. This model predicted the changes in flux between hydrogeological units. The resulting predicted reductions in surface water flows were assessed as negligible. However, the proponent notes that "where drainages are incised and the drainage axis does not coincide with the digital terrain grid, the topographic data commonly fails to reflect stream bed elevations...by as much as 5 m". Therefore, it is the Committee's opinion that there is the potential for impacts to surface and groundwater interactions.

The Committee's advice, in response to the requesting agency's specific questions is provided below.

*Question 1: Are the numerical and conceptual groundwater models presented in the proponent's documentation adequate to predict the impacts on groundwater? If not, please describe these inadequacies.*

1. Undertaking peer review of the groundwater model and sensitivity analyses of key transient variables within the model are considered good practice, however these have not been undertaken. Nonetheless, the groundwater model appears to have performed well in predicting the groundwater impacts under the current extractive regime.
2. The groundwater model's ability to characterise surface and groundwater interactions is limited, given the stated topographical vertical resolution error of up to 5 m. The model would benefit from an improved representation of surface and groundwater interactions and prediction of potential impacts to the Wollombi Brook, the Wollombi Alluvium and ecosystems that are supported by these systems.
3. The Hunter River Catchment contains a significant number of existing and proposed coal mines (open cut and underground), within an approximate 55 km radius. Combining the findings from existing and future groundwater models that predict impacts within the hydrogeologically connected Wittingham Coal Measures of the Hunter Valley would aid in the determination of cumulative impacts over a larger scale than is typically presented through a single environmental assessment. A cumulative impact assessment would utilise appropriately robust, repeatable methodologies to determine the significance of impacts and would provide mitigation, monitoring and management measures to avoid, minimise and report on cumulative impacts.

*Question 2: Do the numerical and conceptual groundwater models presented in the proponent's documentation present any concerns that may impact upon water resources (or any other matters of national environmental significance)?*

4. Groundwater modelling predicts a small reduction in groundwater discharge to Wollombi Brook of 0.14 ML/day over a 15 km reach. Consideration of potential ecological impacts due to changes to surface and groundwater interactions, particularly during low rainfall periods, is not provided within the project assessment documentation.

*Question 3: Does the Committee have any concerns regarding the predicted levels of groundwater drawdown and recovery?*

5. The Committee has the following concerns with the proponent's drawdown recovery predictions:
  - a. The proponent has not provided long term groundwater drawdown contour plots for the target coal seams. The inclusion of drawdown recovery contours for each of the target coal seams, at specific intervals into the future, would be a beneficial inclusion in future iterations of the groundwater model. The provision of this information would provide a better indication of potential future groundwater impacts.
  - b. Groundwater levels are not predicted to recover to present day levels. The new groundwater equilibrium will not occur for at least 500 years following the completion of the proposed project and the final water table is predicted to lie below the current water table. An assessment of the potential impacts of the final groundwater level on surrounding water dependent assets, including the potential for changes to ground and surface water interactions, would be beneficial inclusions to the project assessment documentation.

*Question 4: What does the Committee consider are the key uncertainties and risks of the project in relation to water resources?*

6. The Committee considers that the key risks of the proposed project are the increases in discharge to the ephemeral Loders Creek Catchment and the release of contaminants from the final landform to surface and groundwater systems and impacts to dependent ecosystems.
  - a. The proponent proposes to increase the current licensed maximum discharge of 55 ML/day to 627 ML/day. This is an increase in maximum discharge of over 300 per cent, which has the potential to have an adverse effect on the ephemeral Loders Creek Catchment by changing the flow dynamics of this stream, leading to erosion and potential bank instability.
  - b. The final proposed void will generate a pit lake and act as a groundwater sink beyond 500 years following the completion of the proposed project. The Preliminary Documentation has not considered the potential impacts of the release of pit lake water to surrounding surface or groundwater resources. Water held within the void is expected to become highly saline and may be a source for surface or groundwater contamination, particularly as the pit lake water level at equilibrium is predicted to exceed the void spill height. The proponent predicts that spill will occur in a "spring like manner" through the emplaced waste rock and into the surrounding surface waterways through the identified leakage points. There is a risk that these "springs" will contain contaminants or leachates, including elevated salt levels and acid forming materials. Assessment of this risk should be informed by hydrochemical characterisation of the pit lake and surrounding emplacement areas.
  - c. The risk analysis methodology used by the proponent was semi-quantitative and dealt with risks at a high-level (for example "surface water"), rather than considering the specific measurable individual risk components. The Committee considers that it is good practice to include a stand-alone risk assessment considering specific water-related risks to the environment in project assessment documentation.

*Question 5: Are there any likely impacts that the proponent has not considered that might lead to changes in surface and/or groundwater dynamics that may support other water dependent matters of national environmental significance?*

7. Although the proponent includes baseline surface water conditions for pH, electrical conductivity and total suspended solids, information has not been provided regarding baseline trends for any other water quality parameters. Based on the information provided and the limited surface water quality monitoring regime proposed by the proponent, the Committee is unable to assess the potential for any other pollutants to enter the receiving environment.

*Question 6: Are there additional measures and commitments required to monitor, mitigate and manage impacts resulting from changes to surface and groundwater resources?*

8. The proponent has listed several existing monitoring, management and reporting protocols or plans that it proposes to update and expand to address the ongoing mitigation and management needs of the proposed project. It would be beneficial for these documents to be updated prior to the commencement of the proposed project to prevent the short-term risk should impacts occur unexpectedly or sooner than predicted.
9. The proponent has an extensive network of monitoring bores, an existing groundwater monitoring schedule and commits to use these existing and future datasets to inform and re-calibrate future iterations of groundwater modelling for the site. Additional components of a groundwater management plan should include the development of groundwater impact avoidance and prevention strategies as well as triggers to determine when management or contingency actions are to be undertaken.
10. The following surface water monitoring and mitigation measures would be appropriate to aid in the prevention of impacts to water resources:
  - a. The implementation of a monitoring and mitigation programme to address the risk of erosion and bank instability in the Loders Creek Catchment downstream of the proposed discharge points. This programme should consider the relocation of the proposed Northern Dam discharge point to an area of low erosion risk.
  - b. The monitoring of additional water quality variables including ions, total and trace metals to enable a complete assessment of potential water quality impacts from the proposed project on the surrounding water resources. Triggers, exceedence thresholds and management responses should be developed.
  - c. Installation of an upstream surface water monitoring control site in the Loders Creek Catchment to provide for a representative baseline against which to assess potential hydrological impacts.
  - d. Use of quantitative flow monitoring, such as days with or without flow, to develop a baseline database of flows in and around the proposed site. This baseline would enable a more quantitative assessment of impacts, should they occur, and the success of mitigation measures on ephemeral streams.
11. Improvements to the proponent's existing monitoring regime for water dependent ecological assets would be expected to include:
  - a. Confirmation of the location and extent of GDEs within the area of impact of the proposed project. The proponent should demonstrate that potential impacts to identified GDEs will be monitored, mitigated and managed.
  - b. Ongoing monitoring in aquatic ecosystems, including baseline sampling of stygofauna, macroinvertebrates and fish.

- c. The GDE assessment should consider the potential for impacts to downstream aquatic and riparian ecosystems that may provide habitat for listed threatened species that may occur within the Wollombi Brook, such as the Green and Golden Bell Frog (*Litoria aurea*)<sup>2</sup>.
12. The proponent should demonstrate that all potential risks to water resources as a result of the final landform have been assessed and are mitigated and managed. This assessment should include:
- a. Modelled predictions of water quality, particularly salinity and acidity, in the pit lake and identified leakage points. Water quality criteria, including contingency measures should also be developed for the pit lake and designated leakage points.
  - b. Design of a monitoring bore network within emplacement areas surrounding the pit lake to provide a representative indication of groundwater water quality to identify any leaching of highly saline or acidic material.
  - c. Rehabilitation criteria for the pit lake and surrounding emplacement areas.
13. The Hunter Subregion within the Northern Sydney Basin has been identified for Bioregional Assessment. Data and relevant information from the proposed project should be made accessible for this Bioregional Assessment to assist the knowledge base for regional scale assessments.

<b>Date of advice</b>	10 February 2014
<b>Source documentation available to the Committee in the formulation of this advice</b>	<p>Umwelt (Australia) Pty Ltd 2013a. Bulga Optimisation Project Preliminary Documentation, EPBC Referral 2012/6637. Report for Bulga Coal Management, October 2013.</p> <p>Umwelt (Australia) Pty Ltd 2013b. Bulga Optimisation Project Environmental Impact Assessment. Report for Bulga Coal Management, April 2013.</p> <p>Umwelt (Australia) Pty Ltd 2013c. Bulga Optimisation Project Response to Submissions and Revised and Amended Project Application Assessment Report. Report for Bulga Coal Management, August 2013.</p>
<b>References cited within the Committee's advice</b>	<p><sup>1</sup> Information Guidelines for Proposals Relating to the Development of Coal Seam Gas and Large Coal Mines where there is a Significant Impact on Water Resources available at: <a href="http://www.environment.gov.au/coal-seam-gas-mining/project-advice/pubs/iesc-information-guidelines.pdf">http://www.environment.gov.au/coal-seam-gas-mining/project-advice/pubs/iesc-information-guidelines.pdf</a></p> <p><sup>2</sup> White A.W. and Pyke G.H. 1996. Distribution and conservation status of the Green and Golden Bell Frog <i>Litoria aurea</i> in New South Wales. <i>Australian Zoologist</i> 30 (2): 177-189.</p>