

TAHMOOR COAL MINE LONGWALLS W3-W4 EXTRACTION PLAN

Reasons for Approval

In granting a conditional approval of Tahmoor Coal's Extraction Plan application, the following matters have been carefully considered.

1. PROJECT APPROVAL STATUS AND PREVIOUS APPROVALS

- The Tahmoor Coal Mine operates under several development consents, the earliest of which dates back to 1975. There are two key State consents for the mine, being:
 - DA 57/93: granted in September 1994 by the Land and Environmental Court of New South Wales, which permitted the extension of mining operations to the north of the then mined area; and
 - DA 67/98: granted in February 1999 by the then Minister for Urban Affairs and Planning, which permitted mining in areas of Tahmoor North that were excluded from DA 57/93. This approval has since been modified on five occasions.
- The approved project involves extraction of coal until 2022, at a rate of up to 3 million tonnes of run-of-mine coal a year (Mtpa). Coal is approved to be transported by rail to Port Kembla Coal Terminal, or occasionally Newcastle Port Waratah, for delivery to both Australian and International markets.
- Tahmoor Coal Mine also has approval to transport up to 50,000 tonnes per annum of coal by road within the Wollondilly Shire or in circumstances where rail transport is unavailable.
- DA 67/98 requires an Extraction Plan to be approved by the Secretary before mining in specific longwalls commences.
- On 8 November 2019, the Secretary's nominee granted conditional approval for extraction of Longwalls West 1 (W1) and West 2 (W2) in the Western Domain of the Tahmoor Coal Mine (refer to **Figure 1**). Mining of these panels was completed in June 2021.

2. ASSESSMENT BACKGROUND

- The Western Domain mine plan comprises a series of four longwall panels, longwalls W1 to W4 (refer to **Figure 1**), and are the final panels to be mined under the Tahmoor North development consents.
- Mining in the Western Domain originally proposed a series of six longwall panels directly under Matthews, Cedar and Stonequarry Creeks. A review of this mine plan resulted in the re-orientation of longwalls to avoid directly undermining high-order creeks and a reduction in the number of longwalls.
- Mining related impacts to creeks have previously occurred at Tahmoor Coal Mine where creeks have been directly undermined by longwalls. Impacts includes fracturing of rockbars in Redbank Creek and Myrtle Creek resulting in a loss of water from the pools retained by these rockbars.
- While the revised layout avoids directly undermining several high-order creeks, including Cedar (5th order), Stonequarry (5th order) and Matthews Creeks (4th order), the northern end of longwall W3 is still in close proximity to Stonequarry Creek and some surface impacts are still expected.
- A large and culturally significant controlling rockbar (SR17) is located on Stonequarry Creek approximately 100 metres from the northern commencing end of longwall W3. The rockbar contains approximately 120 grinding grooves that are considered highly culturally significant and rare in the region. Rockbar SR17 retains a large permanent pool approximately 670 metres in length.

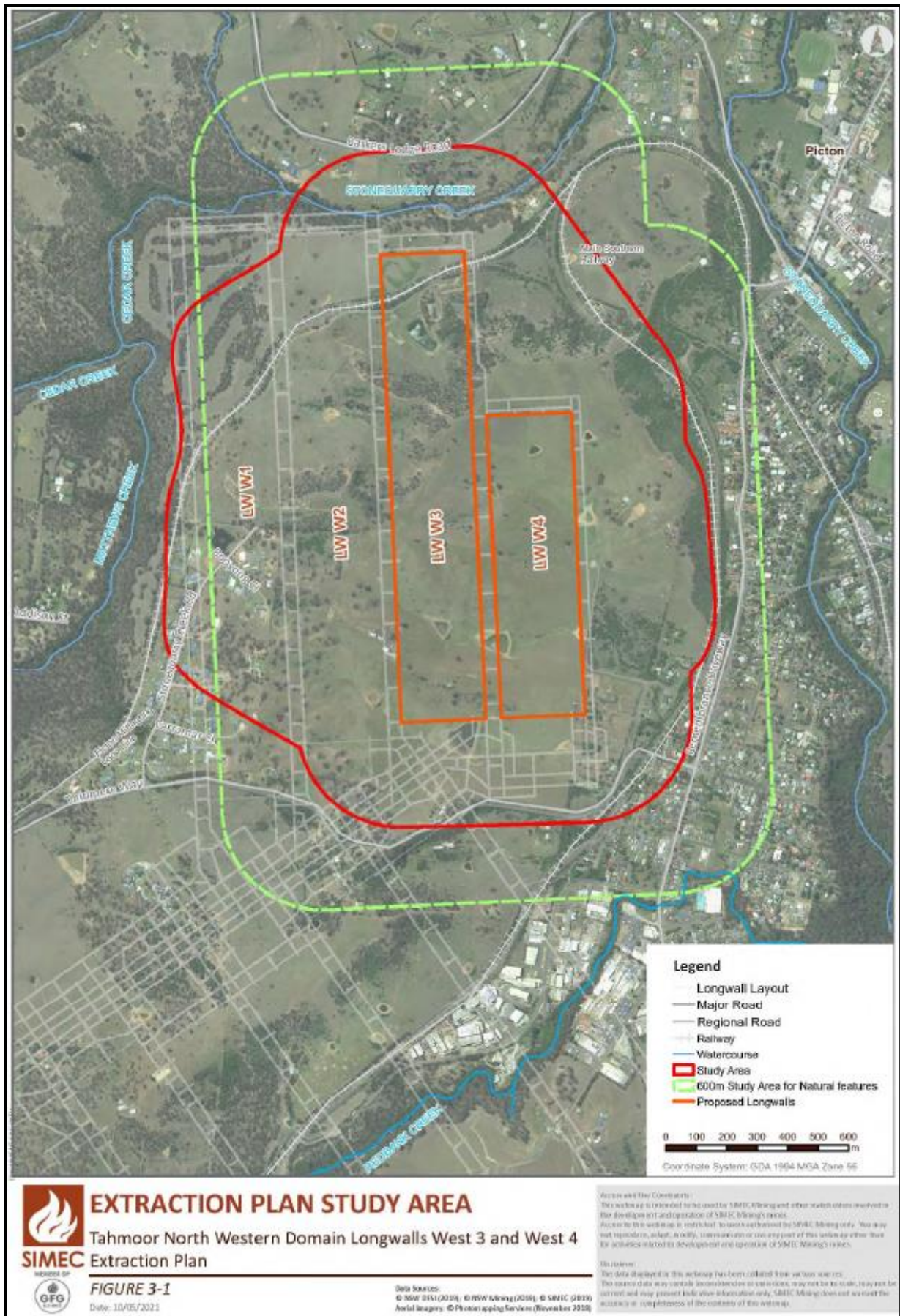


Figure 1: Proposed longwall layout

3. OBSERVED SUBSIDENCE IMPACTS FROM MINING OF W1 AND W2

- Mining of longwalls W1 and W2 was completed in June 2021.
- Observed subsidence due to the mining of longwalls W1 and W2 was approximately 20% less than predicted. This scenario is not typical for Tahmoor Coal Mine.
- No perceptible valley closure movements have been measured across Rockbar SR17 at the completion of longwall W2.
- No visible evidence of impacts to creek rockbar controls have been observed within Cedar, Matthews or Stonequarry Creeks from the mining of longwalls W1 and W2.
- Impacts to pool water levels and recession rates were observed in Cedar Creek during the mining of W1 and W2. Water levels have since recovered in many of the impacted pools, however impacts persist in one pool, CR14. These impacts are considered likely to be due to mining-induced groundwater depressurisation, and, while not observed, mining induced fracturing within pool CR14.
- There is no evidence to date of connective fracturing between the surface and mine workings from the mining of W1 and W2.

4. EXTRACTION PLAN APPLICATION

- On 10 May 2021, the Department received an Extraction Plan for longwalls W3 and W4 in the Western Domain mining area of the Tahmoor Coal Mine (refer to **Figure 1**).
- The Extraction Plan was submitted in accordance with Schedule 2, condition 13H of DA 67/98.
- The proposed layout for longwalls W3 and W4 is within the footprint of the Limit of Subsidence as assessed for the 1999 development consent, as subsequently modified.
- The longwall panels would be 283 metres wide (including first workings) for W3 and 285 metres wide for W4. The length of the longwall panels would be 1,544 metres for W3 and 996 metres for W4. The proposed mining height is 2.15 metres, with the Bulli Coal Seam typically having a thickness of 2.0 to 2.1 metres in this area. The depth of cover ranges from 480 metres to 540 metres.
- The total recoverable reserve from the extraction area is approximately 2.5 million tonnes of coal and the panels are expected to take 13 months to extract, once longwalling begins.
- During the Department's assessment of the Extraction Plan, revisions were made to the Extraction Plan and a number of management plans supporting the Extraction Plan. The revised plans considered by the Department in this determination include:
 - Extraction Plan (Revision 2);
 - Master TARP (Revision 3);
 - Water Management Plan (Revision 2);
 - Heritage Management Plan (Revision 2); and
 - Stonequarry Creek Rockbar Management Plan (Revision 7)

5. CONSIDERATION BY AGENCIES

- The Department sought comments from relevant State agencies, including the Department's Biodiversity and Conservation Division (BCD), the Natural Resources Access Regulator (NRAR), Heritage NSW – Aboriginal Cultural Heritage (ACH), Heritage Council of NSW, Resources Regulator and Division of Resources and Geoscience.
- The Department also sought comments from Wollondilly Shire Council (Council), Subsidence Advisory NSW (SA NSW), the Australian Rail Track Corporation and the Office of National Rail Safety Regulator.
- The Department considered the following to be key issues by agencies:
 - BCD and ACH raised concern regarding the setback distance of W3 from Stonequarry Creek and the rock bar which contains an Aboriginal heritage site consisting of 120 grinding grooves.
 - Resources Regulator requested further consideration of potential subsidence impacts to the Picton Rail Tunnel and Rail Viaduct, noting knowledge around subsidence risks to railway

tunnels and bridges in NSW is limited. The Resources Regulator requested further information regarding the proposed risk management strategies for the tunnel and viaduct and the feasibility of the timely implementation of risk control measures in an operational rail corridor where access is limited.

- NRAR raised concern regarding existing issues related to water licensing, which are separate to the assessment of this extraction plan.
- Council raised general concern regarding potential impacts to surface and groundwater resources.
- On 22 July 2021 and 29 July 2021 the Applicant provided a response to agency submissions. These comments were provided to BCD, Resources Regulator and Council for any residual comment.
- Resources Regulator confirmed on 1 September that they had no further comment. Council provided no further comment.
- BCD provided a further response dated 13 August 2021 recommending that:
 - the setback distance of LW W3 from Stonequarry Creek be increased to reduce the potential impacts of fracturing and water loss from mining;
 - the water monitoring program incorporate a before-after-control-impact (BACI) framework; and
 - a management response plan is required.
- These matters were referred to the Independent Advisory Panel for Underground Mining for advice and the Applicant subsequently submitted the Stonequarry Creek Rockbar Management Plan (SCRMP).
- Heritage NSW confirmed on 13 September 2021 their support for adherence to the Stonequarry Creek Rockbar Management Plan to protect the cultural values of the grinding groove site.

6. INDEPENDENT ADVISORY PANEL FOR UNDERGROUND MINING

- The Independent Advisory Panel for Underground Mining (the Panel) has been established to provide the Department and the Independent Planning Commission of NSW (IPC) with technical advice relating to the assessment and management of subsidence impacts associated with underground mining across NSW.
- The Department requested advice from the Panel in relation to the proposed Extraction Plan, including in relation to the scale and likelihood of impacts to key surface features, the setback distance of W3 from Stonequarry Creek, proposed monitoring and trigger, action, response procedures.
- The Panel sought further information from the applicant on 29 July, 2, 25 and 31 August and 6 September 2021. The Panel met with the applicant and the applicant's subsidence experts on 30 July 2021, 12 August and 27 August 2021. The applicant's heritage experts also attended the 12 August 2021 meeting.
- The Applicant submitted a number of responses to the Panel during August and September, as noted in the Panel advice. This included a new management plan for Rockbar SR17.
- The Panel's final response, dated September 2021, is considered below and provided as **Attachment 1**.

7. KEY ISSUES

7.1 *Aboriginal Cultural Heritage*

- A substantial axe grinding groove site (AHIMS site 52-2-2068) is located approximately 100 metres from the northern starting position of LW W3. The site comprises 120 grinding grooves across three separate clusters on Rockbar SR17 in the bed of Stonequarry Creek. The site is rare and of high cultural and archaeological significance in the region.
- Protection of this highly significant cultural heritage site from mining-related impacts is a priority for the Department and for registered Aboriginal parties (RAPs) associated with the project.

Consequently, the site is afforded a high level of protection under the existing development consent, requiring Tahmoor to achieve the following performance measures for the site:

- negligible subsidence impacts or environment consequences, and
- negligible loss of heritage value.
- The submitted Extraction Plan identified the potential for some fracturing of Rockbar SR17. While the likelihood of this fracturing was assessed as low by the Applicant's subsidence consultants, this raised concerns for the Department about the ability of the Applicant to achieve the required performance measures for the grinding groove site.
- The Department requested advice from the Panel as to whether the setback of LW W3 from Stonequarry Creek was adequate to achieve the performance measures from the heritage site.
- On 3 August 2021, the Panel provided preliminary advice that based on the information in the Extraction Plan, the setback was inadequate to ensure negligible impact on the grinding groove site.
- In response, the Applicant noted that longwall equipment was ready to be installed at the LW W3 face and that changing the starting position would result in an extended stand-down of the majority of its workforce of 575 people with significant economic consequences for the mine.
- Instead, the Applicant has proposed a management strategy based on the original starting position of LW W3. The strategy involved a strict trigger action response plan that would stop mining at very low levels of subsidence movements across the rockbar. The strategy is supported by an extensive monitoring program and is presented in a new management plan, referred to as the SCRMP.

Potential impacts

- Based on the information provided in the Extraction Plan, the Department considers that, in the absence of any control measures, there is an unacceptable risk of fracturing of Rockbar SR17 and of exceeding the performance measures for the grinding groove site.
- Similar concerns were expressed by the Panel following their initial review of the Extraction Plan. This resulted in the Applicant developing a strict management strategy designed to achieve the negligible impact threshold for the grinding groove site. The strategy has been designed to detect any potential adverse impacts on the rockbar, prior to any damage occurring to the grinding groove site or the surrounding rockbar. Further details of the proposed strategy are discussed below.
- If implemented effectively, the Department agrees that mining can be managed to achieve the negligible impact threshold for the grinding groove site.
- The Department notes that the Applicant has sought to quantify the probability of the proposed mining exceeding the negligible impact performance measure for the grinding groove site. The Panel has reviewed the probability analysis and does not endorse the methodology. The Department has therefore not taken the probability assessment into consideration in its decision.

Stonequarry Creek Rockbar Management Plan

- Tahmoor Coal's proposed management strategy for Rockbar SR17 is outlined in the SCRMP.
- The plan has been refined by the Applicant following multiple engagements with the Panel.
- In developing the plan, the Applicant's heritage experts (EMM) also consulted with RAPs and Heritage NSW to define thresholds of impact that would be considered to exceed the negligible impact performance measures for the site. The thresholds reflect the differing heritage values associated with the grinding grooves themselves, and those associated with the broader archaeological and cultural landscape across the rockbar as a whole.
- For the discrete Aboriginal grinding groove features, the performance measure would be exceeded if there was a visually perceptible subsidence impact such as fracturing through a grinding groove. For the remainder of Rockbar SR17, the performance measure would be exceeded if there were multiple visually perceptible fracturing to a level comparable to existing naturally caused examples, or a single visually perceptible crack to a level distinctly more severe than existing naturally occurring fracturing on the rockbar.
- The plan proposes an extensive monitoring network that is capable of identifying very small changes in ground movements across the rockbar in near real-time with a high degree of accuracy. It utilises a range of monitoring methods and measures several different parameters.

- A trigger action response plan (TARP) has been developed that requires longwall operations to stop once low levels of subsidence movements are exceeded.
- The TARP can be triggered by any one of a number of monitoring parameters with the following control measures initiated as subsidence movements increase:
 - The Blue level TARP triggers a review of monitoring data by an expert Technical Committee, who will make recommendations for any additional monitoring or management required.
 - The Yellow level TARP triggers stopping of the longwall to allow detailed review by the Technical Committee. The committee will recommend whether to recommence or relocate longwall operations, based on a review of data trends, observations and consultation with RAPs.
 - The Red level TARP triggers stopping and relocation of longwall operations to a position recommended by the Technical Committee.
- The Applicant has appointed a Technical Committee to review monitoring data, advise on trends in the data and make recommendations for actions under the TARP. Following engagement with the Panel, the Applicant has proposed appointment of a suitably qualified and experienced independent expert to the Technical Committee.
- A suitable highly credentialed candidate has been nominated by the Applicant. The Department considers that this role provides important independent oversight to the recommendations made by the Technical Committee.
- The proposed monitoring and TARP requirements were developed in close consultation with the Panel and provide some of the strictest controls on an underground mining operation in NSW for the protection of a cultural heritage site.

Panel advice

- In its advice to the Department dated September 2021 (**Attachment 1**), the panel provided the following advice in relation to the effectiveness of the SCRMP in managing impacts on Rockbar SR17 and associated grinding groove site:

The Management Plan adopts a standard Trigger Action Response Plan (TARP) approach, which at higher TARP levels can lead to a pause, and potentially stopping of longwall extraction. The TARP approach has been developed through several iterations of discussion and information exchange between the Applicant and the Panel, and now incorporates a matrix system of critical parameters and threshold triggers for each parameter – any one of which can move the rockbar assessment through the different TARP levels from the initial green and blue stages into the more critical higher yellow and red levels. The Panel accepts and in fact strongly supports a process whereby the performance of all parameters against the nominated trigger levels are reviewed collectively. However, it is important to reinforce that the actual process that moves the rockbar management from one TARP level to the next, can be triggered by an exceedance of any one of the multiple sets of triggering parameters, without the need for an exceedance on other parameters.

The Panel is now satisfied with Version 6 of the Management Plan for SR17, which incorporates the proposed TARP model (also as Version 6 and Appendix A of the Management Plan) and associated monitoring regime and proposed monitoring frequency – recognising that it requires a high level of precision measurements, frequent surveys and analysis and regular review by the proposed Technical and Steering Committees. Any failure to adhere to all these aspects of the Management Plan could severely jeopardise the ability to stay within the “negligible impact” criterion.
- The Panel maintains some residual concerns regarding the structural stability of the rockbar and how this might influence the response of the rockbar to subsidence movements. The Panel has recommended that an independent structural geological assessment of the rockbar be completed and submitted before the extraction of LW W3 has retreated more than 150 metres.
- The Department has recommended a condition to this effect, including a requirement for the Applicant’s Technical Committee to recommend any necessary amendments to the SCRMP TARP arising from this assessment.
- The Panel has also recommended that following a Yellow TARP trigger the Applicant must seek the approval of the Secretary to:
 - recommence longwall operations; and

- if it is deemed necessary to relocate longwall operations, for the new starting position of the longwall.
- The Department has carefully considered this recommendation and notes the following:
 - Detailed TARP procedures have been developed in consultation with the Panel to guide actions to cease and recommence longwall operations. The Panel is satisfied with these procedures.
 - The Secretary would likely need to seek the advice of the Panel in relation to such an application.
 - Involving the Secretary and the Panel in the TARP process has the potential to create procedural issues, particularly from a compliance perspective should the Department approve that mining recommence and a non-compliance occurs.
 - If a Yellow TARP is triggered, the recommendation of the Technical Committee will be referred to the Department at the same time as referral to the Steering Committee.
 - In the event that the Department disagrees with the action recommended by the Applicant's Steering Committee following a Yellow TARP trigger, the Department has powers under the *Environmental Planning and Assessment Act 1979* (EP&A Act) to direct the Applicant to take alternative action.
 - The Technical Committee includes an independent qualified geotechnical engineer/ subsidence expert to provide independent oversight over the Committee's recommendations.
- Following consideration of the above, the Department has adopted the Panel's recommendation in part. A condition has been recommended requiring the Applicant seek the approval of the Secretary for the new starting position of the longwall following a Yellow or Red TARP trigger.
- However, to avoid potential procedural issues, and with consideration of the powers available to the Department under the EP&A Act, the approval of the Secretary to recommence mining following a Yellow TARP trigger has not been recommended. Rather, the Department can direct the applicant to cease longwall mining based on its review of reports. The onus is on the Applicant to ensure that it complies with its consent and performance measures.

Conclusions and recommendations

- The Department acknowledges that the SCRMP TARP has been developed to protect the cultural values of the grinding groove site. The plan was developed in consultation with the Panel and includes some of the strictest monitoring requirements and triggers for underground mining in NSW, including stopping mining at very low levels of subsidence movements.
- The Applicant has consulted with RAPs and Heritage NSW during preparation of the SCRMP. The Department has considered the views of the RAPs, in particular their opposition to the starting position of LW W3 due to the risk of impacts to the grinding groove site. Ensuring that these risks are reduced to an acceptable level has been a focus of the Department and the Panel in its review of the SCRMP.
- The Department considers that if the SCRMP is implemented effectively, extraction of LW W3-W4 can be managed to achieve the negligible impact threshold for the grinding groove site and Rockbar SR17, with negligible impact to the cultural heritage values of the site.
- This position is supported by the advice from the Panel and Heritage NSW.

7.2 Natural Features

Stonequarry Creek

- Longwall W3 has a setback of approximately 120 metres from Stonequarry Creek. In this location, Stonequarry Creek is characterised by a long pool (SR17) that is controlled by Rockbar SR17.
- Given the short distance from the longwall starting position to the creek and rockbar, the Department considered potential impacts at this location to be key to its assessment.
- BCD recommended that a greater setback from Stonequarry Creek be provided to reduce the potential impacts of fracturing and water loss from mining.

- The Department sought the advice of the Panel regarding the adequacy of the proposed setback in achieving the relevant performance measures for Stonequarry Creek, Rockbar SR17 and pool SR17.
- The Panel's consideration of this issue resulted in the Applicant preparing the SCRMP to limit subsidence impacts and environmental consequences to the rockbar to a negligible impact threshold. This matter is discussed further in Section 7.1.
- The Department is satisfied that the monitoring and TARP process outlined in the SCRMP would significantly reduce the risk of fracturing of Rockbar SR17 and any environmental consequences for pool water levels at pool SR17 to an acceptable level.
- This position is supported by the advice of the Panel.
- A temporary reduction in baseflow associated with groundwater drawdown is predicted in Stonequarry Creek. Similar reductions were observed in Cedar and Matthews Creeks during mining of LW W1-W2, with recovery observed in all but one pool.
- Connective fracturing between the surface and mine workings is not predicted and has not been observed from the mining of W1 and W2.
- Monitoring of streamflow, pool water level, water quality and pool behaviour will continue in accordance with the TARP outlined in the Water Management Plan for LW W3-W4.

Cedar and Matthews Creeks

- Cedar and Matthews Creeks are located to the west and northwest of W1-W2. Cedar Creek is a minimum of 370 metres from LW W3 and Matthews Creek is a minimum of 850 metres from LW W3.
- Cedar and Matthews Creeks are not expected to experience measurable conventional tilts, curvatures or strains, with potential impacts limited to minor incremental valley related effects.
- The Department notes that valley closure was not observed across Matthews and Cedar Creek during extraction of W1-W2, rather, low levels of ground extension were observed.
- The Department notes that impacts to pool water levels and recession rates were observed in Cedar Creek during the mining of W1-W2. These impacts have since recovered in all but one pool, CR14. Impacts are considered likely to be due to mining-induced groundwater depressurisation, and, while not observed, mining induced fracturing within pool CR14. The mining of W3-W4 has the potential to slightly worsen these impacts, however given the small magnitude of subsidence movements expected, these incremental impacts are unlikely to be significant.
- The Department considers that any incremental impacts to Cedar and Matthews Creeks from the mining of W3-W4 are likely to be minor.

IAPUM advice

- In its advice to the Department dated 10 September 2021 (**Attachment 1**), the Panel confirmed that it is satisfied that the consequences for creek baseflow and surface water levels have been adequately assessed.
- The Panel confirmed that reductions in pool water levels at pool SR17 associated with fracturing is not of concern if controls set out in the SCRMP are in place to ensure negligible subsidence impacts.
- The Panel maintained some residual concerns regarding the potential for mining-induced baseflow losses to cause a visible reduction in water levels in pools on Rockbar SR17 and the potential for this reduction in water level to impact the cultural heritage values of the grinding groove site. The Panel recommended amending the SCRMP to address this aspect, including the addition of a relevant performance indicator associated with reductions in water level due to baseflow losses and visual monitoring of pool water levels on the rockbar.
- In response, the Applicant has amended the SCRMP and Water Management Plan to clarify the performance indicators for pool SR17 and include visual monitoring of water levels in pools upstream and within Rockbar SR17.
- The Panel also recommended the Applicant refine or further justify the method of calculating groundwater level TARP triggers, noting that the methods utilised can potentially result in large margins for drawdowns prior to a trigger.

- The Department has recommended a condition of approval requiring the Applicant undertake a review of the Water Management Plan groundwater level TARP triggers, and implement any changes required to address the matters raised by the Panel, to the satisfaction of the Secretary, prior to the extraction of LW W3 retreating more than 150m from its starting position.

Conclusions and recommendations

- The Department notes that the controlling performance measure for Rockbar SR17 is associated with the grinding groove site located on the rockbar. The performance measure requires negligible subsidence impacts or environmental consequences and negligible loss of heritage values.
- The Applicant proposes to manage subsidence movements across the rockbar to achieve this performance measure and therefore fracturing of the rockbar and associated reductions in pool water levels at pool SR17 are not expected.
- While reductions in baseflow associated with groundwater drawdown could impact water levels in Stonequarry Creek, these impacts are likely to be temporary as demonstrated in most cases by the post-mining recovery observed in pools in Cedar Creek. Suitable performance indicators relating to impacts on water levels in pool SR17 due to baseflow losses have been included in the Water Management Plan.
- The Department notes that any loss of baseflow will require licencing under the *Water Management Act 2000*.
- In addition to the negligible impact performance measures relevant to Rockbar SR17, the Department recommends the following performance measures be applied for Stonequarry, Cedar and Matthews Creeks:
 - No subsidence impact or environmental consequence greater than minor; and
 - No connective cracking between the surface, or the base of the alluvium, and the underground workings.
- Minor is defined as: *not very large, important or serious*.
- The recommended performance measures are consistent with those previously applied for the mining of LW W1-W2.

Remediation Measures:

- The Department acknowledges that Redbank and Myrtle Creeks have been previously impacted as a result of mining directly beneath these creeks.
- The Department notes that the Resources Regulator has approved Corrective Action Management Plans for remediation in Redbank and Myrtle Creeks. Creek remediation trials in Myrtle Creek in late 2019 were found to be effective at maintaining pool water levels throughout 2020. Similar trials are currently being undertaken for pools in Redbank Creek.
- A key difference between impacts to these creeks and the creeks that would be potentially affected by LW W3-W4 is that Redbank and Myrtle Creeks were directly undermined, whereas Stonequarry Creek would not be directly undermined.
- Nevertheless, the Applicant has identified a range of creek remediation techniques that could be utilised in the event of impacts to creeks from mining of LW W3-W4. These measures would be investigated and assessed through a Corrective Action Management Plan process initiated under the Water Management Plan TARP.
- The Department has also included a best practice standard condition, that in the event remediation is not successful, offsets would be required.

7.3 Built Features

- Longwalls W3 and W4 are located within the Wollondilly Shire Council Local Government Area. The predominant land uses in the area include rural residential, small scale cattle and horse grazing.
- Occupied residential dwellings would not be directly undermined by the longwalls. A total of 69 houses have been identified within the study area of the subsidence assessment, with the houses primarily located within Stonequarry Estate above LW W1 to the east of LW W3, and to the west of LW W4 in the residential area of Picton.

- Predicted potential impacts to houses resulting from tilts, curvature and strain from mining are generally minor, with impacts at 96% of dwellings predicted to require nil to very minor repairs. Three to four houses are predicted to require more extensive repair or rebuild. All structures are predicted to remain safe throughout the mining period and repairs would be carried out in accordance with the *Mine Subsidence Compensation Act 2017*.
- Other built features within the vicinity of the longwalls include the Main Southern Railway (including the Picton Rail Tunnel and Rail Viaduct), the Picton Mittagong Loop Line, public roads, drainage culverts, bridges, potable water infrastructure, services infrastructure (sewer, gas, electrical and telecommunications), rural structures, groundwater bores and survey control marks.
- The Picton Viaduct is listed on the state heritage register and is located outside areas predicted to be impacted by conventional subsidence movements.
- The Applicant has developed a range of risk control measures to prevent or manage potential subsidence impacts to the Picton Rail Tunnel and Viaduct, including:
 - The setback distance from the rail infrastructure and the east to west sequencing of the longwalls, which combined with subsidence monitoring, would allow an adaptive approach to management.
 - Monitoring and survey of rail infrastructure utilising a range of methods.
 - Engineering controls that would be implemented in the event of subsidence at the Tunnel, Viaduct and rail infrastructure, including track strengthening, temporarily reinforcing the track span and structural support to the underside of the track span.
 - Progression of the detailed design of engineering controls, pre-purchase of materials and pre-fabrication of controls would enable these controls to be implemented in a timely manner.
- The Resources Regulator has reviewed the proposed risk controls in consultation with the Office of the National Rail Safety Regulator and had no further comment.
- The Panel agrees that the approach proposed by the Applicant to manage potential subsidence impacts to critical rail infrastructure is appropriate, if implemented effectively through a management plan and TARP process. The Panel recommended that rail infrastructure management plans and TARPs be endorsed by the Resources Regulator prior to LW W3 retreating more than 150 metres.
- The Department notes that rail infrastructure management plans and TARPs have been prepared by the Applicant, endorsed by the rail infrastructure owners and reviewed and deemed adequate by the Resources Regulator. This recommendation of the Panel is therefore considered to have been addressed.
- Whilst it is acknowledged that there could be subsidence impacts on some built features, the Department and Resources Regulator notes that the Applicant has extensive experience of undermining built features and is proposing to continue to implement management measures that have been used successfully to date.
- The Department acknowledges that the Applicant has consulted with relevant stakeholders and has provided each with a subsidence monitoring program. The Department also notes that specific infrastructure management plans have been prepared in consultation with each asset owner.
- Furthermore, the longwalls are located within the Bargo Mine Subsidence District which is administered by SA NSW under the *Coal Mine Subsidence Compensation Act 2017*.
- The *Coal Mine Subsidence Compensation Act 2017* provides for the assessment and management of risks associated with subsidence resulting from coal mining operations and includes provision for compensation or repairs required to mitigate the damage caused by mine subsidence.
- The owners of buildings or other surface improvements damaged by mine subsidence can lodge claims for compensation through SA NSW.
- SA NSW reviewed the Extraction Plan and noted that the occupied residential structures would not be undermined and a detailed assessment of possible subsidence impacts to infrastructure was completed.

8. SOCIO-ECONOMIC ISSUES

- The total recoverable reserve from Longwalls W3 and W4 is 2,562,309 tonnes of coal.
- The Department estimates that extraction of the coal reserves in Longwalls W3 and W4 would generate approximately \$31 million in State Government revenue through royalties over the next 2 years.
- Tahmoor Coal Mine produces metallurgical coking coal, which is transported by rail to Port Kembla Coal Terminal and Newcastle for shipping to domestic and overseas customers.
- The company provides around 575 direct jobs (employees and contractors) at the mine and is a significant contributor to regional employment.

9. EVALUATION

- The Department notes that Longwalls W3 and W4 have been designed to minimise impacts on creeks and built features, including the setbacks from Stonequarry, Cedar and Matthews Creeks and critical rail infrastructure.
- However, the Department acknowledges that there remains a residual risk of impacts to the creeks and to a highly significant cultural heritage site comprising of 120 grinding grooves located on a rockbar within Stonequarry Creek.
- Tahmoor Coal is required to achieve a negligible impact performance measure for this significant cultural heritage site and has developed a strict management strategy that would stop mining at very low levels of subsidence in order to protect the site and rockbar from impact.
- The Department also recognises the importance of the availability of water resources in the broader context of the cultural landscape of the grinding groove, and notes that the Extraction Plan includes strict monitoring and performance measures for water loss from the large pool upstream of rockbar SC17 and smaller pools located on the rockbar.
- The management strategy has been developed in consultation with the Panel and includes some of the strictest monitoring requirements and triggers for underground mining in NSW related to Aboriginal cultural heritage.
- To address residual risks to creeks, the Department recommends a performance measure of *minor environmental impacts* for Stonequarry, Cedar and Matthews Creeks. Further detailed performance measures are defined in the Extraction Plan - Water Management Sub Plan, with specific monitoring and performance measures for pool level reductions in pool SR17 from mine induced rock fracturing and baseflow losses, to ensure that pool levels are maintained.
- The Department also has a role under the EP&A Act to ensure compliance with the existing development consent and subsequent approvals under the consent.
- In undertaking this role, the Department has a range of enforcement powers available to it if it considers that there may have been or may potentially be a breach of the development consent or subsequent approvals under the consent, including but not limited to, requiring further setbacks from key features or the cessation of mining operations if considered necessary.

10. CONDITIONS ON LONGWALLS W3 AND W4

The Department has imposed the following conditions on the Extraction Plan approval for Longwalls W3 and W4:

Performance Measures

- 1) The Applicant must ensure that the development does not cause any exceedances of the performance measures in Table 1.
- 2)

Table 1: Subsidence impact performance measures – natural features

Feature	Performance measures
Stonequarry Creek, Cedar Creek and Matthews Creek	No subsidence impact or environmental consequence greater than minor*. No connective cracking between the surface, or the base of the alluvium, and the underground workings.

*minor is defined as *not very large, important or serious*

- 3) These performance measures apply to all mining taking place after the date of this Extraction Plan approval.

Additional Offsets

- 4) If the Applicant exceeds the performance measures in Table 1 and the Secretary determines that:
 - (a) it is not reasonable or feasible to remediate the subsidence impact or environmental consequence; or
 - (b) remediation measures implemented by the Applicant have failed to satisfactorily remediate the subsidence impact or environmental consequence,then the Applicant must provide a suitable offset to compensate for the subsidence impact or environmental consequence, to the satisfaction of the Secretary.

Stonequarry Creek Rockbar SR17

- 5) An independent structural geological assessment of Rockbar SR17, undertaken by an appropriately qualified and experienced expert approved by the Secretary, must be submitted to the Secretary prior to the extraction of LW W3 retreating more than 150 m from its starting position.
- 6) The Tahmoor Coal Technical Committee is to review the independent assessment and provide any recommendations for proposed changes to the Stonequarry Creek Rockbar Management Plan, to the satisfaction of the Secretary, prior to extraction of LW W3 more than 150 m from its starting position.
- 7) On becoming aware of a monitoring event that triggers a stoppage to longwall extraction under the Stonequarry Creek Rockbar Management Plan TARP, the Applicant must stop longwall extraction as soon as is reasonably practical to do so, regardless of proximity to cut-through positions within the panel.
- 8) Following a Yellow or Red TARP trigger under the Stonequarry Creek Rockbar Management Plan that results in a recommendation to relocate longwall operations, the Applicant must seek the approval of the Secretary prior to recommencing longwall operations.
- 9) An application to the Secretary to recommence longwall mining operations under condition 8 must be supported by the following:
 - (a) a review of all available subsidence monitoring data and analysis of trends;
 - (b) records from visual inspections undertaken by the Technical Committee, Heritage specialist and registered Aboriginal parties, including any feedback provided by registered Aboriginal parties; and
 - (c) recommendations of the Technical Committee and a detailed justification for those recommendations.

Water Management Plan

- 10) The Applicant must undertake a review of the Water Management Plan groundwater level TARP triggers and, if necessary following this review, revise the TARP to address the matters raised by the Panel in Section 4.2 of its advice dated September 2021 on the "Tahmoor Coal North Western Domain Longwalls W3 and W4 Extraction Plan."

This review and any subsequent revisions must be undertaken to the satisfaction of the Secretary, prior to the extraction of LW W3 retreating more than 150m from its starting position.



13 September 2021

Stephen O'Donoghue

Director Resource Assessments

As nominee of the Secretary

ATTACHMENT 1
IAPUM ADVICE