

## Advice to decision maker on coal mining project

### IESC 2013-039: Spur Hill Underground Coking Coal Project – New Development

<b>Requesting agency</b>	The New South Wales Mining and Petroleum Gateway Panel
<b>Date of request</b>	23 December 2013
<b>Date request accepted</b>	23 December 2013
<b>Advice stage</b>	Gateway Application

#### Advice

The Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (the Committee) was requested by the New South Wales Mining and Petroleum Gateway Panel to provide advice on the Spur Hill Underground Coking Coal Project in New South Wales. The proposed project has been referred to the Committee at the 'Gateway Stage' due to its location on identified Biophysical Strategic Agricultural Land (BSAL) as legislated under the NSW *Environmental Planning and Assessment Act (1979)*.

This advice draws upon aspects of information in the Application for a Gateway Certificate, including the Preliminary Groundwater Assessment prepared by HydroSimulations, 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 proposed project is a new underground longwall coal mine, producing up to 8 million tonnes per annum of Run of Mine coal over the 25 year proposed life of mine. Coal will be extracted from three seams (Whynot, Bowfield and Warkworth) within the Wittingham Coal Measures. The proposed project area is 33 km<sup>2</sup> within Exploration Licence 7429, located in the Jerrys Plains catchment of the Hunter Basin, 5 km east of Denman and approximately 20 km from Muswellbrook, in the northern Sydney Basin. Due to the preliminary stage of the proposed project, there is limited information on the associated infrastructure; however, it is expected to include: a coal handling and preparation plant; coal stockpile areas; construction of a train load-out, rail spur and loop; and water management equipment and structures, such as water sumps, pumps pipelines and water storages.

The Committee recognises that the Application for a Gateway Certificate has been designed to address the criteria specified as part of the Gateway Process which differs in scale and detail and does not contain the level of detail or analysis expected for a Development Application and accompanying Environmental Assessment. The Committee recommends that the proponent develop any further water related project assessment documentation on the basis of the material provided in its Information Guidelines<sup>1</sup> which would enable a robust assessment of impacts on water resources.

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

*Question 1: The potential likelihood and significance of any impacts of the proposal on water resources, as well as the appropriateness of the proposed mitigation measures.*

1. The extent of documentation about the project and its potential impacts is understandably high level at the Gateway Stage. Consequently, this advice is only able to broadly describe the potential impacts of the proposed project, many of which have been identified in the accompanying Gateway Application documentation.
2. The proposed project has the potential to impact on the Hunter River, Hunter River Alluvium and the Permian porous aquifers (Wittingham Coal Measures) by altering the recharge and discharge patterns in the surface water and groundwater systems; particularly in the north-west and south of the exploration licence area where the Hunter River and Hunter River Alluvium are closest to the proposed mining operations. Further clarification and quantification would be needed to characterise the groundwater flow directions, volumes and quality between the Hunter River, Hunter River Alluvium and Permian aquifers, with particular reference to the following points;

#### Groundwater Model Resolution

- a. While the spatial resolution of the preliminary groundwater model provided may be of adequate complexity for the Gateway Process, improved spatial resolution to better characterise the interactions between the Hunter River, Hunter River Alluvium and the Permian aquifers would improve the assessment of potential impacts.

#### Vertical Connectivity

- b. As a result of the proposed longwall mining, it is predicted that there is a potential for vertical connectivity to reach the surface from depth as a result of connective cracking that could range from 120 – 240 m based on the width of the longwall panel. The Committee supports further investigations on the height of connective cracking which are needed to better predict the potential extent of cracking to the surface, particularly near the Hunter River or the Hunter River Alluvium as a result of the proposed project. It has not been clarified how this cracking is likely to be expressed at the surface or how this would be incorporated into the management plans identified in paragraphs 4 and 5 below.

#### Water Requirements and Averaging Times

- c. The mine inflows that are estimated to range from 1 ML/day to 4.8 ML/day over the 22 years of mining have been averaged over the 1022 year modelled period to be 0.07 ML/day. While this timescale may be appropriate to model the time taken for recovery, in the context of the site water balance, this would not be adequate for modelling mine water requirements.

#### Induced Leakage and Water Quality

- d. Mining is predicted to induce leakage from the Hunter River into the Hunter River Alluvium. The preliminary groundwater assessment considers that the enhanced leakage may have a beneficial impact in terms of decreasing salinity of groundwater in the alluvium however this claim has not been substantiated. There is also no consideration of the potential ecological impacts of changes to the surface water-groundwater connectivity regime or of the impacts of changes to surface water drainage patterns, such as diversion of runoff.
3. The preliminary groundwater modelling predicts that the Permian Wittingham Coal Measures will be dewatered beyond the exploration licence boundary for more than 8 km as a result of the proposed project, with recovery times beyond the 1000 years modelled. The drawdown is predicted to impact on a number of private bores which the proponent commits to 'make good'.

- a. As the Permian porous rock aquifer is classified under the Aquifer Interference Policy 'Minimal Impact Consideration' as a Level 2 (> 2 m drawdown predicted at water supply works), a Groundwater Management Plan will need to be developed which includes groundwater level triggers and a Trigger Action Response Plan.
  - b. The Committee understands that the Permian porous aquifer is not currently regulated under a Water Sharing Plan and therefore additional deep groundwater extraction could potentially impact on the regional water balance. A Water Sharing Plan for the Northern Fractured and Porous Rock Groundwater Sources is anticipated to commence in 2014 and should take into account any impacts on deep groundwater from potential extraction.
4. The Hunter River Alluvium is immediately adjacent to the proposed longwalls in the north-western part of the exploration licence area. The subsidence assessment predicts that at this location the alluvium will experience low levels of vertical subsidence, less than 100 mm, without any significant conventional tilts, curvatures or strains. The proposed Subsidence Management Plan would benefit from specific reference to monitoring of potential impacts to the Hunter River Alluvium to understand the surface water groundwater dynamics, to assist in designing appropriate mitigation strategies.
  5. The longwall mining operations are predicted to result in subsidence of up to 5.3 m during the life of the mine. This has the potential to change surface water dynamics including drainage patterns as a result of surface cracking, increased ponding and scouring of ephemeral drainage lines. The proponent has outlined potential mitigation strategies for the subsidence related impacts of the project including regrading the drainage lines downstream of the ponding areas, or by constructing bunds adjacent to the drainage lines. To assist in identifying areas with a high risk of subsidence, as part of the Development Application the modelled change in landform presented in the Subsidence Assessment should be considered in conjunction with the characteristics of the drainage lines and associated vegetation. This analysis could then be used to enable effective site planning and management

*Question 2: The IESC may also recommend further studies that should be undertaken if relevant.*

6. The Committee considers that any further studies in preparation for developing an Environmental Assessment should have reference to the type of information that enables a robust assessment of water resources such as those outlined in the Information Guidelines<sup>1</sup>.
7. A conceptual site water balance that describes the estimated quantities of water that are likely to be taken from any water source over the course of the proposed longwall mining, would assist in the comprehensive assessment of potential impacts on water resources over the life of the mine. This would be an important part of the environmental assessment for a Development Application. It should describe the interactions between the hydrogeological units and the Hunter River over the life of mine and include all water to be utilised as a result of the project, including in the proposed coal handling and processing plant, as well as water management measures such as storage dams.
8. Several aspects would improve confidence in the preliminary model predictions including: refining the temporal and spatial scale (as discussed above in paragraph 2a and 2c), simulating cumulative impacts and undertaking a sensitivity analysis. These would be included in modelling used to support a Development Application. In addition, the proponent has committed to review and validate the modelling once the first longwall panel has been completed and every 5 years subsequently. If the results from the proposed metering of inflows into the mine significantly differ from the predicted modelling, the proponent should review the model before 5 years have elapsed.

9. Limited information on water quality (EC values only) has been provided for surface water and groundwater. Further studies should include additional parameters such as relevant organic chemicals, pH and heavy metals to ensure that water quality remains within guidance levels for pollutants.
10. The preliminary groundwater assessment states that there are no high priority groundwater dependent ecosystems listed in the relevant Water Sharing Plan, and that flora surveys have determined that there is no groundwater dependent vegetation. However, the Agricultural Impact Assessment report identifies a number of Endangered Ecological Communities that may be present in the proposed project area, including Hunter Floodplain Red Gum Woodland which is strongly associated with alluvium along watercourses. The provision of the flora survey report, as well as the fauna and habitat studies outlined below, would assist in assessing the likelihood and significance of impacts of the proposal on groundwater dependent ecosystems, including potential changes in water quality and quantity in the Hunter River Alluvium.
11. A systematic approach is needed to better understand the potential impacts of changes to groundwater recharge and discharge in the Hunter River Alluvium, including defining (i) the role of groundwater discharge in supporting instream communities in the Hunter River and (ii) the environmental water requirements of any vegetation using the Hunter River Alluvium. This would include: undertaking hydrogeological conceptualisation to identify areas of shallow groundwater (< 20 metres below ground level) and groundwater discharge, overlaying this information with vegetation and wetlands mapping to identify areas of potential groundwater dependent ecosystems; and fauna (such as stygofauna, macroinvertebrates and fish), flora and habitat surveys. This would provide baseline information on the location and extent of groundwater dependent ecosystems and a robust basis for consideration of impacts.
12. 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.

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<b>Date of advice</b>	10 February 2014
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<b>Source documentation available to the Committee in the formulation of this advice</b>	Spur Hill Underground Coal Pty Ltd, 2013. Agricultural Impact Assessment to support a gateway application for the Spur Hill Underground Coking Coal Project (including Appendices B – Subsidence Assessment and C Preliminary Groundwater Assessment).
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<b>References cited within the Committee’s advice</b>	<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>
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