APPENDIX J: IESC ADVICE

1. IESC advice (2016-075) dated 14 March 2016
2. Response from WCPL titled "Wilpinjong Extension Project Reconciliation of IESC Comments"
3. DPI comments on IESC advice dated 3 August 2016
4. IESC advice (2016-078) dated 2 September 2016
5. Response from WCPL titled "Wilpinjong Extension Project Reconciliation of IESC Comments (September 2016)"

IESC 2016-075: Wilpinjong Extension Project (EPBC 2015/7431, SSD6764) – Expansion

Requesting agencies	The Australian Government Department of the Environment The New South Wales Department of Planning and Environment
Date of request	28 January 2016
Date request accepted	3 February 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 the New South Wales Department of Planning and Environment to provide advice on Peabody's Wilpinjong Extension Project in NSW.

This advice draws upon aspects of information in the Environmental Impact Statement, 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 Wilpinjong Extension Project (the proposed project) is an extension of the approved Wilpinjong Coal Mine, located 40 kilometres north-east of Mudgee in central New South Wales. The proposed project lies immediately south, and upstream, of the Goulburn River National Park. The project discharges mine water to Wilpinjong Creek, which flows into the National Park through Wollar Creek.

The extension comprises approximately 800 hectares of additional open cut mining area, continued production of up to 16 Mtpa of ROM coal from the Ulan Coal Seam and Moolarben Coal Member, and extension of the approved mine life by approximately seven years. The extension includes associated mine infrastructure such as haul roads and relocation of existing power lines and roads.

Key potential impacts

Key potential impacts to water resources resulting from the proposed project include:

- contamination of Wilpinjong Creek due to leaching of metals from reject materials
- changes to water quality and flow regime (e.g. volume, timing, frequency and duration) of Wilpinjong Creek and Wollar Creek
- contributing to cumulative impacts from mines within Wilpinjong Creek and Wollar Creek.

Assessment against information guidelines

The IESC, in line with its Information Guidelines (IESC, 2015), has considered whether the proposed project assessment has used the following:

Relevant data and information: key conclusions

Hydrological data from the approved Wilpinjong Coal Mine and from the neighbouring Moolarben Coal Mine were used to support the assessment of impacts to groundwater resources. However, limited surface water quality data was provided. This omission is an issue for assessment of potential metal contamination, as elevated levels of soluble metals in waste rock were identified in the Geochemistry Assessment.

Application of appropriate methods and interpretation of model outputs: key conclusions

The numerical groundwater model is appropriate to assess impacts of groundwater drawdown. Steady state and transient calibration, and peer review were undertaken. However, sensitivity analysis, uncertainty analysis and model verification were not undertaken. The neighbouring Moolarben Coal Mine was appropriately included in the numerical groundwater modelling to determine potential cumulative impacts, but the Ulan Mine was not included. This may affect cumulative impact predictions.

A sensitivity analysis was undertaken for the water balance model, but not for the salt balance.

Without justification the Geochemistry Assessment compared dissolved molybdenum and selenium concentrations to ANZECC/ARMCANZ (2000) Primary Industries (Livestock Drinking Water) guidelines instead of ecosystem protection guidelines. The Groundwater Assessment (EIS, App. C) did not make comparisons to water quality guidelines.

Groundwater dependency of terrestrial vegetation was not appropriately assessed and methods used were inconsistent between the Groundwater Assessment and the Biodiversity Assessment. Stygofauna should be assessed through a desktop analysis, followed by possible sampling.

Advice

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

Question 1: Do the groundwater and surface water assessments, including the numerical models within, provide reasonable estimations of the likely impacts to water-related resources (including water quality or water quantity). This consideration should include particular reference to Wilpinjong Creek and Wollar Creek, and any cumulative impacts associated with the Moolarben Coal Mine.

Response

1. The use of a Class 2 numerical groundwater model (as classified under Barnett et al., 2012) is appropriate for assessment of impacts to groundwater resources. However, the numerical groundwater modelling predictions would be strengthened through the application of sensitivity and uncertainty analyses, model verification, and updating of the groundwater model as new data become available.

2. Further consideration and assessment of surface water impacts is required. The conclusion that potential impacts to surface water are negligible when compared to the approved Wilpinjong Coal Mine needs to be supported by further quantifying and detailing the existing condition of the environment in the vicinity of the approved Wilpinjong Coal Mine (e.g. further geochemical studies and characterisation of surface water quality).

3. The surface water assessment, including the surface water cumulative impact assessment, would be strengthened by quantifying changes to the flow regime over the life of the proposed project. This assessment should include potential cumulative impacts from the proposed project, the approved Wilpinjong Coal Mine and the Moolarben Coal Mine.

Explanation

Groundwater

4. The Ulan Mine situated on the far side of the adjacent Moolarben Coal Mine, in a separate subcatchment of the Goulburn River, was not included as part of the numerical groundwater modelling cumulative impact assessment scenario. Potential cumulative drawdown impacts from the Moolarben Coal Mine, approved Wilpinjong Coal Mine and proposed project may be exacerbated by drawdown effects from the Ulan Mine, but these potential effects have not been considered.

5. Several limitations associated with the groundwater numerical model and acknowledged in the assessment documentation (EIS, App. C, pp. 71–72) may reduce confidence in the modelling predictions. Confidence in the numerical groundwater modelling predictions would be improved by:

    a. core sampling and testing as recommended in the assessment documentation (EIS, App. C, p. 92), to further elucidate aquifer properties (e.g. effective porosity and horizontal and vertical hydraulic conductivity)

    b. sensitivity analyses on the numerical groundwater model

    c. providing justification for model boundaries

    d. sensitivity analysis on model boundaries

    e. an uncertainty analysis on model predictions

    f. model verification using monitoring data not used in the calibration process

    g. updating the numerical groundwater model as more data and information from the proposed project become available.

6. The proponent states that metal concentrations are considered typical for groundwater in the area and reflect baseline conditions (EIS, App. C, p. 52), however:

    a. Baseline conditions were not presented in the assessment documentation. Measured metal concentrations were presented in box plots for each particular metal and as a result temporal trends and spatial variations are not able to be determined (EIS, App. C, Figure 3-28).

    b. Groundwater metal concentrations, including baseline values, have not been compared to ANZECC/ARMCANZ (2000) water quality guidelines for ecosystem protection. Local water quality guidelines could be developed using ANZECC/ARMCANZ (2000) recommended methods and validated for the area.

7. As part of the approved Wilpinjong Coal Mine groundwater monitoring network, 28 monitoring bores (PZ01–28) were installed next to Pit 1 and Pit 2 to monitor groundwater level and groundwater quality (i.e. tailings dam seepage). The proponent states there is no evidence of solute breakthrough (EIS, App. C, p. 53). However, in mid to late 2011 PZ16 indicates a sharp rise then fall in salinity and a decrease then rise in pH, which may be indicative of

short-term solute breakthrough. Concentrations of other solutes, e.g. dissolved metals, were not presented.

8. Tailings are expected to be placed within spoil emplacement areas (EIS, App. D, p. 82). The potential for leaching of contaminants from the spoil emplacement areas has not been assessed.

Surface water

9. Water quality impacts of the proposed project on Wilpinjong and Wollar Creeks are considered in the assessment documentation to be negligible: "with the implementation of management measures in the existing Wilpinjong Coal Mine Water Management Plan (Peabody, 2006a), the potential adverse effect of the [proposed] project on downstream water quality would be negligible" (EIS, p. 4-64). The Surface Water Assessment (EIS, App. D) does not provide adequate evidence to demonstrate the effectiveness of the existing strategies for managing impacts to surface water at the approved Wilpinjong Coal Mine, particularly in relation to potential metal contamination. For example:

    a. A surface water quality monitoring programme has been ongoing across the site since 2004, but surface water quality data for parameters other than EC, sulphate, pH and turbidity have not been provided.

    b. Measurement of metals was identified at a limited number of the surface water monitoring sites. For these sites, the frequency of monitoring was intermittent and the period of sampling was short. For example, metals were measured in two sites on Wilpinjong Creek and one site on Wollar Creek intermittently over an 18 month period from June 2004 to January 2006 and metals in Pit 2 west were monitored intermittently from January 2011 to September 2012 (EIS, App. D pp. 53–54). No data were provided.

    c. Limited water quality monitoring data were provided for water storages and tailings disposal storages (i.e. data were provided for pH, EC, and sulphate from pre-2013 and spot samples from 2015), and no data were provided for sediment dams (EIS, App. D, pp. 71-73), despite these locations being defined in the Surface Water Management and Monitoring Plan for the approved Wilpinjong Coal Mine (Peabody, 2006b) for monthly sampling.

    d. The surface water quality data presented indicates a number of sites regularly exceed the ANZECC/ARMCANZ (2000) guideline trigger values for the protection of aquatic ecosystems and/or Primary Industries (Livestock Drinking Water), i.e. EC, turbidity, and sulphate (EIS, App. D, pp. 55–56). Local water quality guidelines and objectives were not developed and while baseline values were reported (for pH, EC, turbidity) (EIS, App. D, section 3.6.2), contextual information was not provided to explain how these values were derived. The information presented does not allow consideration of the suitability of the baseline data set and whether these exceedences reflect the existing environment or mining-related impacts.

    e. Data from nearby mining operations are not provided, despite the close proximity of the proposed project to Moolarben Coal Mine. These data would provide further contextual information on the upstream water quality of Wilpinjong Creek, and consideration of the potential impacts of the approved Wilpinjong Coal Mine in relation to those from nearby mines.

10. The assessment concludes that potential changes to surface water flows (i.e. from catchment excision and loss of baseflow) in Wilpinjong Creek and Wollar Creek are minor when

compared to the approved Wilpinjong Coal Mine (EIS, App. D, p. 149). These findings would be strengthened by the following:

a. consideration of the cumulative reduction in catchment area over the operational period, including against each relevant sub-catchment and reductions associated with Moolarben Coal Mine

b. quantifying changes to flow regime from the proposed project (with particular regard to timing, duration and frequency) due to the combined impact of catchment excision, loss of baseflow, and regulated and uncontrolled discharges. While the assessment presents a flow frequency curve of the combined impact of estimated baseflow loss and maximum catchment excision (EIS, App. D, p. 149, Fig 8.5), further detail on the modelling (e.g. how discharges and changes to catchment area have been incorporated into the model) would enable consideration of the appropriateness of model outputs. The analysis should compare the proposed project, pre-mining condition, and effects of the approved Wilpinjong Coal Mine operations.

c. subsequent assessment of potential downstream ecological impacts resulting from predicted changes to flow regime

d. discussion of the approved Wilpinjong Coal Mine's existing stream flow triggers[1], including historical performance.

11. The proponent did not undertake new flood studies for the proposed project as the proposed extension lies outside of the Wilpinjong Creek and Cumbo Creek 1 in 1,000 annual exceedance probability design flood extent (EIS, App. D, p. 75). While this may be a plausible approach, the assessment should discuss assumptions, limitations and applicability of the previous study.

12. The water balance model for the proposed project is configured so as not to allow uncontrolled discharge of mine water from mine water storages; excess mine water is stored in mining pits instead (EIS, App. D, p. 134). However, the water balance modelling indicates that: the water management system is sensitive to climatic conditions (EIS, App. D, p. 127); discharges from sediment dams during the first 5 years of the proposed project, under wet and very wet conditions, are up to 75 ML/month and 390 ML/month respectively (EIS, App. D, p. 134); and 'significant quantities' of water will need to be stored in the pits (EIS, App. D, p. 128), which will cause disruption to operations. Sediment dams have also been used to store mine water in the past (EIS, App. D, p. 70). Considering these factors, the assessment could be improved by:

a. quantification of impacts through solute balance modelling

b. further assessment of the risk of discharge of mine-affected water and sediment-affected water, including how water stored in pits will be managed during periods of high intensity rainfall.

13. While the assessment documentation includes a cumulative impact assessment for surface water, the scale of the assessment and approach of not quantifying the existing level of impact does not enable cumulative impacts to Wilpinjong and Wollar creeks to be

[1] While the stream flow triggers were not discussed in the assessment documentation, the IESC notes these are articulated in the *Wilpinjong Coal Project Surface and Ground Water Response Plan* (Peabody, 2006c) and would expect these to be discussed as part of the assessment of the proposed project.

considered. Given the level of existing and proposed development on Wilpinjong Creek a local scale quantitative assessment should be included.

Geochemistry

14. No testing of overburden, interburden and coal reject materials for elemental enrichment and solubility was conducted for the approved Wilpinjong Coal Mine (EIS, App. K, p. 44). The Geochemistry Assessment for the proposed project (EIS, App. K) indicates enrichment of arsenic and selenium and solubility of molybdenum and selenium in some of the coal reject, interburden and overburden materials (EIS, App. K, pp. 34, 39–40, 44), and that certain waste rock materials would be potentially acid forming. Given these preliminary results the assessment should include the following to improve the assessment of potential impacts:

    a. A detailed description of the methodology of the solubility testing should be provided. The description provided (EIS, App. K, p. 23) was not adequate to provide confidence that the results predict the range of metals that may present a mobilisation risk.

    b. Additional solubility studies (e.g. over a range of pH and kinetic tests) should be conducted to better inform understanding of the risks associated with metal contamination from waste storage, disposal, handling and treatment.

    c. Results from solubility studies should be compared to the ANZECC/ARMCANZ (2000) water quality guidelines for ecosystem protection.

Identification of water-related assets

15. The proponent's assessment of potential impacts to water-dependent assets would be improved by consistent classification of groundwater dependent ecosystems through the use of the following:

    a. identification of areas of shallow groundwater (less than 20 metres below ground level) and groundwater discharge overlaid with vegetation mapping to identify areas of potential groundwater dependency

    b. techniques from the Australian GDE Toolbox (Richardson et al., 2011), applied to confirm groundwater use by vegetation and groundwater discharge to surface water bodies

    c. a desktop study (e.g. Eco Logical, 2015) to assess the likelihood of stygofauna presence. If stygofauna are likely to be present, a pilot study following WA EPA (2007) guidelines is recommended.

Question 2: Has the Applicant provided reasonable strategies to effectively avoid, mitigate or reduce the likelihood, extent and significance of impacts to significant water-related resources?

Response

16. No. The level of information describing avoidance, mitigation and reduction strategies within the assessment documentation is limited. The proponent considers that the existing strategies associated with the approved Wilpinjong Coal Mine are adequate. However, data to support the adequacy of existing strategies were not presented so the effectiveness of these strategies is not able to be assessed.

17. The existing measures are implemented through management plans which have not been included within the assessment documentation. Without these plans, it is not possible to determine how effective the measures would be at mitigating or reducing impacts from the proposed project.

Explanation

18. As identified in Paragraph 9, the information presented within the assessment documentation is not sufficient to demonstrate the effectiveness of existing strategies to avoid, mitigate and reduce potential impacts to surface water quality. This would be improved by inclusion of:

    a. background information and description of sampling methodologies. For example, groundwater metals data should include contextual information such as when the data were collected to enable assessment of whether this is representative of baseline conditions. Baseline data were not available for assessment

    b. baseline data and data collected during the approved Wilpinjong Coal Mine operations. This would enable consideration of the effectiveness of the existing strategies to manage potentially acid forming waste rock, and the adequacy of the water management system

    c. metals analysis for surface water on site (creeks, dams and other storages) and drainage lines including Wilpinjong Creek.

19. Mine water discharges from the Wilpinjong Coal Mine may contain untreated mine affected water mixed with permeate from the reverse osmosis plant while remaining within water quality discharge criteria (EIS, App. D, p. 82). Discharge water quality criteria only include EC, oil and grease, pH and total suspended solids (EIS, App. D, p. 74) so it is possible that other contaminants are being released from the site through this pathway without detection. Water quality data in the assessment documentation is not sufficient for this risk to be assessed.

Question 3: Would the IESC recommend any other strategies to avoid, mitigate or reduce the likelihood, extent and significance of impacts on water-related resources? And if so, why?

Response

20. Yes. To determine the need for additional strategies to avoid, mitigate or reduce potential impacts on water-related resources the IESC suggests development of a monitoring and management regime (further details in the response to Question 4). Should additional strategies be required, results from the monitoring programme should be used to inform adaptive management measures entailing ongoing waste management, water management, and mine closure strategies.

Explanation

Adaptive management/monitoring regime

21. Management trigger values should be used to inform adaptive management approaches, with Trigger Action Response Plans (TARPs) developed to apply appropriate avoidance, mitigation and reduction strategies. Adaptive management approaches should be applied (but not limited) to the following areas:

    a. Waste management: Results from regular monitoring of trace metals in surface water (e.g. creeks, dams and other storages on site) and groundwater (including back-filled areas, tailings and rejects emplacement areas) should be used to inform ongoing waste management strategies, such as the placement of potentially acid forming waste material and shape of the final landform. These data can also demonstrate the effectiveness of the mine water management system in preventing contamination of surrounding creeks (i.e. via surface water runoff, discharges, or groundwater seepage) both during and post mining.

b. Water management system: Results from the surface water monitoring programme should be used to demonstrate the effectiveness of the mine water management system in the prevention of contamination of surrounding creeks (i.e. via surface water runoff, discharges, or groundwater seepage) both during and post operations. Management triggers and associated responses for key storages within the water management system (e.g. sediment dams) should be developed. Management responses could include increasing the pumping capacity to divert water to the mine water management system instead of being released from the site, resizing/introducing additional temporary sediment dams, and the use of flocculating agents or other treatment as necessary.

c. Contaminant management: implement the tiered approach in the National Water Quality Management Strategy (refer to the decision tree at Figure 3.4.2 of ANZECC/ARMCANZ, 2000) for any contaminant in mine related discharges that exceeds its water quality guideline for ecosystem protection (ANZECC/ARMCANZ, 2000). This could include contaminant speciation or ecotoxicity testing.

d. Mine closure: As more data become available during operations, surface water and groundwater modelling and predictions for the final voids should be reviewed and updated. These outputs should inform ongoing refinement of the final landform.

e. Third party impacts: The State-owned Wollar Public School bore is expected to experience groundwater drawdown by greater than 2 metres. Triggers for remedial action should be developed and the bore should be monitored regularly for trigger exceedance.

Other suggestions

22. If additional water-related assets are identified as a result of further surveys (as recommended in Paragraph 15), predicted impacts should be reassessed in light of the additional data collected, and appropriate avoidance and mitigation strategies proposed.

Question 4: Would the IESC recommend any additional monitoring or management measures to address any residual impacts on water-related resources?

Response

23. Yes. Recommended additional monitoring and management (see response to Question 3, above) measures include:

    a. determination of appropriate local water quality guidelines and objectives

    b. spatial and temporal expansion of the surface water and groundwater monitoring networks, including event-based monitoring of surface water quality

    c. ongoing refinement of the proposed final landform based on information collected during operations

    d. continued aquatic ecology surveys.

Explanation

Water quality guidelines and objectives

24. The IESC considers surface water and groundwater monitoring presented as part of the Water Management Plan (Peabody, 2006a) should be consistent with the National Water Quality Management Strategy (ANZECC/ARMCANZ, 2000), and could include determination of appropriate local water quality guidelines and objectives (for physical and chemicals

stressors, and relevant toxicants). The assessment documentation compares surface water quality data for EC, turbidity and pH to baseline values (EIS, App. D, section 3.6.2), but details surrounding the baseline data sets for both surface water and groundwater were lacking. Additional relevant parameters such as metals should also be included.

25. The Water Management Plan (Peabody, 2006a) should be updated to reflect the proposed project, and potential local water quality guidelines and objectives. Further, the plan should define the adaptive management approach, including management triggers and appropriate management responses in the event that management triggers and/or water quality objectives are exceeded. This could include ecotoxicity testing or further aquatic ecology surveys to determine impact. This should build upon the approach described in the *Wilpinjong Coal Project Surface and Ground Water Response Plan* (Peabody, 2006c).

Groundwater and surface water monitoring regime

26. The proponent states that the existing groundwater monitoring network is considered adequate to assess groundwater levels and quality, and for groundwater model calibration and verification (EIS, p. 4-53). While monitoring sites show reasonable spatial distribution and represent the main stratigraphic units, monitoring could be improved by the following:

    a. Additional bores should be installed outside the pit expansion areas to the southwest, south, and southeast of the proposed project site because most of the bores in these areas are located in the pit expansion areas and will need to be removed once mining commences.

    b. Two bores were installed in spoil emplacement areas: GWf1 in Pit 1 and GWf2 in Pit 5. Continued monitoring of these bores is recommended. Such data are useful in providing information on the recharge rates through spoil, spoil permeabilities, and to validate modelling assumptions and predictions. In the future, it would be useful to install and monitor an additional bore in the spoil/final landform north of the proposed Pit 8 final void (assuming that GWc31 will be removed by mining).

    c. The proponent states that the tailings storage facility for the approved Wilpinjong Coal Mine located in Pit 2 is no longer active (EIS, App. C, p. 88), but indicates that water and tailings for the proposed project will be treated within Pit 2 using a tailings filter press (EIS, App. D, p. 82). Monitoring of PZ20 and PZ21 (located north of Pit 2) could be reinstated, as recommended in the assessment documentation (EIS, p 4-53), to monitor any potential seepage impacts. The reinstatement of some of the other piezometers (PZ01-28) already installed upstream and downstream of the expected tailings treatment area should also be considered.

    d. Groundwater monitoring stations could be established in the backfilled pits to monitor water quality as the groundwater level reaches equilibrium, provide an early indication of potential water quality impacts to groundwater and associated surface waters, and demonstrate performance of existing waste management practices.

    e. Molybdenum could be added to the groundwater monitoring programme, as recommended in the assessment documentation (EIS, p. 91), as there is a risk that molybdenum may be mobilised from waste rock under near neutral conditions (EIS, App. C, p. 88).

27. The existing surface water monitoring programme, included in the Surface Water Management and Monitoring Plan (SWMMP) (Peabody, 2006b), is proposed to be retained and revised for the proposed project. This plan is not described explicitly in the assessment documentation (e.g. parameters and frequency). The SWMMP accessed by the IESC from

the proponent's website is dated March 2006. When updating the SWMMP to incorporate the proposed project, the IESC suggests the following improvements:

a. Metals monitoring on a monthly and event-based basis should be included for the existing surface water monitoring sites, and storages, tailings disposal storages, and sediment dams. This should cover arsenic, molybdenum and total alkalinity/acidity, as noted in the assessment documentation (EIS, p. 4-68), and any metals that pose a risk of mobilisation, as identified in existing solubility studies (and any additional studies as recommended in Paragraph 14).

b. The most upstream site on Wilpinjong River (WIL-U2) is very close to the Project Boundary, and the proposed extension extends to this area. Monitoring stations further upstream would assist in characterising upstream water quality, the ongoing influence of the proposed project, and impacts of nearby operations. Additional downstream monitoring points on Wollar Creek would also assist in identifying impacts to waters within the downstream Goulburn River National Park. Data sharing with nearby operations may help to address this deficiency.

Final landform

28. In relation to the proposed final voids and final landform, the following should continue to be assessed and revised as data is collected during operations:

    a. assessment of legacy issues and risks to water resources as a result of the final landform, including potential risks to regional hydrogeological units and surface watercourses caused by potential leakage, loss of baseflow, or connectivity (e.g. flood ingress and overflow) as a result of the final voids. This should include quantification of the inflow/outflow of the backfilled pits and the final void predicted to act as a flow-through system, including the volume, travel times and salt loads of seepage and risk of overflow.

    b. design of a post-mining groundwater and surface water monitoring network to provide a indication of groundwater and surface water quality.

Aquatic ecology surveys

29. Stream health and aquatic macroinvertebrate surveys were conducted annually between 2011 and 2014 (EIS, App. F, p.14). It is not stated in the assessment documentation whether aquatic ecology monitoring will continue on the site. Monitoring should continue on an annual basis to identify potential cumulative impacts in the Wilpinjong and Wollar Creek catchments, especially focussing on how extended low-flow periods might affect biota (e.g. atyid shrimps) and other ecological aspects.

30. The Northern Sydney Basin Bioregion, which includes the Hunter subregion, has been identified as a Bioregional Assessment priority region. Data and relevant information from the proposed project should be made accessible to this Bioregional Assessment and related research projects.

Date of advice	14 March 2016
Source documentation available to the IESC in the	McVicar, T. R., Pinetown, K. L., Hodgkinson, J. H., Barron, O. V., Rachakonda, P. K., Zhang, Y. Q., Dawes, W. R., Macfarlane, C., Holland, K. L., Marvanek, S. P., Wilkes, P. G., Li, L.T. & Van Niel, T. G., 2015. *Context statement for the Hunter subregion.* Product 1.1 for the Hunter subregion from the Northern Sydney Basin

formulation of this advice	Bioregional Assessment. Department of the Environment, Bureau of Meteorology, CSIRO and Geoscience Australia, Australia. Peabody Energy, 2016. *Wilpinjong Extension Project Environmental Impact Statement.*
References cited within the IESC's advice	ANZECC/ARMCANZ, 2000. Australian Guidelines for Water Quality Monitoring and Reporting. National Water Quality Management Strategy (NWQMS). Canberra: Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand. Barnett, B., Townley, L. R., Post, V., Evans, R. E., Hunt, R. J., Peeters, L., Richardson, S., Werner, A. D., Knapton, A. & Boronkay, A., 2012. Australian groundwater modelling guidelines, Waterlines report, National Water Commission, Canberra. Eco Logical, 2015. Bylong Coal project Environmental Impact Statement - Stygofauna Impact Assessment. Prepared for Hansen Bailey. IESC. 2015. Information Guidelines for the Independent Expert Scientific Committee advice on coal seam gas and large coal mining development proposals [Online]. Available: http://www.iesc.environment.gov.au/system/files/resources/012fa918-ee79-4131-9c8d-02c9b2de65cf/files/iesc-information-guidelines-oct-2015.pdf. Peabody, 2006a. Wilpinjong Coal Project: Site Water Management Plan. Peabody, 2006b. Wilpinjong Coal Project: Surface Water Management and Monitoring Plan. Peabody, 2006c. Wilpinjong Coal Project: Surface and Groundwater Response Plan. Richardson, S., Irvine, E., Froend, R., Boon, P., Barber, S. & Bonneville, B., 2011. Australian groundwater dependent ecosystems toolbox part 2: assessment tools, National Water Commission. Western Australia Environmental Protection Authority (WA EPA), 2007. *Guidance for the Assessment of Environmental Factors (in accordance with the Environmental Protection Act 1986)*, Draft Guidance statement No. 54A, Western Australia.

Wilpinjong Extension Project
Reconciliation of IESC Comments

ID No.	IESC Comment	Response
1	The use of a Class 2 numerical groundwater model (as classified under Barnett et al., 2012) is appropriate for assessment of impacts to groundwater resources. However, the numerical groundwater modelling predictions would be strengthened through the application of sensitivity and uncertainty analyses, model verification, and updating of the groundwater model as new data become available.	WCPL provided a response to this comment in Section 2.5 (Page 29 and 30) of the RTS. In summary, WCPL's response is that: • Section 5.7.1 of the Groundwater Assessment describes why a formal sensitivity analysis is not required in consideration of the calibration process and the significant amount of available data (i.e. from the extensive monitoring network in place for over 10 years). • The Groundwater Assessment included a sensitivity analysis that tested the potential influence of climate change on groundwater model predictions. • DPI Water accepted the rationale on sensitivity analysis in their submission on the Project. • Consistent with IESC's recommendation, WCPL has committed to updating of the groundwater model as new data become available in Section 4.7.3 of the EIS.

ID No.	IESC Comment	Response
2	Further consideration and assessment of surface water impacts is required. The conclusion that potential impacts to surface water are negligible when compared to the approved Wilpinjong Coal Mine needs to be supported by further quantifying and detailing the existing condition of the environment in the vicinity of the approved Wilpinjong Coal Mine (e.g. further geochemical studies and characterisation of surface water quality).	WCPL notes that IESC's comment relates primarily to downstream water quality and is addressed in Section 2.5 (Pages 30 to 33) of the RTS. The response in the RTS presented additional water quality data for key mine water storages at the existing/approved Wilpinjong Coal Mine. In summary, WCPL's response is that: • WRM Water and Environment (2015) considered the potential impacts of discharge in terms of the element enrichments and solubilities identified in the Geochemistry Assessment (Geo-Environmental Management [GEM], 2015) and determined that the risk of elevated dissolved solids and other contaminants impacting downstream waters is low. • DRE consider that geochemical constraints have been well defined in the EIS and that they can be effectively managed by conventional mining and rehabilitation techniques in their submission on the Project. • A review of additional data provided in the RTS (i.e. Pages 30 to 33 and Tables 3 and 4) supports the conclusion in WRM Water and Environment (2015).
3	The surface water assessment, including the surface water cumulative impact assessment, would be strengthened by quantifying changes to the flow regime over the life of the proposed project. This assessment should include potential cumulative impacts from the proposed project, the approved Wilpinjong Coal Mine and the Moolarben Coal Mine.	WCPL provided a response to this comment in Section 2.5 (Page 33) of the RTS. In summary, WCPL's response is that: • Changes to flow regime were assessed in the Surface Water Assessment (WRM Water and Environment, 2015). • WRM Water and Environment (2015) concluded that the Project's incremental contribution to any potential cumulative impacts on surface water flow or availability are expected to be negligible.

ID No.	IESC Comment	Response
4	The Ulan Mine situated on the far side of the adjacent Moolarben Coal Mine, in a separate subcatchment of the Goulburn River, was not included as part of the numerical groundwater modelling cumulative impact assessment scenario. Potential cumulative drawdown impacts from the Moolarben Coal Mine, approved Wilpinjong Coal Mine and proposed project may be exacerbated by drawdown effects from the Ulan Mine, but these potential effects have not been considered.	This comment is addressed in Section 2.4 of the *Wilpinjong Extension Project – Groundwater Assessment* (HydroSimulations, 2015) (Groundwater Assessment), which states: *The Ulan Mine Complex is immediately beyond the Moolarben Coal Complex. Depressurisation of the Ulan Coal Seam or overlying coal measures, resulting from the operation of the Ulan Mine, will not extend through the Moolarben area because of the depressurisation (and extraction) of the coal seam that will occur due to Moolarben's operations. Therefore, mining at Ulan will not contribute to the cumulative effects of the WCM on the local water sources.*

ID No.	IESC Comment	Response
5	Several limitations associated with the groundwater numerical model and acknowledged in the assessment documentation (EIS, App. C, pp. 71–72) may reduce confidence in the modelling predictions. Confidence in the numerical groundwater modelling predictions would be improved by: a. core sampling and testing as recommended in the assessment documentation (EIS, App. C, p. 92), to further elucidate aquifer properties (e.g. effective porosity and horizontal and vertical hydraulic conductivity); b. sensitivity analyses on the numerical groundwater model; c. providing justification for model boundaries; d. sensitivity analysis on model boundaries; e. an uncertainty analysis on model predictions; f. model verification using monitoring data not used in the calibration process; and g. updating the numerical groundwater model as more data and information from the proposed project become available.	WCPL note that DPI Water (18 March 2016) state the following in their submission on the Project (emphasis added): *DPI Water acknowledges the model satisfies the requirements of Groundwater Modelling Guidelines (2012) with the exception of completing the sensitivity analysis. Dr Kalf did not provide any commentary on the exclusion of sensitivity analysis but DPI Water accepts Dr Merrick's rationale of the longer term data history and site characterisation to constrain unforseen risks. It is not expected that this omission would undermine the model classification or predictions made.* A response to each of IESC's specific recommendations is below: a. As identified by IESC, WCPL has committed to undertaking additional core testwork and implementing the results into any future reviews of the groundwater model. The results of the groundwater monitoring program would also inform periodic refinement of the numerical model. Revised outputs from the numerical model would be reported in the Annual Review, as relevant over the life of the Project and used to inform regular site water balance reviews. b. See WCPL response to Comment 1 regarding sensitivity analysis. c. Selected model boundaries are discussed in Section 5.4 of the Groundwater Assessment. Dr Frans Kalf states the following regarding model boundaries in his Peer Review (Attachment 4 of the EIS): "*The boundaries chosen for the model area are also suitable…*" d. See WCPL response to Comment 1 regarding sensitivity analysis. e. See WCPL response to Comment 1 regarding model uncertainty. f. See response to 'a' above. g. See response to 'a' above.

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6	The proponent states that metal concentrations are considered typical for groundwater in the area and reflect baseline conditions (EIS, App. C, p. 52), however: a. Baseline conditions were not presented in the assessment documentation. Measured metal concentrations were presented in box plots for each particular metal and as a result temporal trends and spatial variations are not able to be determined (EIS, App. C, Figure 3-28). b. Groundwater metal concentrations, including baseline values, have not been compared to ANZECC/ARMCANZ (2000) water quality guidelines for ecosystem protection. Local water quality guidelines could be developed using ANZECC/ARMCANZ (2000) recommended methods and validated for the area.	Baseline metal concentrations were presented in the Groundwater Assessment (Page 52 and Figure 3-28). Following review of IESC comments on the Project, additional data regarding key metal concentrations in mine water storages was presented in the RTS, including a comparison to relevant ANZECC/ARMCANZ (2000) water quality guidelines (Section 2.5, Pages 30 to 33 and Tables 3 and 4). Further temporal and spatial analysis of groundwater quality data is not considered warranted for the assessment of the Project. It is noted that the Surface Water Management and Monitoring Plan (Appendix 5 of the Water Management Plan) and the Groundwater Monitoring Plan (Appendix 6 of the Water Management Plan) incorporate triggers and response measures for key analytes that have been developed in accordance with ANZECC/ARMCANZ (2000) recommended methods.
7	As part of the approved Wilpinjong Coal Mine groundwater monitoring network, 28 monitoring bores (PZ01–28) were installed next to Pit 1 and Pit 2 to monitor groundwater level and groundwater quality (i.e. tailings dam seepage). The proponent states there is no evidence of solute breakthrough (EIS, App. C, p. 53). However, in mid to late 2011 PZ16 indicates a sharp rise then fall in salinity and a decrease then rise in pH, which may be indicative of short-term solute breakthrough. Concentrations of other solutes, e.g. dissolved metals, were not presented.	The statement referred to by the IESC is from Section 3.9.3 of the Groundwater Assessment and is provided below (emphasis added): *More detailed commentary on these figures follows below, but in general, there is no evidence of a solute breakthrough at the down-gradient PZ bores that would indicate a medium- to long-term issue with the tailings dams.* The potential short-term solute breakthrough identified by IESC is recognised in Section 3.9.3 of the Groundwater Assessment, which states: *Apparent acidic conditions were found in a single reading at PZ28, which may be anomalous, and in three consecutive readings at PZ16 in 2011, which suggests that these low pH readings (pH = 5.1-5.4) were correct. However, in both of these bores, the pH returned to 6.5 and 7 respectively following the brief period of lower readings. This suggests that there may have been some short-term observable effect possibly related to the tailings dams, but possibly unrelated.* HydroSimulations (2015) considered the potential short-term solute breakthrough that was highlighted by the IESC, but concluded that there is no evidence of a medium- to long-term issue, given the monitoring data indicated the EC and pH normalised afterwards.

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8	Tailings are expected to be placed within spoil emplacement areas (EIS, App. D, p. 82). The potential for leaching of contaminants from the spoil emplacement areas has not been assessed.	Refer response to Comment 7. Potential for leaching of contaminants from the waste emplacement areas is considered in Section 7.1.6 of the Groundwater Assessment, which concludes that there would be would be negligible impacts to groundwater quality (either directly or via final pit voids) as a result of PAF material. Additional data relating to the outcomes of the Geochemistry Assessment (GEM, 2015) and key metal concentrations in mine water storages is also provided in Section 2.5 (Pages 30 to 33 and Tables 3 and 4) of the RTS.
9	Water quality impacts of the proposed project on Wilpinjong and Wollar Creeks are considered in the assessment documentation to be negligible: "with the implementation of management measures in the existing Wilpinjong Coal Mine Water Management Plan (Peabody, 2006a), the potential adverse effect of the [proposed] project on downstream water quality would be negligible" (EIS, p. 4-64). The Surface Water Assessment (EIS, App. D) does not provide adequate evidence to demonstrate the effectiveness of the existing strategies for managing impacts to surface water at the approved Wilpinjong Coal Mine, particularly in relation to potential metal contamination. For example: a. A surface water quality monitoring programme has been ongoing across the site since 2004, but surface water quality data for parameters other than EC, sulphate, pH and turbidity have not been provided. b. Measurement of metals was identified at a limited number of the surface water monitoring sites. For these sites, the frequency of monitoring was intermittent and the period of sampling was short. For example, metals were measured in two sites on Wilpinjong Creek and one site on Wollar Creek intermittently over an 18 month period from June 2004 to January 2006 and metals in Pit 2 west were monitored intermittently from January 2011 to September 2012 (EIS, App. D pp. 53–54). No data were provided. c. Limited water quality monitoring data were provided for water storages and tailings disposal storages (i.e. data were provided for pH, EC, and sulphate from pre-2013 and spot samples from 2015), and no data were provided for sediment dams (EIS, App. D, pp. 71-73), despite these locations being defined in the Surface Water Management and Monitoring Plan for the approved Wilpinjong Coal Mine (Peabody, 2006b) for monthly sampling.	WCPL provided a response to this comment in Section 2.5 (Page 34) of the RTS. In summary, WCPL's response is that: • Additional monitoring data for metals identified in the Geochemistry Assessment (GEM, 2015) is provided in Section 2.5 (Pages 30 to 33) of the RTS. This data supports the existing conclusions in the Surface Water Assessment (WRM Water and Environment, 2015) and the Geochemistry Assessment (GEM, 2015). • The RTS also presents additional monitoring data from Wilpinjong Creek, which supports the adequacy of the existing management measures implemented at the Wilpinjong Coal Mine. • Relevant water quality data is published annually in the Annual Environmental Management Reports/Annual Reviews in accordance with the Wilpinjong Coal Mine Project Approval (05-0021). • The Department has recently approved the Water Management Plan (and associated sub-plans) for the existing/approved Wilpinjong Coal Mine. The Water Management Plan was prepared in accordance with Project Approval (05-0021) and in consultation with DPI Water. These plans include relevant trigger levels and trigger action response plans based on the process outlined in ANZECC/ARMCANZ (2000). • The existing Wilpinjong Coal Mine Water Management Plan (and associated sub-plans) would be reviewed and revised to incorporate the Project subject to the conditions of any Development Consent for the Project.

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	d. The surface water quality data presented indicates a number of sites regularly exceed the ANZECC/ARMCANZ (2000) guideline trigger values for the protection of aquatic ecosystems and/or Primary Industries (Livestock Drinking Water), i.e. EC, turbidity, and sulphate (EIS, App. D, pp. 55–56). Local water quality guidelines and objectives were not developed and while baseline values were reported (for pH, EC, turbidity) (EIS, App. D, section 3.6.2), contextual information was not provided to explain how these values were derived. The information presented does not allow consideration of the suitability of the baseline data set and whether these exceedences reflect the existing environment or mining-related impacts. e. Data from nearby mining operations are not provided, despite the close proximity of the proposed project to Moolarben Coal Mine. These data would provide further contextual information on the upstream water quality of Wilpinjong Creek, and consideration of the potential impacts of the approved Wilpinjong Coal Mine in relation to those from nearby mines.	
10	The assessment concludes that potential changes to surface water flows (i.e. from catchment excision and loss of baseflow) in Wilpinjong Creek and Wollar Creek are minor when compared to the approved Wilpinjong Coal Mine (EIS, App. D, p. 149). These findings would be strengthened by the following: a. consideration of the cumulative reduction in catchment area over the operational period, including against each relevant sub-catchment and reductions associated with Moolarben Coal Mine; b. quantifying changes to flow regime from the proposed project (with particular regard to timing, duration and frequency) due to the combined impact of catchment excision, loss of baseflow, and regulated and uncontrolled discharges. While the assessment presents a flow frequency curve of the combined impact of estimated baseflow loss and maximum catchment excision (EIS, App. D, p. 149, Fig 8.5), further detail on the modelling (e.g. how discharges and changes to catchment area have been incorporated into the model) would enable consideration of the appropriateness of model outputs. The analysis should compare the proposed project, pre-mining condition, and effects of the approved Wilpinjong Coal Mine operations; c. subsequent assessment of potential downstream ecological impacts resulting from predicted changes to flow regime; and	Refer to response to Comment 3. In summary, WCPL's response is that: • Changes to flow regime were assessed in the Surface Water Assessment (WRM Water and Environment, 2015). • WRM Water and Environment (2015) concluded that the Project's incremental contribution to any potential cumulative impacts on surface water flow or availability are expected to be negligible. On this basis, further assessment of downstream effects on ecological impacts (i.e. beyond the assessment presented in the Aquatic Ecology Assessment, Appendix F of the EIS) is not considered to be warranted. Assessment of performance against the approved Wilpinjong Coal Mine's existing stream flow triggers (as detailed in the Water Management Plan and associated sub-plans) is presented annually in the Annual Environmental Management Reports/Annual Reviews in accordance with the Wilpinjong Coal Mine Project Approval (05-0021).

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	d. discussion of the approved Wilpinjong Coal Mine's existing stream flow triggers[1], including historical performance. [1] While the stream flow triggers were not discussed in the assessment documentation, the IESC notes these are articulated in the *Wilpinjong Coal Project Surface and Ground Water Response Plan* (Peabody, 2006c) and would expect these to be discussed as part of the assessment of the proposed project.	
11	The proponent did not undertake new flood studies for the proposed project as the proposed extension lies outside of the Wilpinjong Creek and Cumbo Creek 1 in 1,000 annual exceedance probability design flood extent (EIS, App. D, p. 75). While this may be a plausible approach, the assessment should discuss assumptions, limitations and applicability of the previous study.	As described in the EIS, there is no anecdotal evidence of the railway embankment to the north of the Project having been overtopped during the 1955 flood (largest flood in living memory). The previous flood study was conducted for the design of relevant flood protection infrastructure at the existing/approved Wilpinjong Coal Mine. The use of this previous study is considered appropriate, given the nature and proximity of Wilpinjong Creek to the Project open cut extensions, which are typically located further from Wilpinjong Creek than the existing/approved mine.
12	The water balance model for the proposed project is configured so as not to allow uncontrolled discharge of mine water from mine water storages; excess mine water is stored in mining pits instead (EIS, App. D, p. 134). However, the water balance modelling indicates that: the water management system is sensitive to climatic conditions (EIS, App. D, p. 127); discharges from sediment dams during the first 5 years of the proposed project, under wet and very wet conditions, are up to 75 ML/month and 390 ML/month respectively (EIS, App. D, p. 134); and 'significant quantities' of water will need to be stored in the pits (EIS, App. D, p. 128), which will cause disruption to operations. Sediment dams have also been used to store mine water in the past (EIS, App. D, p. 70). Considering these factors, the assessment could be improved by: a. quantification of impacts through solute balance modelling; and b. further assessment of the risk of discharge of mine-affected water and sediment-affected water, including how water stored in pits will be managed during periods of high intensity rainfall.	Consistent with EPA's recommendation, WCPL would apply to vary EPL 12425 to reflect the Project and this would include the sediment dams as relevant licensed discharge points (with appropriate dam sizing and discharge criteria that reflects the purpose of the sediment dams). Additional information regarding the operation of Project sediment dams is provided in Section 2.5 (Pages 34 and 35) of the RTS. On this basis, solute balance modelling is not considered warranted. The risk of discharge of mine-affected water and sediment-affected water is provided in the Surface Water Assessment (WRM Water and Environment, 2015). WRM Water and Environment (2015) indicates that there would be no off-site overflows from mine water storages under any modelled climatic conditions. Water being stored in open pits over the life of the Project (i.e. potential disruption to mining operations) is an operational risk to WCPL and not a potential environmental risk. It is noted that Wilpinjong Coal Mine operates multiple active areas and this would allow for mining to continue if water is required to be stored in another active area(s) for a period of time.

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		The management of mine affected water is also described in the approved Wilpinjong Coal Mine Water Management Plan. The existing Water Management Plan would be reviewed and revised to incorporate the Project subject to the conditions of any Development Consent for the Project.
13	While the assessment documentation includes a cumulative impact assessment for surface water, the scale of the assessment and approach of not quantifying the existing level of impact does not enable cumulative impacts to Wilpinjong and Wollar creeks to be considered. Given the level of existing and proposed development on Wilpinjong Creek a local scale quantitative assessment should be included.	Refer to response to Comment 3. Section 4.8.2 of the EIS summarises the impacts of the existing/approved Wilpinjong Coal Mine on Wilpinjong Creek. WRM Water and Environment (2015) concluded that the Project's incremental contribution to any potential cumulative impacts on surface water flow or availability are expected to be negligible.
14	No testing of overburden, interburden and coal reject materials for elemental enrichment and solubility was conducted for the approved Wilpinjong Coal Mine (EIS, App. K, p. 44). The Geochemistry Assessment (2015) for the proposed project (EIS, App. K) indicates enrichment of arsenic and selenium and solubility of molybdenum and selenium in some of the coal reject, interburden and overburden materials (EIS, App. K, pp. 34, 39–40, 44), and that certain waste rock materials would be potentially acid forming. Given these preliminary results the assessment should include the following to improve the assessment of potential impacts: a. A detailed description of the methodology of the solubility testing should be provided. The description provided (EIS, App. K, p. 23) was not adequate to provide confidence that the results predict the range of metals that may present a mobilisation risk. b. Additional solubility studies (e.g. over a range of pH and kinetic tests) should be conducted to better inform understanding of the risks associated with metal contamination from waste storage, disposal, handling and treatment. c. Results from solubility studies should be compared to the ANZECC/ARMCANZ (2000) water quality guidelines for ecosystem protection.	Refer to response to Comment 2. In summary, Section 2.5 (Pages 30 to 33 and Tables 3 and 4) of the RTS presents additional monitoring data for selenium (Se), molybdenum (Mo) and arsenic (As) (i.e. the key metals identified in the Geochemistry Assessment) as well as a comparison to relevant ANZECC/ARMCANZ (2000) water quality guidelines. The additional analysis in the RTS indicates: • With the exception of one measurement of Se from the CHPP Sediment Dam, Mo and Se concentrations in all mine water storages are less than relevant ANZECC/ARMCANZ (2000) guideline values and the National Health and Medical Research Council (NHMRC) (2011) human drinking water guideline values. • All but one of the As samples are below the NHMRC (2011) human drinking water guideline value and all but four are below the recommended water quality trigger value for 99% species protection in freshwater aquatic ecosystems (ANZECC and ARMCANZ, 2000). This supports the existing conclusions in the Surface Water Assessment (WRM Water and Environment, 2015) and the Geochemistry Assessment (GEM, 2015).

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15	The proponent's assessment of potential impacts to water-dependent assets would be improved by consistent classification of groundwater dependent ecosystems through the use of the following: a. identification of areas of shallow groundwater (less than 20 metres below ground level) and groundwater discharge overlaid with vegetation mapping to identify areas of potential groundwater dependency; b. techniques from the Australian GDE Toolbox (Richardson et al., 2011), applied to confirm groundwater use by vegetation and groundwater discharge to surface water bodies; and c. a desktop study (e.g. Eco Logical, 2015) to assess the likelihood of stygofauna presence. If stygofauna are likely to be present, a pilot study following WA EPA (2007) guidelines is recommended.	The assessment of potential impacts of the Project on groundwater dependent ecosystems (GDEs) has been undertaken in accordance with the *Risk Assessment Guidelines for Groundwater Dependent Ecosystems* (GDE guideline) (NOW, 2012) and has been informed by the following guidelines: • *National Atlas of Groundwater Dependent Ecosystems* (BoM, 2015); • *NSW State Groundwater Dependent Ecosystems Policy* (NSW Department of Land and Water Conservation, 2002); and • *Dependence of ecosystems on groundwater and its significance to Australia, Occasional Paper No. 12/98* (Hatton and Evans, 1998). In accordance with the GDE guideline, Wilpinjong Creek is considered to be a 'low value' GDE. The Project would present a low risk to Wilpinjong Creek (as defined in the GDE guideline) (Appendices E and F of the EIS). WCPL would continue to conduct water quality and flow monitoring in Wilpinjong Creek.

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16	No. The level of information describing avoidance, mitigation and reduction strategies within the assessment documentation is limited. The proponent considers that the existing strategies associated with the approved Wilpinjong Coal Mine are adequate. However, data to support the adequacy of existing strategies were not presented so the effectiveness of these strategies is not able to be assessed.	Refer to WCPL's response to Comment 9. WCPL provided a response to this comment in Section 2.5 (Page 34) of the RTS. In summary, WCPL's response is that: • The Department has recently approved the Water Management Plan (and associated sub-plans) for the existing/approved Wilpinjong Coal Mine. The Water Management Plan was prepared in accordance with Project Approval (05-0021) and in consultation with DPI Water. These plans include relevant trigger levels and trigger action response plans based on the process outlined in ANZECC/ARMCANZ (2000). • Relevant water quality data is published annually in the Annual Environmental Management Reports/Annual Reviews in accordance with the Wilpinjong Coal Mine Project Approval (05-0021). • The RTS also presents additional monitoring data from Wilpinjong Creek, which supports the adequacy of the existing management measures implemented at the Wilpinjong Coal Mine. • The existing Wilpinjong Coal Mine Water Management Plan would be reviewed and revised to incorporate the Project subject to the conditions of any Development Consent for the Project.
17	The existing measures are implemented through management plans which have not been included within the assessment documentation. Without these plans, it is not possible to determine how effective the measures would be at mitigating or reducing impacts from the proposed project.	WCPL note that the Department has recently approved a number of updated environmental management plans for the existing/approved Wilpinjong Coal Mine. These management plans are available on the WCPL website: http://www.peabodyenergy.com/content/427/australia-mining/new-south-wales/wilpinjong-mine/approvals-plans-and-reports-wilpinjong-mine In addition, relevant water quality data and consideration against the relevant Water Management Plan triggers is published annually in the Annual Environmental Management Reports/Annual Reviews in accordance with the Wilpinjong Coal Mine Project Approval (05-0021).

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18	As identified in Paragraph 9, the information presented within the assessment documentation is not sufficient to demonstrate the effectiveness of existing strategies to avoid, mitigate and reduce potential impacts to surface water quality. This would be improved by inclusion of: a. Background information and description of sampling methodologies. For example, groundwater metals data should include contextual information such as when the data were collected to enable assessment of whether this is representative of baseline conditions. Baseline data were not available for assessment. b. Baseline data and data collected during the approved Wilpinjong Coal Mine operations. This would enable consideration of the effectiveness of the existing strategies to manage potentially acid forming waste rock, and the adequacy of the water management system. c. Metals analysis for surface water on site (creeks, dams and other storages) and drainage lines including Wilpinjong Creek.	Refer to WCPL's response to Comments 9 and 16.
19	Mine water discharges from the Wilpinjong Coal Mine may contain untreated mine affected water mixed with permeate from the reverse osmosis plant while remaining within water quality discharge criteria (EIS, App. D, p. 82). Discharge water quality criteria only include EC, oil and grease, pH and total suspended solids (EIS, App. D, p. 74) so it is possible that other contaminants are being released from the site through this pathway without detection. Water quality data in the assessment documentation is not sufficient for this risk to be assessed.	WCPL provided a response to this comment in Section 2.5 (Pages 30 to 33 and Tables 3 and 4) of the RTS. The response in the RTS presented additional metals analysis for key mine water storages at the existing/approved Wilpinjong Coal Mine. In summary, WCPL's response is that WRM Water and Environment (2015) considered the potential impacts of discharge in terms of the element enrichments and solubilities identified in the Geochemistry Assessment (GEM, 2015) and determined that the risk of elevated dissolved solids and other contaminants impacting downstream waters is low. The additional data provided in the RTS supports the conclusion in WRM Water and Environment (2015).
20	Yes. To determine the need for additional strategies to avoid, mitigate or reduce potential impacts on water-related resources the IESC suggests development of a monitoring and management regime (further details in the response to Question 4). Should additional strategies be required, results from the monitoring programme should be used to inform adaptive management measures entailing ongoing waste management, water management, and mine closure strategies.	IESC's recommendation for development of a monitoring and management regime is consistent with WCPL's proposed approach, described in Section 4.8.3 of the EIS as follows: *The existing Water Management Plan would be reviewed and revised to incorporate the Project subject to the conditions of any Development Consent for the Project.*

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21	Management trigger values should be used to inform adaptive management approaches, with Trigger Action Response Plans (TARPs) developed to apply appropriate avoidance, mitigation and reduction strategies. Adaptive management approaches should be applied (but not limited) to the following areas: a. Waste management: Results from regular monitoring of trace metals in surface water (e.g. creeks, dams and other storages on site) and groundwater (including back-filled areas, tailings and rejects emplacement areas) should be used to inform ongoing waste management strategies, such as the placement of potentially acid forming waste material and shape of the final landform. These data can also demonstrate the effectiveness of the mine water management system in preventing contamination of surrounding creeks (i.e. via surface water runoff, discharges, or groundwater seepage) both during and post mining. b. Water management system: Results from the surface water monitoring programme should be used to demonstrate the effectiveness of the mine water management system in the prevention of contamination of surrounding creeks (i.e. via surface water runoff, discharges, or groundwater seepage) both during and post operations. Management triggers and associated responses for key storages within the water management system (e.g. sediment dams) should be developed. Management responses could include increasing the pumping capacity to divert water to the mine water management system instead of being released from the site, resizing/introducing additional temporary sediment dams, and the use of flocculating agents or other treatment as necessary. c. Contaminant management: implement the tiered approach in the National Water Quality Management Strategy (refer to the decision tree at Figure 3.4.2 of ANZECC/ARMCANZ, 2000) for any contaminant in mine related discharges that exceeds its water quality guideline for ecosystem protection (ANZECC/ARMCANZ, 2000). This could include contaminant speciation or ecotoxicity testing. d. Mine closure: As more data become available during operations, surface water and groundwater modelling and predictions for the final voids should be reviewed and updated. These outputs should inform ongoing refinement of the final landform.	Refer to WCPL's response to Comments 9 and 16. The Wilpinjong Coal Mine Water Management Plan was approved by the Department in May 2016. The Surface and Groundwater Response Plan (Appendix 7 of the Water Management Plan) includes Trigger Action Response Plans developed to apply appropriate management and mitigation measures to the existing Wilpinjong Coal Mine. As described in Section 4.8.3 of the EIS: *The existing Water Management Plan would be reviewed and revised to incorporate the Project subject to the conditions of any Development Consent for the Project.* A Final Void Management Plan would be developed as a component of the Mine Closure Plan in advance of mine closure in consultation with the DRE and other relevant authorities. Potential impacts of the final voids on water resources has been considered in the Surface Water Assessment (WRM Water and Environment, 2015) and Groundwater Assessment (HydroSimulations, 2015). In summary: • The Project would have no measurable incremental impact on flow in Wilpinjong Creek. • Maximum void water levels are expected to be well below the crest of the void. • Incremental baseflow impacts to Wilpinjong Creek due to the Project would be negligible. • The Project is predicted to have negligible impact on water quality in Wilpinjong Creek. Consistent with EPA's recommendation, WCPL would apply to vary EPL 12425 to reflect the Project and this would include the sediment dams as relevant licensed discharge points (with appropriate dam sizing and discharge criteria that reflects the purpose of the sediment dams).

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	e. Third party impacts: The State-owned Wollar Public School bore is expected to experience groundwater drawdown by greater than 2 metres. Triggers for remedial action should be developed and the bore should be monitored regularly for trigger exceedance.	Make good provisions for the Wollar Public School bore are described in the EIS and Section 2.5 of the RTS (Page 29). WCPL met with the Wollar Public School in April 2016 to discuss the groundwater drawdown predictions at the school bore and the future availability of make good provisions, should these be required. The school representative indicated general satisfaction with the information provided, and no particular concerns were raised.
22	If additional water-related assets are identified as a result of further surveys (as recommended in Paragraph 15), predicted impacts should be reassessed in light of the additional data collected, and appropriate avoidance and mitigation strategies proposed.	Refer to WCPL's response to Comment 15. No further surveys are considered warranted. Refer to WCPL's response to Comment 16 regarding existing trigger action response plans and associated mitigation measures in the Water Management Plan.
23	Yes. Recommended additional monitoring and management (see response to Question 3, above) measures include: a. determination of appropriate local water quality guidelines and objectives; b. spatial and temporal expansion of the surface water and groundwater monitoring networks, including event-based monitoring of surface water quality; c. ongoing refinement of the proposed final landform based on information collected during operations; and d. continued aquatic ecology surveys.	The Wilpinjong Coal Mine Water Management Plan was approved by the Department in May 2016. In summary, WCPL's response is that: • The Surface Water Management and Monitoring Plan (Appendix 5 of the Water Management Plan) and Groundwater Monitoring Program (Appendix 6 of the Water Management Plan) provide local water quality triggers for surface water and groundwater. • Recommendations for ongoing surface water and groundwater monitoring are presented in Section 4.7.3 and 4.8.3 of the EIS. • The final landform would be refined and subject to approval by DRE as part of a Mine Closure Plan for the Project. • The annual stream health monitoring program for the existing approved Wilpinjong Coal Mine is described in the Surface Water Management and Monitoring Plan (Appendix 5 of the Water Management Plan) and would continue for the Project, subject to the requirements of any Development Consent for the Project.

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24	The IESC considers surface water and groundwater monitoring presented as part of the Water Management Plan (Peabody, 2006a) should be consistent with the National Water Quality Management Strategy (ANZECC/ARMCANZ, 2000), and could include determination of appropriate local water quality guidelines and objectives (for physical and chemicals stressors, and relevant toxicants). The assessment documentation compares surface water quality data for EC, turbidity and pH to baseline values (EIS, App. D, section 3.6.2), but details surrounding the baseline data sets for both surface water and groundwater were lacking. Additional relevant parameters such as metals should also be included.	Relevant water quality data is published annually in the Annual Environmental Management Reports/Annual Reviews in accordance with the Wilpinjong Coal Mine Project Approval (05-0021). This includes comparison to trigger levels developed in accordance with ANZECC/ARMCANZ (2000). Refer to WCPL's response to Comments 16 and 19 regarding the Water Management Plan and additional analysis of metal concentrations in mine water storages presented in the RTS.
25	The Water Management Plan (Peabody, 2006a) should be updated to reflect the proposed project, and potential local water quality guidelines and objectives. Further, the plan should define the adaptive management approach, including management triggers and appropriate management responses in the event that management triggers and/or water quality objectives are exceeded. This could include ecotoxicity testing or further aquatic ecology surveys to determine impact. This should build upon the approach described in the Wilpinjong Coal Project Surface and Ground Water Response Plan (Peabody, 2006c).	An updated Wilpinjong Coal Mine Water Management Plan was approved by the Department in May 2016. The Surface Water Management and Monitoring Plan (Appendix 5 of the Water Management Plan) and Groundwater Monitoring Program (Appendix 6 of the Water Management Plan) provide local water quality triggers for surface water and groundwater. The Surface and Groundwater Response Plan (Appendix 7 of the Water Management Plan) includes Trigger Action Response Plans developed to apply appropriate management and mitigation measures to the existing Wilpinjong Coal Mine. The annual stream health monitoring program for the existing approved Wilpinjong Coal Mine is described in the Surface Water Management and Monitoring Plan (Appendix 5 of the Water Management Plan).

ID No.	IESC Comment	Response
26	The proponent states that the existing groundwater monitoring network is considered adequate to assess groundwater levels and quality, and for groundwater model calibration and verification (EIS, p. 4-53). While monitoring sites show reasonable spatial distribution and represent the main stratigraphic units, monitoring could be improved by the following: a. Additional bores should be installed outside the pit expansion areas to the southwest, south, and southeast of the proposed project site because most of the bores in these areas are located in the pit expansion areas and will need to be removed once mining commences. b. Two bores were installed in spoil emplacement areas: GWf1 in Pit 1 and GWf2 in Pit 5. Continued monitoring of these bores is recommended. Such data are useful in providing information on the recharge rates through spoil, spoil permeabilities, and to validate modelling assumptions and predictions. In the future, it would be useful to install and monitor an additional bore in the spoil/final landform north of the proposed Pit 8 final void (assuming that GWc31 will be removed by mining). c. The proponent states that the tailings storage facility for the approved Wilpinjong Coal Mine located in Pit 2 is no longer active (EIS, App. C, p. 88), but indicates that water and tailings for the proposed project will be treated within Pit 2 using a tailings filter press (EIS, App. D, p. 82). Monitoring of PZ20 and PZ21 (located north of Pit 2) could be reinstated, as recommended in the assessment documentation (EIS, p 4-53), to monitor any potential seepage impacts. The reinstatement of some of the other piezometers (PZ01-28) already installed upstream and downstream of the expected tailings treatment area should also be considered. d. Groundwater monitoring stations could be established in the backfilled pits to monitor water quality as the groundwater level reaches equilibrium, provide an early indication of potential water quality impacts to groundwater and associated surface waters, and demonstrate performance of existing waste management practices. e. Molybdenum could be added to the groundwater monitoring programme, as recommended in the assessment documentation (EIS, p. 91), as there is a risk that molybdenum may be mobilised from waste rock under near neutral conditions (EIS, App. C, p. 88).	As identified by the IESC, WCPL has committed to the following additional groundwater monitoring: • Continued monitoring of the two bores installed in spoil emplacement areas: (GWf1 in Pit 1 and GWf2 in Pit 5). • Reinstatement of monitoring at PZ20 and PZ21. • Establishment of groundwater monitoring bores in backfilled open cuts to monitor water quality as the groundwater level reaches equilibrium. • Inclusion of Mo in the groundwater monitoring programme. Additional monitoring sites outside the extension areas are not considered necessary as these areas are already adequately covered by the existing monitoring sites. As described in Section 4.8.3 of the EIS: *The existing Water Management Plan would be reviewed and revised to incorporate the Project subject to the conditions of any Development Consent for the Project.*

ID No.	IESC Comment	Response
27	The existing surface water monitoring programme, included in the Surface Water Management and Monitoring Plan (SWMMP) (Peabody, 2006b), is proposed to be retained and revised for the proposed project. This plan is not described explicitly in the assessment documentation (e.g. parameters and frequency). The SWMMP accessed by the IESC from the proponent's website is dated March 2006. When updating the SWMMP to incorporate the proposed project, the IESC suggests the following improvements: a. Metals monitoring on a monthly and event-based basis should be included for the existing surface water monitoring sites, and storages, tailings disposal storages, and sediment dams. This should cover arsenic, molybdenum and total alkalinity/acidity, as noted in the assessment documentation (EIS, p. 4-68), and any metals that pose a risk of mobilisation, as identified in existing solubility studies (and any additional studies as recommended in Paragraph 14). b. The most upstream site on Wilpinjong River (WIL-U2) is very close to the Project Boundary, and the proposed extension extends to this area. Monitoring stations further upstream would assist in characterising upstream water quality, the ongoing influence of the proposed project, and impacts of nearby operations. Additional downstream monitoring points on Wollar Creek would also assist in identifying impacts to waters within the downstream Goulburn River National Park. Data sharing with nearby operations may help to address this deficiency.	The Wilpinjong Coal Mine Water Management Plan was approved by the Department in May 2016. The Surface Water Management and Monitoring Plan (Appendix 5 of the Water Management Plan) establishes the following monitoring frequencies: • Monthly monitoring of field pH and EC, turbidity and sulfate at existing surface water monitoring sites. • Quarterly monitoring of metals (including alkalinity/acidity, As and Mo) at existing surface water monitoring sites. • Routine monitoring of water usage, volumes of water stored on site and volumes of water discharged via EPL 12425. Monthly monitoring of metals is not considered to be warranted (i.e. quarterly is considered to be sufficient) for the existing surface water monitoring sites. Monitoring of sediment dams would be undertaken in accordance with EPL 12425 (as varied to incorporate the Project). As identified by the IESC, additional monitoring upstream of the Wilpinjong Coal Mine can be satisfied using data published by the Moolarben Coal Complex for monitoring sites SW15, SW16, SW17 and SW18. Therefore, no additional sites are proposed to be established by WCPL for the Project. WOL 1 is already located downstream of the confluence of Wilpinjong Creek and Wollar Creek. Additional downstream monitoring sites are therefore not considered to be warranted. As described in Section 4.8.3 of the EIS: *The existing Water Management Plan would be reviewed and revised to incorporate the Project subject to the conditions of any Development Consent for the Project.*

ID No.	IESC Comment	Response
28	In relation to the proposed final voids and final landform, the following should continue to be assessed and revised as data is collected during operations: a. assessment of legacy issues and risks to water resources as a result of the final landform, including potential risks to regional hydrogeological units and surface watercourses caused by potential leakage, loss of baseflow, or connectivity (e.g. flood ingress and overflow) as a result of the final voids. This should include quantification of the inflow/outflow of the backfilled pits and the final void predicted to act as a flow-through system, including the volume, travel times and salt loads of seepage and risk of overflow. b. design of a post-mining groundwater and surface water monitoring network to provide a indication of groundwater and surface water quality.	A Final Void Management Plan would be developed as a component of the Mine Closure Plan in advance of mine closure in consultation with the DRE and other relevant authorities. Potential impacts of the final voids on water resources has been considered in the Surface Water Assessment (WRM Water and Environment, 2015) and Groundwater Assessment (HydroSimulations, 2015). In summary: • The Project would have no measurable incremental impact on flow in Wilpinjong Creek. • Maximum void water levels are expected to be well below the crest of the void. • Incremental baseflow impacts to Wilpinjong Creek due to the Project would be negligible. • The Project is predicted to have negligible impact on water quality in Wilpinjong Creek. Relinquishment of rehabilitated land would require meeting relevant mining lease and Development Consent conditions and the approval of the relevant Minister(s).
29	Stream health and aquatic macroinvertebrate surveys were conducted annually between 2011 and 2014 (EIS, App. F, p.14). It is not stated in the assessment documentation whether aquatic ecology monitoring will continue on the site. Monitoring should continue on an annual basis to identify potential cumulative impacts in the Wilpinjong and Wollar Creek catchments, especially focussing on how extended low-flow periods might affect biota (e.g. atyid shrimps) and other ecological aspects.	The annual stream health monitoring program for the existing approved Wilpinjong Coal Mine is ongoing and is described in the Surface Water Management and Monitoring Plan (Appendix 5 of the Water Management Plan). The existing Water Management Plan would be reviewed and revised to incorporate the Project subject to the conditions of any Development Consent for the Project.
30	The Northern Sydney Basin Bioregion, which includes the Hunter subregion, has been identified as a Bioregional Assessment priority region. Data and relevant information from the proposed project should be made accessible to this Bioregional Assessment and related research projects.	Comment noted. WCPL monitoring data is presented in the Annual Environmental Management Reports/Annual Reviews that are publicly available on the Peabody website.

REFERENCES

Australasian Groundwater and Environmental (2005) *Wilpinjong Coal Project Environmental Impact Statement – Bore Census.*

Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.*

Geo-Environmental Management (2015) *Wilpinjong Extension Project Environmental Geochemistry Assessment (2015) of Overburden, Interburden and Coal Rejects.*

HydroSimulations (2015) *Wilpinjong Extension Project Groundwater Assessment.*

New South Wales Government (2012) *Aquifer Interference Policy.*

WRM Water & Environment (2015) *Wilpinjong Extension Project Surface Water Assessment.*

Department of Primary Industries

OUT16/28624

Mr Stephen Shoesmith
Resource Assessments
NSW Department of Planning and Environment
GPO Box 39
SYDNEY NSW 2001

Stephen.Shoesmith@planning.nsw.gov.au

Dear Mr Shoesmith

Wilpinjong Extension Project (*SSD 6764*)
Comment on the Independent Expert Science Committee Concerns

I refer to your email dated 15 July 2016 to the Department of Primary Industries in respect to the above matter.

Comment by DPI Water

DPI Water supports the recommendations of the IESC and considers that these comments should be considered by the proponent and incorporated into the updated Water Management Plan to improve its effectiveness.

The IESC have made comments regarding the groundwater numerical model and the proponent has made the commitment to undertake additional core sampling and testing to increase the understanding of aquifer properties inclusive of effective porosity and horizontal and vertical hydraulic conductivity. The proponents RTS indicates this additional information will contribute into future reviews of the groundwater model and additionally the result of the groundwater monitoring program will inform periodic refinement of the numerical model, the outcomes of which will be reported in the Annual Review as appropriate. DPI Water considers it appropriate for the proponent to advise the frequency that they will update and run the numerical model and also when they will undertake this to include additional monitoring and core sampling information. Additionally it is recommended that when this information is presented in the Annual Review that a table regarding impacts on predicted water take from each water source is also included.

DPI Water also supports the recommendation made by IESC to increase the number and frequency of surface water quality monitoring sites. DPI Water considers that this recommendation be reflected in the updated Water Management Plan in conjunction with further analysis regarding appropriate trigger criteria.

DPI Water in the letter dated 15 July 2016 recommended that the updated Water Management Plan include a commitment to undertake further statistical analysis of the drivers of salinity increase in Wilpinjong Creek downstream of the activity. It should be considered that a geomorphic framework to guide salt suppression actions and to promote

recovery of linked pools and geomorphic features in Wilpinjong Creek should be considered and the opportunities for rehabilitation of this water course considered and reflected in the relevant plan.

It is noted that the proponent has referred to existing approved plans in addressing comments by the IESC. It is recommended that the proponent make a commitment to update the Water Management Plan post approval and that this update occur with consideration to the recommendations made by the IESC.

For further enquiries please contact Hannah Grogan, Water Regulation Officer (Newcastle) on (02) 4904 2516 or Hannah.Grogan@dpi.nsw.gov.au.

Yours sincerely

Graeme White
Manager Assessments
3 August 2016

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

	(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*.

Wilpinjong Extension Project
Reconciliation of IESC Comments (September 2016)

ID No.	IESC Comment	Response
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.	Comment noted.

ID No.	IESC Comment	Response
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.	Further consideration and responses to IESC's detailed comments is provided below.
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	The existing Wilpinjong Coal Mine Water Management Plan (and associated sub-plans) would be reviewed and revised to incorporate the Project subject to the conditions of any Development Consent for the Project. Consistent with the IESC's recommendation, the updated Water Management Plan would include provisions for monthly and event based monitoring of a downstream monitoring point on both Wilpinjong Creek and Wollar Creek (e.g. WILD and WOL1). The monitoring data presented in WCPL's previous response to the IESC related to data from on-site water storages. The 95% species protection in freshwater aquatic ecosystems value (ANZECC and ARMCANZ, 2000) was applied to this data to provide a reference point for operational water on-site, not the quality of water that is discharged to Wilpinjong Creek. Notwithstanding, application of the 95% guideline value to water quality in Wilpinjong Creek is considered appropriate given • The *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC and ARMCANZ, 2000) define "rural streams receiving runoff from land disturbed to varying degrees by grazing or pastoralism" as slightly to moderately disturbed systems. • The *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC and ARMCANZ, 2000) state that the 95% protection level trigger values should apply to most ecosystems that could be classified as slightly–moderately disturbed. Given the typically poor baseline condition of Wilpinjong Creek due to existing agricultural practices (Bio-Analysis, 2015), the use of lower protection level trigger values could also be considered warranted. Consistent with the IESC's recommendation, the Project updated Water Management Plan would include appropriate trigger values for select metals.

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	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.	Consistent with the IESC's recommendation, WCPL would undertake further geochemical testing to confirm the solubility of arsenic, selenium and molybdenum in waste rock and tailings over the life of the mine. If the additional testwork indicates any additional water management measures are required, this may also trigger a revision of the relevant components of the Water Management Plan.
	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.	Consistent with the IESC's recommendation, the Project updated Water Management Plan would include appropriate trigger values for select metals.
	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).	The trigger values described in the Water Management Plan have been derived in accordance with the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC and ARMCANZ, 2000) using the 20th and 80th percentiles of the existing baseline data. Therefore the existing baseline dataset correspondingly includes natural variation that results in values outside of the trigger values that have been derived from this dataset. Consistent with the Water Management Plan, any exceedance of the trigger values (defined as the recorded value at the downstream monitoring site exceeding the upstream site and exceeding the trigger values on three consecutive monitoring rounds) would result in implementation of the relevant Trigger Action Response Plan (TARP). The outcomes of any TARP would being be reported in the Annual Review.
	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.	Consistent with the IESC's recommendation, the updated Water Management Plan would include additional information regarding the timing and seasonality of peak and low flows.

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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 be 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.	Consistent with the IESC's recommendation, WCPL would resume monitoring at four piezometers in the vicinity of the existing Tailings Dams (PZ20, PZ21, a third site down-gradient of TD1 and TD2 and a fourth site down-gradient of TD3). The screened intervals of the relevant piezometers would be described in the Project updated Water Management Plan. Monitoring of these four piezometers would include analysis of relevant metals (e.g. arsenic, molybdenum and selenium) against appropriate groundwater trigger values, developed in accordance with *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC and ARMCANZ, 2000).

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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.	Consistent with the IESC's recommendation, future reviews and updates of the groundwater model would: • Include where relevant the application of uncertainty analysis to groundwater model outputs. • Focus on the refinement of model results around the Pit 8 area (acknowledging that make good provisions for the Wollar School bore have already been agreed with the school, should these be required in future).

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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.	Consistent with the IESC's recommendation, the Final Void Management Plan would include data collected during operations to determine potential risks to water resources, characterise the hydrological environment of the backfilled open cut pits and final voids and include a post-mining water quality monitoring network (i.e. to be monitored until the relevant mining leases are relinquished).
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.	Consistent with the IESC's recommendation, the Project updated Water Management Plan would include consideration of potential impacts on groundwater dependent ecosystems.
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.	Comment noted. WCPL monitoring data is presented in the Annual Environmental Management Reports/Annual Reviews that are publicly available on the Peabody website.

REFERENCES

Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.*