

Advice to decision maker on coal mining project

IESC 2020-112: Russell Vale Revised Underground Expansion Project (MP 09_0013) Expansion

Requesting agency	The New South Wales Department of Planning, Industry and Environment
Date of request	28 January 2020
Date request accepted	29 January 2020
Advice stage	Assessment

The Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (the IESC) provides independent, expert, scientific advice to the Australian and state government regulators on the potential impacts of coal seam gas and large coal mining proposals on water resources. The advice is designed to ensure that decisions by regulators on coal seam gas or large coal mining developments are informed by the best available science.

The IESC was requested by the New South Wales Department of Planning, Industry and Environment to provide advice on the Russell Vale Revised Underground Expansion Project in New South Wales, proposed by Wollongong Coal Ltd. This document provides the IESC's advice in response to the requesting agency's questions. These questions are directed at matters specific to the project to be considered during the requesting agency's assessment process. This advice draws upon the available assessment documentation, data and methodologies, together with the expert deliberations of the IESC, and is assessed against the IESC Information Guidelines (IESC, 2018).

Summary

The proposed Russell Vale Colliery Underground Expansion Project (the project) is an extension to the existing Russell Vale Colliery, and is located approximately 8 kilometres north of Wollongong, New South Wales. The current proposal is for bord-and-pillar extraction east of Cataract Reservoir, involving only first workings in the Wongawilli Seam and extracting up to 3.7 million tonnes of run-of-mine coal over a five-year period.

The project is located within the Cataract Reservoir catchment. Cataract Reservoir is a source of drinking water for Sydney and lies within the Metropolitan Special Area, a restricted-access area designated to protect Sydney's drinking-water catchments. The project is on the Woronora Plateau which supports groundwater-dependent ecosystems (GDEs) such as Coastal Upland Swamps in the Sydney Basin

Bioregion. These swamps are listed as Endangered Ecological Communities (EECs) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the *New South Wales Threatened Species Conservation Act 1995* (TSC Act).

The Committee has been requested by the NSW Department of Planning, Industry and Environment to consider the peer-reviewed uncertainty analysis and a quantitative assessment of the risk of pillar failure for the project, both of which were recommended by the IESC in its advice published on the 3 December 2019. However, an independent peer-review, by a recognised expert in multi-seam geomechanical stability, of the quantitative assessment of the risk of pillar failure has not been provided. The IESC maintains that this independent review of the quantitative assessment is crucial in understanding any underlying risks from the project as the proponent asserts that there will be no further collapse of the overlying strata and almost no possibility of additional impacts.

Key potential impacts from this project are:

- changes to water regimes and irreversible changes in EPBC Act-listed swamps;
- impacts on in-stream and riparian environments and water-dependent flora and fauna, resulting from changes to flows and water regimes in streams and swamps as a result of pillar collapse;
- potential long-term impacts to groundwater levels and quality post-mining where discharge from adits may occur in perpetuity; and
- the receiving environment of Bellambi Creek being influenced by the discharge of adit water with exceedances of the ANZG (2018) default guideline values for freshwater aquatic ecosystems (95% species protection level) for copper, zinc and nickel.

The IESC has identified areas in which additional work is required to address the key potential impacts, as detailed in this advice. These are summarised below.

- The quantitative assessment of the risk of pillar failure presented by the proponent must be independently peer-reviewed by a recognised expert in multi-seam geomechanical stability.
- Groundwater and surface water monitoring focusing on the multi-seam extraction areas should consider the drawdown response over the duration of mining and for a long enough period after mining ceases to confirm that no delayed significant impacts are occurring, or, if they do, until recovery is complete.
- Further monitoring of the adit water quality to address the potential risks associated with the discharge of either untreated or treated water entering Bellambi Gully Creek.
- A quantitative site-specific water balance is needed for Bellambi Gully Creek that accounts for the various sources of uncertainty.

Context

Mining has occurred at the project site since the 1880s using various underground mining methods. The original underground proposal in 2009 sought a major expansion in the Wonga West area (a total of seven longwall panels) and the Wonga East area (a total of 11 longwall panels). At the existing mine, multi-seam extraction had led to subsidence and cracking, with the full extent of environmental consequences unclear. As the implications of these uncertainties for catchment water quality and quantity were a major issue, the original proposal was reviewed in 2014 by the NSW Planning Assessment Commission (PAC). They concluded that there was insufficient information available to make a planning decision. The project was then amended, proposing extraction from eight longwalls east of Cataract Reservoir. This proposal was reviewed by the PAC in 2016 which concluded that social and economic

benefits of the project were likely outweighed by potential environmental impacts. The project was then significantly revised to the current proposal for bord-and-pillar mining east of Cataract Reservoir, involving only first workings in the Wongawilli Seam.

The project will require the construction of a coal processing plant; however, no coal washing will occur at the site. Existing water management infrastructure will be used with some minor changes to the water management system. Discharges of treated mine-affected water will continue to Bellambi Gully Creek and will be managed under the existing environment protection licence EPL 12040.

The IESC previously provided advice to the Australian Government Department of the Environment and the New South Wales Department of Planning and Environment on the project on 11 September 2014. Further advice was provided to the New South Wales PAC on 11 March 2015. Advice was also provided to the Australian Government Department of the Environment on the Russell Vale Longwall 6 Project (23 September 2014), which was approved by the NSW PAC and the Department of the Environment. The IESC provided advice to the New South Wales Department of Planning, Industry and Environment on 3 December 2019 on the current revised project plan, and recommended that a quantitative assessment of the risks of pillar failure be done and independently peer-reviewed by a recognised expert in multi-seam geomechanical stability. This recommendation was made to provide greater confidence in the proponent's assertion that pillar failure was so unlikely that there was no need to collect baseline ecological data or monitor for potential impacts on overlying water-dependent assets, including listed EECs (Coastal Upland Swamps in the Sydney Basin Bioregion) and creeks feeding Sydney's drinking water supply.

Response to questions

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

Question 1: Does the quantitative assessment of risk of pillar failure satisfy the IESC that there is a "negligible risk" of pillar failure associated with the Project?

1. The advice provided by the IESC on 3 December 2019 to the Department of Planning, Industry and Environment recommended a quantitative assessment of the risk of pillar failure and that it should be independently reviewed by a recognised expert in multi-seam geomechanical stability. This review is yet to be done. The IESC recommends that the regulator make their decision, based on the results of this review once conducted.
2. This review should consider, but not be limited to, issues outlined below.
 - a. Given the proposed project utilises non-conforming pillars, further information and justification is required of the proposed pillar design including pillar loading and the width to height ratio of 8 – 10.
 - b. The quantitative assessment provided has highlighted that there is still uncertainty about future subsidence in the Bulli Seam goaf areas and that there remains a potential risk of additional subsidence in the Bulli Seam in seven of the 14 goaf areas whose status has not been confirmed by the proponent (SCT 2020, p. 14). Furthermore the exact locations of the seven goafs, where subsidence is possible, in relation to the Coastal Upland Swamps has not been clearly defined by the proponent; this information is critical to determine the risk from the potential subsidence.

Question 2: Does the uncertainty analysis of the groundwater and water balance models satisfy the IESC that the predictions of cumulative water losses and the influence of adits on long-term groundwater levels, flow and quality are acceptable?

3. The proponent has presented an uncertainty analysis of the groundwater model. However, the proponent has not provided an adequate water balance that allows assessment of the predictions of cumulative water losses and the influences of adits on long-term groundwater levels flow and quality.

Groundwater model

4. While the groundwater model is fit for purpose for predicting mining inflows, it is not adequate for predicting surface and shallow subsurface processes that are likely to affect swamps. Consequently, ongoing monitoring of these surface and shallow subsurface processes near potentially affected swamps and appropriate reference sites should continue in order to address limitations of the model.
5. Since the advice of 3 December 2019, the IESC recommends that the proponent should undertake on-going monitoring of the groundwater drawdown over the duration of the project and once mining has ceased. The predicted drawdown extent and mine inflow rates (maximum inflows in the range of 262 ML/year to 326 ML/year (Umwelt 2020, Appendix 1, p. 30)) could be underpredicted. The IESC advice on 3 December 2019 (Paragraph 17a of IESC 2019-018) to the Department of Planning, Industry and Environment recommended groundwater and surface water monitoring, focusing on the multi-seam extraction areas, which the proponent should adopt in a groundwater and a surface water management plan.

Water Balance

6. The potential long-term influence of the adits on water resources has not been adequately assessed. The adits may impact groundwater levels and flow paths, and discharge from the adits could impact surface water quality (Paragraph 9). The potential influence of the adits should be investigated further as recommended in the IESC advice of 3 December 2019 (IESC 2019-018) and outlined in Paragraph 7 below.
7. The proponent has presented a groundwater model water budget, not a site-specific water balance for water management in Bellambi Gully Creek. Paragraph 21 in the IESC Advice of 3 December 2019 (IESC 2019-018) highlighted a quantitative site-specific water balance is needed that accounts for the various sources of uncertainty (e.g. using the Water Accounting Framework for the Australian Minerals Industry, Minerals Council of Australia 2014) and includes:
 - a. the total water supply and demand under a range of rainfall, climatic and water demand scenarios to support the uncertainty analysis;
 - b. the required water infrastructure, including infrastructure capacity and transfers;
 - c. the volumes of water requiring discharge under a range of rainfall scenarios; and,
 - d. the potential water quality impacts caused by one or more of the above water management actions.
8. The proponent has not addressed Paragraph 10 in the IESC advice of 3 December 2019 (IESC 2019-018) which stated that the estimate of catchment runoff undertaken for the water balance modelling is only 0.2% of mean annual rainfall and appears unreasonably low (this may be because the Farm Dams calculator used in the analysis provides estimates of “permitted harvestable runoff” not mean annual runoff). Further clarification is required regarding the assumptions relating to the water balance estimates as these have implications for dilution requirements, catchment yields in Bellambi Gully Creek and the sizing of water management infrastructure.

Adit water quality

9. The proponent has presented water quality data for the adits which only considers six monitoring dates in 2015 and one in 2017 (Umwelt 2020, Appendix 1, p. 59). The dissolved copper

concentrations presented by the proponent from 2015 and 2017 are up to 311 times the ANZG (2018) default guideline values for freshwater aquatic ecosystems (95% species protection level). Similarly, nickel is 35 times and zinc 10 times the respective default guideline values in ANZG (2018). The proponent has calculated the annual volume of adit discharge to be 110 ML and has highlighted the need for treatment if it adversely impacts the receiving Bellambi Gully Creek. The monitoring data provided suggest that if this discharge is not diluted or treated, impacts to the receiving environment of Bellambi Gully Creek are likely. However, the proponent has not explained how the adverse impacts will be monitored and mitigated. Instead, the proponent states that they are investigating treating the water and the potential of beneficial reuse options. The EPL 12040 (issued by the NSW EPA 2019) specifies discharge limits for only pH, electrical conductivity (EC), total suspended solids (TSS) and turbidity in Bellambi Gully Creek. The IESC recommends further monitoring of the adit water and that the proponent undertake the following to address potential risks associated with discharge of either untreated or treated water to Bellambi Gully Creek.

- a. For both the adit water and Bellambi Gully Creek, monitoring of analytes such as a broad suite of metals and other contaminants, in addition to pH, EC, TSS and turbidity, and comparison of results with ANZG (2018) guidelines for 95% species protection for aquatic ecosystems.
- b. Collating data on the total flow volumes and frequencies of high, median and low flows. Changes to the flow regimes may have direct effects on native biota (e.g. potential breeding and nursery habitats of native fish) and the water quality of the receiving environments.
- c. Collating continuous and accurate stream gauging data in Bellambi Gully Creek just upstream of the release point to enable accurate calculation of the dilutions and loads for discharge of adit water.
- d. Development of site-specific in-stream water quality objectives for physico-chemical parameters which have considered the ANZG Guidelines (2018) for aquatic ecosystem protection as detailed in Huynh and Hobbs (2019).
- e. Discussion and analysis of the potential long-term impacts of adit outflows by providing further information on expected changes in outflow quantity and quality, including whether groundwater discharged at the adit has interacted with rejects deposited within the mine workings. This is needed to guide treatment options.

Date of advice	5 March 2020
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Source documentation provided to the IESC for the formulation of this advice	<p>Available [online]: http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=3448 accessed March 2020.</p> <p>Hebblewhite Consulting 2019a. <i>Peer Review: Russell Vale Colliery - Subsidence Assessment</i>. Report No. 1907/01.1. September 2019.</p> <p>Hebblewhite Consulting 2019b. <i>Russell Vale Colliery Subsidence Assessment Supplementary Summary Report</i>. Report No. 1907/01.2. 12 October 2019.</p> <p>Huynh T and Hobbs D 2019. Deriving site-specific guideline values for physico-chemical parameters and toxicants. Report prepared for the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development through the Department of the Environment and Energy. [Online]: http://www.iesc.environment.gov.au/system/files/resources/249ff82e-f853-499b-ac06-d90726f8a394/files/information-guidelines-explanatory-note-site-specific-guidelines-values.pdf</p>
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SCT 2020. IESC 2019-108: *Quantitative assessment of risk of pillar failure in Russell Vale East area*. WCRV5111. January 2020. SCT Operations Pty Ltd.

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**References
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