

Advice to decision maker on coal mining project

IESC 2016-078: Wilpinjong Extension Project (EPBC 2015/7431, SSD 6764) – Expansion

Requesting agency	The Australian Government Department of the Environment and Energy The New South Wales Department of Planning and Environment
Date of request	27 July 2016
Date request accepted	28 July 2016
Advice stage	Assessment

Context

The Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (the IESC) was requested by the Australian Government Department of the Environment and Energy and the New South Wales Department of Planning and Environment to provide advice on Wilpinjong Coal Pty Ltd's (the proponent) Wilpinjong Extension Project in NSW.

The Wilpinjong Extension Project (the proposed project) is an extension of the approved Wilpinjong Coal Mine, located 40 kilometres north-east of Mudgee in central NSW. The proposed project is located within an area of extensive existing mining, with the currently approved mine operating since 2006. An approved discharge point is located on Wilpinjong Creek.

The IESC provided advice on this project on 14 March 2016. The proponent has since provided documents that respond to that advice and the regulators have requested further IESC advice relating to that response. This advice draws upon aspects of information in the proponent's Response to Submissions (the Response) and the proponent's Reconciliation of IESC Comments (the proponent's Reconciliation), together with the expert deliberations of the IESC. The project documentation and information accessed by the IESC are listed in the source documentation at the end of this advice.

The March 2016 IESC advice on this project noted the lack of information on mitigation and management measures, surface water baseline data, and groundwater baseline data in the Environmental Impact Statement (EIS). The updated Water Management Plan (Peabody Energy May 2016) and associated appendices provide details of mitigation and management measures for the existing mine (not including the proposed project), and some baseline data for surface water (EC, pH, turbidity, flow) and groundwater (EC, pH and level). This information should have been provided within the EIS document as it provides the basis for characterising the existing environment and assessing potential impacts of the proposed project. Given the proponent has been operating for several years, surface water and groundwater monitoring data collected over this period should allow

a baseline to be established. The omission and lack of consideration of this data hinder a robust assessment of impacts.

The IESC considers that uncertainty remains regarding the potential impact of the proposed project on a number of key water resources identified in the area, such as downstream aquatic ecosystems, particularly within the Goulburn River National Park, and the registered bore associated with Wollar School. Other groundwater dependent ecosystems (GDEs) may also be present within the project boundary and surrounds; however the potential impact on these remains uncertain.

Advice

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

Question 1: Does the additional information provided by the Applicant (the responses to submissions and specific response to the IESC's recommendations) adequately address the matters identified in the IESC's advice (IESC March 2016: points 1-30)?

1. The additional information provided by the proponent addresses some of the issues identified in the IESC's advice (those that remain unaddressed are in Paragraph 2, below). The following matters are adequately addressed:
 - a. A commitment was provided in the proponent's Reconciliation (p. 4) to undertake core testing to further elucidate aquifer properties and incorporate the results into future reviews of the groundwater model. This also included using the results of the groundwater monitoring program to inform periodic refinement of the groundwater model. The revised outputs from the numerical model will then be used to inform regular site water balance reviews. This adequately addresses points 5a, 5f and 5g in the March 2016 advice.
 - b. The IESC accepts the rationale for why the Ulan Mine Complex was not included in the cumulative groundwater impact assessment, as provided in the proponent's Reconciliation (p. 3) to address the risk of drawdown effects due to cumulative impacts (Point 4 in the March 2016 advice).
 - c. A commitment was provided in the proponent's Reconciliation (p. 16) to reinstate two existing groundwater monitoring locations at PZ20 and PZ21, install additional monitoring bores in backfill areas and include analyses for molybdenum in the groundwater sampling program. This commitment adequately addresses part of point 26c in the March 2016 IESC advice.
 - d. Annual stream health monitoring will be conducted on Wilpinjong and Cumbo creeks, including aquatic macroinvertebrate surveys in spring (as per the proponent's Reconciliation, p. 18 and Peabody Energy May 2016, Appendix 5). This adequately addresses point 29 in the March 2016 IESC advice.
 - e. Further information was provided describing the applicability of the previous flood study to the proposed project (proponent's Reconciliation, p. 8). This adequately addresses point 11 in the March 2016 IESC advice.
2. Matters in relation to the characterisation and assessment of surface water flow and quality and groundwater quality still remain unresolved and further assessment and characterisation is needed to adequately assess potential impacts on downstream aquatic ecosystems, particularly within the Goulburn River National Park. Consistent with advice provided in March 2016, the IESC consider these matters require further consideration as detailed in response to Question 2, below.

Question 2: If not, please identify why and provide advice on what should be done to address these residual matters.

Surface Water

3. Potential downstream impacts to surface water quality and flows (volume, timing, frequency and duration) of Wilpinjong and Wollar creeks have not been adequately addressed as the required information was not provided. This information is required for robust assessment of risk to downstream ecosystems, including in the Goulburn River National Park. To address these residual matters, consistent with the March 2016 advice, the following additional information should be provided:
 - a. The Water Management Plan should include a commitment to monthly and event-based metals monitoring and monitoring of additional downstream points on Wollar Creek (IESC March 2016: points 2, 9, 12, 13, 14 & 27). While the Response (pp. 32–33) provides some 2015/16 data for on-site water storages for arsenic, selenium and molybdenum, the IESC considers that there were too few samples to assess the potential impacts of discharges to downstream aquatic ecosystems. The IESC also considers that the proponent has applied the *ANZECC/ARMCANZ (2000) Water Quality Guidelines* (the Guidelines) inappropriately to some of these data. The freshwater low reliability guideline value of 0.034 mg/L (ANZECC/ARMCANZ 2000b, p. 8.3-133) should be used for molybdenum and, due to the risk of bioaccumulation, the 99% guideline value of 0.005 mg/L should be used for selenium (ANZECC/ARMCANZ 2000a, p. 3.4-17; ANZECC/ARMCANZ 2000b, pp. 8.3-136 to 8.3-140). The Response states that the 95% guideline value was used for selenium because the 99% value was below the proponent's level of detection (LOD; reported as 0.01 mg/L in the Response, p. 32, Table 3). The more conservative 99% ecosystem protection guideline value for selenium is well above the established practical LOD (ANZECC/ARMCANZ 2000b, p. 8.3-137). Therefore the proponent should consider alternative analysis methods in consultation with their laboratory to ensure their LOD is commensurate with the 99% guideline value. Additional monitoring points and sampling undertaken consistent with the Guidelines will enable the proponent to determine the potential impacts to downstream aquatic ecosystems within the Goulburn River National Park, and inform management and mitigation of those impacts.
 - b. Additional solubility studies of arsenic, selenium and molybdenum in waste and tailings material should be conducted including tests over a range of pH conditions and kinetic tests. These tests should be described in detail as part of the impact assessment for the proposed project to inform revision of the surface water management and monitoring plan (IESC March 2016: points 14, 20 & 27). These studies would enable a more informed understanding of the risks associated with metal and acid contamination from waste storage, disposal, handling and treatment.
 - c. Management triggers and associated responses have been developed (IESC March 2016: points 20, 21, 23, & 24) for the existing mine for a sub-set of water quality parameters, as detailed in the *Wilpinjong Mine Water Management Plan* (Peabody Energy May 2016, Appendix 5). Surface water trigger values and associated responses for metals should also be developed to enable identification and management of potential impacts to downstream ecosystems.
 - d. The effectiveness of existing surface water management at the Wilpinjong Mine should be demonstrated to inform revision of the plan to include the proposed project (IESC March 2016: points 16, 17, 18, 19, & 25). The *Wilpinjong Mine Water Management Plan* (Peabody Energy May 2016, Appendix 5) appears to show several instances where surface water quality trigger values have been exceeded but it is not clear from the EIS, the Response, or available environmental reporting (Peabody Energy 2016) how the relevant Trigger Action Response Plans were applied. For example, pH values in Wilpinjong Creek, downstream of Wilpinjong Coal Mine, are frequently outside the baseline trigger values (Peabody Energy

May 2016, Appendix 5, table 11 on p. 35 & Figure 7 on p.17; EIS, Appendix D, Figure 3.19, p. 58).

- e. Changes to flow regime, particularly characterisation of timing and seasonality of peak and low flows, have not been quantified (IESC March 2016: points 3, 10, 13, 27 & 29) and should be assessed when updating the *Wilpinjong Mine Water Management Plan* so as to fully identify impacts to downstream ecosystems.

Groundwater

4. The potential for contaminants leaching from tailings dams located adjacent to Wilpinjong Creek has not been adequately addressed (IESC March 2016: points 6, 7, 8 & 26c). Leakage from the tailings dams can impact groundwater and downstream surface water quality, with potential impacts on aquatic and groundwater dependent ecosystems. The following matters remain unaddressed, namely:
 - a. Concentrations of other solutes, e.g. dissolved metals, should be presented to support the conclusion that there is no long-term issue. The proponent's conclusion that "there is no evidence of a medium- to long-term issue, given the monitoring data indicated the EC and pH normalised afterwards" is not supported as monitoring appears to have been suspended in December 2011 (Peabody Energy (EIS) 2016, Appendix C, Table 3-5, p. 35).
 - b. The proponent has committed to reinstating monitoring at piezometers PZ20 and PZ21 to monitor potential seepage. Further monitoring from a representative selection of piezometers PZ01 to PZ28 should be considered for inclusion in the revised *Wilpinjong Mine Water Management Plan*. Monitoring of these piezometers would allow detection of potential seepage from the adjacent tailings dams (TD1-TD7) which could affect the water quality of Wilpinjong Creek. The screened interval of these piezometers should be provided.
 - c. Baseline groundwater metal concentrations for each monitoring bore should be presented to enable detection of spatial and temporal trends. The proponent considers this is not warranted due to the additional metals sampling undertaken to characterise mine water storages (proponent's Reconciliation, p. 5). The intent of the IESC's March 2016 point 6(a) was to establish a baseline for metals upon which potential impacts to groundwater quality can be assessed. Despite quarterly sampling (Peabody Energy May 2016, Appendix 6), a baseline characterisation of metals in groundwater has not been established. Establishing a baseline is important to be able to develop specific groundwater trigger values and associated responses for metals to incorporate into the revised *Wilpinjong Mine Water Management Plan*.
5. Future reviews and updates to the numerical groundwater model are important to validate and provide certainty on groundwater drawdown predictions throughout the life of the proposed project. This is particularly important when considering and monitoring impacts to other groundwater users in the area, in particular the registered groundwater bore associated with the Wollar School and potential GDEs, located to the east of the proposed project (IESC March 2016: point 21).
 - a. The *Wilpinjong Mine Water Management Plan* should be updated to include the application of uncertainty analysis to groundwater model outputs (IESC March 2016: points 1 & 5). The IESC Information Guidelines (IESC 2015) are consistent with the Australian modelling guidelines with respect to analysis of uncertainty of predictions and the use of sensitivity analysis for calibration and assessment of uncertainty. The groundwater modelling for the proposed project does not provide any descriptor of uncertainty for predictions, apart from the general confidence classification for the model. Irrespective of conceptualisation and

calibration of the model, the difference in stresses on the groundwater system between the calibration and measurement phases and associated changes in material properties, mean that there would still be a need for some form of uncertainty analysis of predictions, even if qualitative in nature. There has been considerable effort to reduce parameter uncertainty in the groundwater model through the analysis of recharge, baseflow and groundwater inflow to mining pits; and calibration of the groundwater model with respect to piezometric heads and hydrological fluxes and reviewing studies of hydraulic properties. While modelling outputs compare well with observations, there are some areas where this is less the case. This, together with the wide range of estimates of recharge, baseflow and hydraulic parameters, the importance of evapotranspiration in discharge and acknowledged limitations of the model, contribute to parameter uncertainty in the existing model. The communication of uncertainty in predictions is important to understand risks and to formulate risk mitigation, and the effort and rigour associated with the uncertainty analysis should be commensurate with the risks involved.

- b. The proponent has committed to collect data and refine their groundwater model on a regular basis. Refinement of the model's results around the Pit 8 area should be a focus given the spatial and temporal paucity of data in that area. This could be undertaken as a component of the ongoing site management and be included in the revised *Wilpinjong Mine Water Management Plan*.

Final Landform

- 6. The proponent has stated that a Final Void Management Plan will be developed. Consistent with the March 2016 IESC advice (point 20, 23 & 28), this plan should use data collected during mine operations to assess potential risks to water resources, characterise the hydrological environment of the backfilled pits and the final void, and include a post-mining water quality monitoring network. This information is important to ensure long-term risks to water resources are appropriately mitigated.

Identification of Water-Related Assets

- 7. Neither the Response nor the proponent's Reconciliation provided the terrestrial vegetation groundwater dependency mapping or stygofauna desktop study suggested the March 2016 IESC Advice (points 15 & 22). These are important to accurately characterise and mitigate groundwater impacts in the Water Management Plan.
- 8. As stated in IESC's previous advice (IESC March 2016, point 30), the proposed project is located within Northern Sydney Basin Bioregion. Data and relevant information from the proposed project should be made accessible to this Bioregional Assessment and related research projects.

Date of advice	02 September 2016
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Source documentation available to the IESC in the formulation of this advice	<p>Peabody Energy 2016. <i>Approvals, Plans and Reports – Wilpinjong Mine</i>. Available: http://www.peabodyenergy.com/content/427/australia-mining/new-south-wales/wilpinjong-mine/approvals-plans-and-reports-wilpinjong-mine.</p> <p>Peabody Energy 2016. <i>Wilpinjong Extension Project Environmental Impact Statement – Response to Submissions</i>. Available: http://majorprojects.planning.nsw.gov.au/page/development-categories/mining--petroleum---extractive-industries/mining/?action=view_job&job_id=6764.</p> <p>Peabody Energy 2016. <i>Wilpinjong Extension Project Reconciliation of IESC Comments</i></p>
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(Attachment to RFA)

**References
cited within the
IESC's advice**

ANZECC/ARMCANZ 2000a. *Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Volume 1*. Available:
<http://www.agriculture.gov.au/water/quality/guidelines/volume-1>

ANZECC/ARMCANZ 2000b. *Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Volume 2*. Available:
<http://www.agriculture.gov.au/water/quality/guidelines/volume-2>

IESC 2015. *Information Guidelines for the Independent Expert Scientific Committee advice on coal seam gas and large coal mining development proposals*. Available:
<http://www.iesc.environment.gov.au/system/files/resources/012fa918-ee79-4131-9c8d-02c9b2de65cf/files/iesc-information-guidelines-oct-2015.pdf>.

IESC 2016. *Advice to Decision maker on Coal Mining Projects – IESC 2016-075. Wilpinjong Extension Project (EPBC 2015/7431) – Expansion*. Available:
<http://www.iesc.environment.gov.au/committee-advice/proposals/wilpinjong-project-advice-2016-075>

Peabody Energy May 2016. *Wilpinjong Coal: Water Management Plan*. Available:
<http://www.peabodyenergy.com/content/427/australia-mining/new-south-wales/wilpinjong-mine/approvals-plans-and-reports-wilpinjong-mine>.

Peabody Energy (EIS) 2016. *Wilpinjong Extension Project Environmental Impact Statement*. Available: http://majorprojects.planning.nsw.gov.au/page/development-categories/mining--petroleum---extractive-industries/mining/?action=view_job&job_id=6764.
