# Advice to decision maker on coal mining project

## IESC 2025-156: Boggabri Coal Mine Modification 10 (EPBC 2024/09887) – Expansion

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| **Requesting agency** | The Australian Government Department of Climate Change, Energy, the Environment and Water |
| **Date of request** | 10 June 2025 |
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| **Advice stage** | Assessment |

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

The IESC was requested by the Australian Government Department of Climate Change, Energy, the Environment and Water to provide advice on the Boggabri Coal Pty Ltd's Boggabri Coal Mine Modification 10 in New South Wales. This document provides the IESC's advice in response to the requesting agency's questions. These questions are directed at matters specific to the project to be considered during the requesting agency's assessment process. This advice draws upon the available assessment documentation, data and methodologies, together with the expert deliberations of the IESC, and is assessed against the IESC Information Guidelines (IESC 2024).

### Summary

The Boggabri Coal Mine Modification 10 Project (the 'project') is a proposed extension to the existing Boggabri Coal Mine (BCM) open-cut pit, located 15 kilometres northeast of Boggabri, New South Wales (Xenith 2025, p. 1). The project will disturb 85 hectares (ha) of land while continuing to mine northwest (Xenith 2025, p. 18). It will extract an additional 30 million tonnes (Mt) of Run-of-Mine (ROM) thermal, semi-soft coking and pulverised coal injection (PCI) coal (Xenith 2025, p. 46) and extend the life of the mine from 2036 to 2040 (Xenith 2025, p. 8).

The project will continue to utilise the current infrastructure which includes a coal handling and processing plant (CHPP), ancillary infrastructure, power and communications infrastructure, and a water management system (Xenith 2025, p. 3). The water management system will continue to use existing sediment and mine-affected water dams (noting Mine Water Dam 5 will be mined out under Modification 8), with the Block Dam potentially being decommissioned in 2028 to allow for mining northwards (EMM

2025, Figures 5.1 and 5.2, pp. 34 – 35), and potential establishment of a new sediment dam in 2031 (EMM 2025, Figure 5.3, p. 36).

The project is in the Namoi River catchment in the Murray-Darling Basin. The headwaters of Nagero and Back creeks are within the proposed project area, with the downstream creek line already captured into BCM as part of current operations (EMM 2025, p. 51). The upstream creek lines of Nagero and Back creeks will be mined out under Modification 10, with any rainfall-runoff being captured into the water management system (EMM 2025, p. 51).

The proponent has identified a Threatened Ecological Community (TEC) south of BCM, which has the potential to rely on groundwater in the alluvium along Nagero Creek (WSP 2025b, pp. 17 – 18). The proponent has also identified groundwater-dependent ecosystems (GDEs) regionally with one known and one high-potential aquatic GDE, and 10 high-potential terrestrial GDEs (WSP 2025b, p. 34). Species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and their habitats occur within the project area, including koala (*Phascolarctos cinereus*) (WSP 2025a, Table 8.2, p. 108) and *Vincetoxicum forsteri* (presented in the documentation as *Tylophora linearis*) (WSP 2025a, Table 8.3, p. 109).

Key potential impacts from this project are:

- clearing of 85 ha of native vegetation, some of which is used by EPBC Act-listed species such as koala;
- permanent removal of the upper reaches of Back and Nagero creeks and their riparian zones;
- reduction of groundwater access by terrestrial vegetation within the Nagero Creek Study Area from additional cumulative drawdown; and
- cumulative impacts from the proposed project and current operations, as well as regional impacts from the BCM and surrounding mines, in particular due to increased groundwater drawdown in the coal seams.

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

- The results of the groundwater model scenarios should be presented more clearly. A comparison between scenario 8 (cumulative proposed – excluding BCM) and scenario 6 (cumulative proposed) should be done to assess the specific impact from Modification 10 should all other proposed mining be approved. The potentiometric heads for each key aquifer should be presented separately as the combined water table maps are misleading.
- Climate-change scenarios should be incorporated into the water balance modelling to account for any potential changes in future rainfall when estimating the inflows, on-site storage and discharge volumes.
- Monitoring and management plans should be updated to place a greater emphasis on assessing ‘leading indicators’ to trigger actions to prevent or minimise impacts.

**Context**

The project is a proposed expansion of Boggabri Coal Mine (BCM) to allow mining to continue to the northwest of the existing mining complex. BCM lies 15 km northeast of Boggabri in New South Wales within the Gunnedah Basin and will extract an additional 30 Mt of ROM thermal, coking and PCI coal over the extended 4-year life of the mine (Xenith 2025, p. 8). It will use existing infrastructure, including the

CHPP, power and communication infrastructure, ancillary infrastructure and water management system (Xenith 2025, p. 3).

The project is in the Namoi River catchment, with the headwaters of two creeks within the project area. These headwaters will be removed as mining moves northwards (EMM 2025, p. 51). The proponent has also identified GDEs regionally with one known and one high-potential aquatic, and 10 high-potential terrestrial GDEs (WSP 2025b, p. 34), and one locally: a TEC of Poplar Box Grassy Woodland on Alluvial Plains, which could be using groundwater in the alluvium (WSP 2025b, pp. 17 – 18).

Groundwater is present within three main water-bearing units: alluvial sediments, the Maules Creek Formation and the Boggabri Volcanics. All three units outcrop locally, and the regional water table is formed from combination of all three units. Groundwater generally flows from east to west towards the Namoi River and then north / northwest along the Namoi River alignment (AGE 2025, p. 60).

The existing Maules Creek Coal Mine and Tarrawonga Coal Mine are immediately adjacent north and south of the BCM, respectively. The Vickery Extension coal mine is approximately 14 km to the south, and the Narrabri Underground Mine is approximately 27 km north-northwest of the proposed project area (Xenith 2025, Figure 1, p. 2).

A total of 85 ha of vegetation is planned to be cleared as a part of the project. This includes habitat for two EPBC Act-listed species: 84.48 ha of koala habitat (WSP 2025a, Table 8.2, p. 108) and 1.29 ha of *Vincetoxicum forsteri* (*Tylophora linearis*) habitat (WSP 2025a, Table 8.3, p. 109). The proponent has assessed the required credits for offsetting the clearance of this vegetation (WSP 2025a, p. 132).

**Response to questions**

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

Question 1: To what extent can decision makers have confidence in the predictions of potential impacts on water resources provided in the modification report, including in regard to surface water quality, groundwater drawdown, and potential impacts on groundwater dependent ecosystems and other users?

a) Has an appropriate model been selected and used by the Applicant? Are the assumptions used in the model reasonable, appropriately conservative and appropriately justified?

b) Has the model been calibrated with sufficient monitoring data to provide meaningful predictions, including worst-case impacts on surface and groundwater resources?

c) Has the model been appropriately conceptualised?

d) Has appropriate sensitivity and uncertainty analyses been undertaken, including consideration of the potential effects of climate change?

e) Have the surface and groundwater assessments sufficiently assessed surface and groundwater interactions?

1. Decision makers can be confident about the proponent's predictions of the project's potential impacts on water resources, with respect to surface water quality, groundwater drawdown, and potential impacts on GDEs and other users. The assessment built upon the IESC's previous advice (2021-125), guidelines and explanatory notes, resulting in a suitably detailed environmental impact statement. The following text answers the five sub-questions (a-e) specifically and includes several recommendations for further improvements of this assessment.

<u>Groundwater</u>

2. Potential groundwater impacts of the project were assessed using the Boggabri, Tarrawonga and Maules Creek (BTM) Complex's revised AGE (2025) MODFLOW-USG (MFUSG) model. MFUSG is appropriate modelling software for developing a groundwater model of this scale. The assumptions and limitations (AGE 2025, App. F, p. 5) were appropriate, and justified given the model objectives.

3. The groundwater model was appropriately calibrated. An automated calibration process was adopted and used 247 monitoring points and 24,258 observations (collected between 2006 and 2024) to match groundwater levels measured during previous mining activities. Half of the observations were from the alluvial layers (AGE 2025, App. F p. 33), which enables meaningful predictionsgiven that most receptors of potential impacts are related to the alluvial sediments. Worst case predictions were not explicitly made but the uncertainty analysis (Paragraph 6) indicates the possibilities for cumulative scenarios where all proposed mining occurs.

4. A detailed conceptual hydrogeological model has been developed (AGE 2025, Section 7) and summarised (AGE 2025, Section 7.13, p. 95). The numerical model is consistent with the conceptualisation. Where existing features (e.g., the Conomos Fault) have not yet been fully characterised by data (Paragraph 25), model parameterisation has been informed through the calibration process.

5. A traditional assessment of sensitivity was not undertaken. The model peer reviewer considered that this was appropriate given the calibration method used (AGE 2025, App. G, p. 10). Nevertheless, information regarding parameter sensitivity would have been generated through the calibration process. This information is valuable to understand which parameters are important to modelled outcomes and should be reported.

6. The uncertainty analysis was undertaken through two steps: a Monte-Carlo approach to produce drawdown probability surfaces, and a data space inversion (DSI) approach to assess uncertainty in value predictions (AGE 2025, App. F, p. 108). The peer reviewer cautioned the use of the DSI until its practical credibility has been tested, particularly through comparison to traditional methods (AGE 2025, App. G, p. 12). The IESC considers that the uncertainty analyses are appropriate for this project.

7. The proponent has taken a simplified approach to the potential effects of climate change in the groundwater model. This is considered adequate by the IESC for this project. The estimation of long-term impacts by the groundwater model is also dependent on the water balance model (Paragraph 9) for the final void and its climate change assumptions.

8. Assessments for the Namoi River and Nagero Creek are sufficient to characterise surface and groundwater interactions (Paragraph 13). Surface and groundwater interactions are detailed for the Namoi River (AGE 2025, Section 7.7.1, p. 71) and Nagero Creek (AGE 2025, Section 7.7.2, p. 72). Assessment of potential interactions for Bollol Creek have also been undertaken (refer to AGE 2025, Section 7.7.3, p. 75), but the results are not clear and should be articulated. The presence of groundwater within 2 m of the ground surface immediately south of the Tarrawonga Coal Mine may suggest that groundwater discharges in some areas along the length of Bollol Creek (Paragraph 13). Potential surface and groundwater interactions for Maules Creek and Back Creek should be discussed in the modification report given potential cumulative impacts affecting these areas.

<u>Surface Water</u>

9. The water balance model (GoldSim) selected by the proponent is an industry standard, with all assumptions appropriately justified in the discussion. However, the proponent has chosen a median selection with historical climatic data as a conservative approach and does not present a range of possible outcomes. Multiple relevant Bureau of Meteorology stations (EMM 2025, Table 3.1, p.10) and Scientific Information for Land Owners (SILO) data (EMM 2025, p. 11) along with historical

climatic data are used for confirming correct inputs of the model. The proponent used multiple climate change projections (EMM 2025, Appendix B, Figure B.1, p. 2) for the final void model; however, they have not used these models for the water balance. As historical and current climate conditions may not be representative when the proposed project is expected to operate (approximately 2031 to 2040 (EMM 2025, Figure 5.3, p. 36)), the proponent should also use the already modelled climate change projections (EMM 2025, Appendix B, Figure B.1, p. 2) in the water balance modelling. In addition, the proponent should incorporate representative climate change scenarios (e.g., RCP8.5).

10. The predicted potential impacts on surface water and surface water quality have been adequately identified within the project report (Xenith 2025) and associated appendix (EMM 2025). The proposed project will remove the remaining creek lines of Nagero and Back creeks between BCM and Maules Creek Coal Mine. Once the creek lines are removed, rainfall-runoff will be captured into BCM's current water management system to be used on site. As downstream reaches of these creek lines are already captured by current operations (EMM 2025, p. 51), changes to flows and sediment transport from removal of these headwaters will not propagate downstream. Where required, excess water will be discharged into the remaining Nagero Creek south of BCM under the currently approved environment protection license (EPL). The proponent has also developed water quality objectives based on ANZG (2018) guidelines for the water management system (EMM 2025, Table 4.6, pp. 30 - 31). The proponent should manage discharges within these water quality objectives in addition to the EPL conditions, and any exceedances should be reported.

Question 2: Does the modification report provide an adequate assessment of cumulative impacts to surface and groundwater resources during the mining operations and during the post-mining recovery phase? Do these assessments adequately consider surface and groundwater interactions?

Groundwater

11. The project report provides an adequate assessment of cumulative impacts to groundwater resources. The groundwater modelling considers 15 scenarios: 14 with variations of mining activity and a null case without mining against which impacts can be assessed (AGE 2025, Table 8.1, p. 100). Of these, 3 primary scenarios were used to assess cumulative impacts: scenario 2 (all cumulative approved), scenario 6 (all cumulative proposed) and scenario 15 (cumulative approved and BCM Modification 10 proposed). However, the use of different combinations of these scenarios in different sections of the report resulted in a complex narrative regarding potential impacts that may occur. It is not always clearly documented what scenario or combination of scenarios is being presented in each figure. The report discusses predicted increases in cumulative impacts between scenario 2 and scenario 6 (AGE 2025, Section 9.2.1, pp. 107-111). The report also discusses predicted increases in impact specifically from the project (comparing scenario 14 (approved BCM only) and scenario 11 (proposed BCM only)) (AGE 2025, Section 9.2.2, pp. 112-116). The proponent should include a comparison between scenario 8 (cumulative proposed – excluding BCM) and scenario 6 to enable an assessment of the specific impact from the project should all other proposed mining be approved.

12. A visual comparison between the approved and proposed cumulative drawdown in the alluvium presented in Figure 9.5 (AGE 2025, Section 9.2.1, p. 108) suggests that the project will contribute to increases in the footprint of drawdown in the alluvium below Maules Creek and in the Barbers Lagoon area. This increase in drawdown is not reflected in Figure 9.9 (AGE 2025, Section 9.2.2, p. 111) which presents drawdown from existing BCM and proposed project activities in isolation. Based on this, considering impacts solely attributable to the project in isolation of impacts from other activities in the region may present a misleading picture of the potential cumulative impacts of the project. The IESC suggests that Figure 9.5b (AGE 2025, p. 108) is a more reliable representation of the likely changes in groundwater drawdown in response to the project and current approved activities and should be used as the basis for assessing potential impacts to GDEs and other users.

13. The assessments adequately consider surface and groundwater interactions. The groundwater modelling does not predict that cumulative groundwater drawdown will reach the Namoi River. It is not clear whether groundwater is connected to Bollol Creek (Paragraph 8); however, groundwater drawdown (at the water table) is not predicted to extend below Bollol Creek (AGE 2025, App. F, Figure F64, p. 90).

14. The post-closure water table contours plot potentiometric heads for multiple disconnected aquifers (e.g., Figure 9.1 to 9.4), incorrectly implying inflow from the regolith into the pits. The potentiometric head for each key aquifer should be presented separately.

15. The closure scenarios appear to demonstrate that the Maules Creek Coal Mine pit void influences recovery of groundwater elevations across the BTM complex area. This possibility and its implications for the surface and groundwater resources during the post-mining recovery phase should be discussed.

Surface Water

16. The surface water assessment adequately addresses the potential cumulative impacts of the project. The remaining headwaters of Nagero and Back creeks will be removed, and runoff will be captured into the water management system. The proponent states that this will have minimal cumulative impact because these headwaters are already disconnected from their downstream reaches by current operations (Paragraph 10). Captured surface water will be stored in sediment dams for use on-site or discharged into Nagero Creek under the EPL.

Groundwater-Dependent Ecosystems

17. The Groundwater Impact Assessment (WSP 2025b) identified one known and one high-potential aquatic GDE and 10 high-potential terrestrial GDEs within a regional study boundary (WSP 2025b, pp. 9-10). Four different TECs have been located within the regional study boundaries, with two of the TECs within the Nagero Creek Study Area (WSP 2025b, Table 3.5, pp. 17-18). Groundwater levels within the alluvial plain were typically between 7 - 10 metres below ground level (mbgl) (WSP 2025b, p. 12) and groundwater modelling does not predict any incremental drawdown in the Nagero Creek alluvium specifically due to the project (WSP 2025b, p. 48). However, the likely impacts of the project on the Nagero Creek Study Area alluvium to the southwest of the project area are discussed in terms of cumulative drawdown (WSP 2025b, p. 48), suggesting further project-specific impacts to surrounding groundwater levels.

18. The GDE assessment attempts to differentiate between groundwater-dependent vegetation and vegetation relying on surface water. PCT101 (Poplar Box – Yellow Box – Western Grey Box grassy woodland) is identified as the only Plant Community Type (PCT) that has a proportional dependence on groundwater within the Nagero Creek Study Area (WSP 2025b, Table 4.1, p.28). This PCT corresponds to the TEC Poplar Box Grassy Woodland on Alluvial Plains (WSP 2025b, p. 56). The proponent expressed doubts that PCT101 is reliant on groundwater based on the results of soil-adjusted vegetation index (SAVI) mapping with rainfall analysis, and the opportunistic nature of how PCT101 accesses groundwater (WSP 2025b, p. 29). However, SAVI mapping cannot establish a lack of reliance of the TEC on groundwater, and the root systems of poplar box are estimated as having a depth between 12.6 – 26.6 mbgl (WSP 2025b, p. 29) which is below the typical groundwater level. The proponent should collect further evidence (e.g. using methods in Doody et al. 2019) to confirm that this TEC and other terrestrial GDEs in the cumulative drawdown zone are not facultatively reliant on groundwater access, especially during extended dry periods.

19. The predicted drawdown in the alluvium is variously described across its extent as being a maximum of 1.3 m, greater than 2 m, 3.8 m, and a maximum of 5.1 m (WSP 2025b, p. 48). The cumulative drawdown within the alluvial ‘tongue’ (located south of the project area) is projected to be between

0.7 – 5.1 m within the Nagero Creek Study Area (WSP 2025b, p. 48). The risk assessment prepared by the proponent indicates a high risk due to 'Predicted reduction in groundwater levels beyond seasonal variation' (WSP 2025b, p. 50), yet PCT101 is predicted to have a low risk of canopy change due to reduction in groundwater access for a deep-rooted species (WSP 2025b, p. 51). A clear rationale supported by more field evidence (Paragraph 17) for these determinations should be included in the proponent's risk assessment of cumulative impacts and be complemented by suitable monitoring strategies to assess 'leading indicators' (Paragraph 20) for these GDEs.

Question 3: Does the modification report provide reasonable strategies to effectively avoid, mitigate or minimise the likelihood, extent and significance of impacts, including cumulative impacts, to significant water-related resources?

Groundwater

20. The project report outlines several strategies to mitigate potential impacts to groundwater quality, extractive groundwater users, and GDEs. However, timely adoption of these strategies depends heavily on appropriate choice and reliable monitoring of suitable 'leading indicators'. 'Leading indicators' are ones that change before the subject of interest (in this case, impacts on significant water-related resources) and can inform preventative actions, in contrast with 'lagging indicators' that measure the subject of interest after it has changed (Stevenson et al. 2021). The proponent should place greater emphasis on monitoring suitable 'leading indicators' to trigger prompt adoption of strategies to avoid, mitigate or minimise the likelihood, extent and significance of impacts (also see Doody et al. (2019: 53) who recommend using hydrological variables as early-warning indicators of impending potential impacts of groundwater changes on GDEs).

21. The hydrogeological conceptual model (AGE 2025, Section 7) does not discuss natural or background metals concentrations in groundwater. The geochemical assessment (RGS 2025) indicates that some metals may leach from overburden, interburden and/or coal seam floor and roof material (which is used as backfill) at concentrations exceeding ANZG freshwater (95%) guidelines. The groundwater quality monitoring data should be presented and discussed to inform potential risks from changes in groundwater quality. Potential impacts on the groundwater and surface water environments (including proposed pit lakes on the adjacent mines) from this should be assessed and managed.

Surface Water

22. Sampling for water quality should be conducted prior to discharge to ensure compliance with the water quality objectives as identified in Table 4.6 (EMM 2025, pp. 30 – 31), in addition to EPL requirements (Paragraph 10) to further strengthen mitigation of potential downstream contamination from discharges.

Groundwater-Dependent Ecosystems

23. Terrestrial GDE monitoring programs within the Nagero Creek Study Area appear to be sufficient to monitor vegetation health in coordination within the existing Water Management Plan (Xenith 2025, p. 101). Previous conditional monitoring programs are relevant to continued terrestrial GDE assessment; however, no specific actions have been included for the Nagero Creek Study Area, beyond the broad risk management actions listed in Table 5.2 (WSP 2025b, p. 52) that target terrestrial vegetation health, and there are no specific management methods aimed towards the alluvium. Given the predicted differential drawdown across the alluvium (Paragraph 17) and the assessment that 'Predicted reduction in groundwater levels beyond seasonal variation' pose a high risk to terrestrial GDEs (WSP 2025b, p. 50), the proponent should specify what leading indicators will be monitored near terrestrial GDEs in the Nagero Creek Study Area, how often and where these will

be monitored, and what mitigation or management responses will be initiated if declines in the water table pose a risk to these GDEs, especially PCT101.

24. Although drawdown is predicted in the alluvial 'tongue' along Nagero Creek where stygofauna have been collected, the proponent does not specify what impacts are predicted on stygofauna. For example, Table 5.1 (WSP 2025b) only discusses terrestrial GDEs and ignores stygofauna even though their presence is why the alluvial aquifer is considered of 'high ecological value'. Given the known presence of stygofauna in this alluvium, the proponent should provide a full assessment of potential impacts of the project-specific and cumulative changes in groundwater levels and water quality on stygofauna, what monitoring of leading indicators is planned and where, and what mitigation options may be needed.

Question 4: Are there any additional mitigation, monitoring, management or offsetting measures that should be considered by decision makers to address the residual impacts of the project on water resources?

25. The IESC supports the proposed additions to the monitoring bore network (AGE 2025, p.136), including testing to understand the hydraulic properties of the Conomos Fault. These data would provide further confidence in the proponent's representation in the model of the barrier-conduit behaviour (Murray and Power 2021) along this fault.

26. Three terrestrial GDE monitoring sites are located within the Nagero Creek Study Area (WSP 2025b, Figure 6.1, p. 60). However, the western edge of the area does not contain monitoring sites that correspond with the location of a patch of Poplar Box Grassy Woodland on Alluvial Plains TEC (noting that the predicted drawdown in this area is approximately 0.3 m). An additional site monitoring appropriate leading indicators in this location would provide timely warning if the drawdown is greater than predicted and would indicate potential residual impacts to this TEC that may require mitigation or offsetting measures.

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| **Date of advice** | 28 July 2025 |
| **Source documentation provided to the IESC for the formulation of this advice** | Xenith 2025. *Boggabri Coal Mine Modification 10 Modification Report*. Prepared by Xenith Consulting Pty Ltd on behalf of Boggabri Coal Operations Pty Ltd, 30 May 2025. |
| **References cited within the IESC's advice** | ANZG 2018. *Australian and New Zealand guidelines for fresh and marine water quality*. Australian and New Zealand Governments and Australian state and territory governments. Available [online]: https://www.waterquality.gov.au/anz-guidelines accessed 11 July 2025.<br><br>Australasian Groundwater & Environmental Consultants (AGE) 2025. *Groundwater Impact Assessment Boggabri Coal Mine Modification 10*. Prepared by Australasian Groundwater & Environmental Consultants for Xenith Consulting Pty Ltd on behalf of Boggabri Coal Operations Pty Ltd, 27 May 2025.<br><br>Doody TM, Hancock PJ, Pritchard JL 2019. *Information Guidelines Explanatory Note: Assessing groundwater-dependent ecosystems.* Report prepared for the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development through the Department of the Environment and Energy, Commonwealth of Australia 2019. Available [online]: Information Guidelines Explanatory Note - Assessing groundwater-dependent ecosystems \| iesc accessed 23 July 2025 |

EMM 2025. *Boggabri Coal Mine Modification 10 - Surface Water Impact Assessment*. Prepared by EMM for Xenith Consulting Pty Ltd on behalf of Boggabri Coal Operations Pty Ltd, 23 May 2025.

IESC 2021. Advice to decision maker on coal mining project. IESC 2021-125: Boggabri Coal Mine Modification 8 (EPBC 2021/8875) – Expansion [Online]. Published 5 September 2021. Available [online]:Advice to decision maker on coal mining project IESC 2021-125: Boggabri Coal Mine Modification 8 (EPBC 2021/8875, MP 09_0182 MOD 8) –Expansion accessed 23 July 2025.

IESC 2024. *Information Guidelines for proponents preparing coal seam gas and large coal mining development proposals.* Available [online]: Information guidelines for proponents preparing coal seam gas and large coal mining development proposals | iesc accessed 23 July 2025.

Murray TA and Power WL 2021. *Information Guidelines Explanatory Note: Characterisation and modelling of geological fault zones.* Report prepared for the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development through the Department of Agriculture, Water and the Environment, Commonwealth of Australia 2021. Available [online]: Information Guidelines Explanatory Note - Characterisation and modelling of geological fault zones | iesc accessed 27 July 2025.

RGS 2025. *Technical Report Geochemical Assessment Boggabri Coal Mine Modification 10*. Prepared by RGS Environmental Consultants Pty Ltd for Xenith Consulting Pty Ltd on behalf of Boggabri Coal Operations Pty Ltd, 25 March 2025.

Stevenson SL, Watermeyer K, Caggiano G, Fulton EA, Ferrier S, Nicholson E. 2021. Matching biodiversity indicators to policy needs. *Conservation Biology*, 35, 522-532.

WSP 2025a. *Biodiversity Development Assessment Report Boggabri Coal Mine MOD 10*. Prepared by WSP for Xenith Consulting Pty Ltd on behalf of Boggabri Coal Operations Pty Ltd, 29 May 2025.

WSP 2025b. *Boggabri Coal Mine Modification Groundwater Dependent Ecosystem Assessment*. Prepared by WSP for Xenith Consulting Pty Ltd on behalf of Boggabri Coal Operations Pty Ltd, 28 May 2025.