Our ref: DOC20/204317
Your ref: SSD 5602

Genevieve Lucas
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Department of Planning, Industry and Environment
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Dear Ms Lucas

Amendment report – Angus Place mine extension project (SSD 5602)

Thank you for your email dated 10 March 2020 to the Biodiversity and Conservation Division (BCD) requesting comments on the amendment report for the Angus Place mine extension project.

BCD has reviewed the amendment report, revised biodiversity impact assessment, swamp offset strategy and revised cultural heritage assessment. Please note that BCD also reviewed the approved generic cultural heritage management plan when undertaking the review of the revised cultural heritage assessment.

BCD notes that the swamp offset strategy encompasses swamps affected by both the Springvale and Angus Place projects. Significantly, BCD also notes that it remains unclear as to how the offset liability generated by these projects in relation to swamps will be addressed.

BCD have not reviewed the draft swamp monitoring program and biodiversity management plans at this stage as these draft plans are incomplete. However, BCD would be pleased to review future drafts if the project is approved.

BCD's recommendations are provided in **Attachment A**, with detailed comments provided in **Attachment B**. BCD's review of the maximum offset liability calculations for the Angus Place extension project are provided in **Attachment C**. BCD also requested a review of the amendment report and supporting documents by the Department of Planning, Industry and Environment's Science Division, and this is provided in **Attachment D**.

If you require any further information regarding this matter, please contact Liz Mazzer, Conservation Planning Officer, via liz.mazzer@environment.nsw.gov.au or (02) 6883 5325.

Yours sincerely

Sarah Carr
Director North West
Biodiversity and Conservation Division

18 May 2020

Attachment A – BCD's Recommendations

Attachment B – BCD's Detailed Comments

Attachment C – BCD review – RPS (2019) Newnes Plateau swamp – maximum offset liability: Angus Place mine extension. RPS 15 May 2019

Attachment D – Science Division review

Attachment A

BCD's recommendations

Angus Place mine extension project – amendment report

Biodiversity impacts could be further avoided

1. A review of longwall dimensions and layout should be conducted that focuses on avoiding impacts on swamps, streams, aquifers and associated threatened species.

Biodiversity assessment of surface disturbance is required

2.1 Biodiversity offset credits should be calculated for the 50.48 hectares of native vegetation within the surface infrastructure impact envelope.

2.2 The proponent should provide a clear schedule for clearing of native vegetation for surface infrastructure so that stages can be identified.

2.3 Biodiversity offset requirements should be calculated for each stage in accordance with the Biodiversity Assessment Method and presented in a biodiversity development assessment report.

Further information is required to support the swamp offset strategy

3.1 The maximum offset liability report for Angus Place should be reworked so that ecosystem and species credit calculations are presented for each individual Newnes Plateau Shrub Swamps and Newnes Plateau Hanging Swamps rather than by longwall.

3.2 This report should follow the format of a biodiversity development assessment report consistent with the Biodiversity Assessment Method.

3.3 Credit liability calculations should be presented for each individual swamp. All swamps should be individually identified, categorised as Newnes Plateau Shrub Swamps or Newnes Plateau Hanging Swamps, and labelled for clarity.

3.4 A summary list of all plots, including those not used in the Biodiversity Assessment Method calculations, be provided. This should include the location of each plot, the swamp it is in and the vegetation integrity score.

3.5 Definitions should be provided for 'high' and 'low' condition swamps.

3.6 A table clearly showing each individual Newnes Plateau Shrub Swamp and Newnes Plateau Hanging Swamp, the threatened species associated with that swamp, total area of the swamp, area of the swamp used for the species polygon, and the species credits generated for the swamp, be provided. A clear map should also be provided showing the locations of each Newnes Plateau Shrub Swamp and Newnes Plateau Hanging Swamp.

3.7 Species credits be calculated for Klaphake's sedge (*Carex klaphakei).*

3.8 A copy of *Boronia deanei research and management program: 2017 Boronia deanei monitoring report* prepared for Centennial Coal, Springvale (RPS 2019) be provided to BCD.

The swamp offset strategy does not adequately offset impacts

4.1 Any proposal to transfer land from state forest to state conservation area should be discussed by the relevant government agencies before the swamp offset strategy is approved. BCD understands such discussions are occurring at a whole of government level in NSW.

4.2 Components of the swamp offset strategy that are required by NSW and Commonwealth consents should not be considered as offset components.

EPBC offset calculations require review

5.1 EPBC Temperate Highland Peat Swamps on Sandstone swamp offset calculations for the swamps and associated threatened species should assume total loss of Newnes Plateau Shrub Swamps.

5.2 An analysis of the scale of impacts of mining at Springvale on Newnes Plateau Hanging Swamps should be provided. This information should be incorporated into offset calculations for Temperate Highland Peat Swamps on Sandstone.

Impacts on the World Heritage Area have not been fully considered

6.1 The impacts of groundwater drawdown and loss of surface flow to Carne Creek and other streams flowing into the World Heritage Area on World Heritage values should be fully assessed.

There are deficiencies in the information presented in the amendment report

7.1 All of the deficiencies listed in section 7 of appendix B should be addressed.

Aboriginal consultation for the revised cultural heritage assessment is adequate

8.1 Maintain consultation with the Registered Aboriginal Parties.

Improving the quality of ACH information within the project area

9.1 Determine the validity of AHIMS 45-1-2689.

9.2 Establish the significance (degree) of harm to any sites listed at threat from the project development in consultation with the Registered Aboriginal Parties.

Excavate AHIMS rock shelter site 45-1-0084

10.1 Undertake archaeological excavation of rock shelter AHIMS 45-1-0084 before underground tunnelling commences.

10.2 The proposed assessment report recommendation of detailed recordings of identified rock shelters (with less risk of collapse) must be undertaken before underground works commence.

BCD seek proportionate off sets to mitigate harm to ACH

11.1 Develop and undertake a research excavation program of select Newnes swamps in partnership with the Registered Aboriginal Parties.

Acronyms

BC Act	*Biodiversity Conservation Act 2016*
BAM	Biodiversity Assessment Method
BCD	Biodiversity and Conservation Division
BCF	Biodiversity conservation fund
BIA	Biodiversity impact analysis
DGRs	Director General's requirements
DPIE	Department of Planning Industry and Environment
EPBC Act	*Environment Protection and Conservation Act 1999*
NPHS	Newnes Plateau Hanging Swamp
NPSS	Newnes Plateau Shrub Swamp
PCT	Plant Community Type
SOS	Swamp offset strategy
THPSS	Temperate Highland Peat Swamps on Sandstone
WHA	World Heritage Area

Attachment B

BCD's detailed comments

Angus Place mine extension project – amendment report

Biodiversity

1 Biodiversity impacts could be further avoided

The *NSW Biodiversity Offsets Policy for Major Projects* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy* apply to the Angus Place mine extension project.

These policies require that, before offsets are considered, impacts must first be avoided, and unavoidable impacts minimised through mitigation measures. Only then should offsets be considered for remaining impacts.

BCD acknowledges that some avoidance and mitigation measures have been included in the longwall mine design:

- Longwall 1015 has been shortened to avoid directly undermining Trail Six (Japan) Swamp.
- Shortening longwalls to provide a minimum setback from the Gardens of Stone National Park of 1000 m to reduce the risks of subsidence related impacts on the National Park.
- Shortening longwalls to avoid major cliffs.

However, BCD consider that further mitigation and avoidance measures should be implemented to reduce predicted impacts. For example:

- The 2014 Angus Place proposal avoided directly undermining Twin Gully swamp (see figure 8.6 of the 2014 environmental impact statement). Longwalls 1009 and 1010 now directly undermine Twin Gully Swamp and Twin Gully North Swamp.
- Longwalls 1004 and 1005 could be designed to avoid directly undermining Tristar Swamp and the connected Type 1 Wolgan River lineament zone.
- Longwall 1014 could be shortened so that it does not undermine the Burralow aquifer that feeds Trail Six (Japan) Swamp.
- Longwalls could be set back further from Crocodile and Birds Rock Swamps to maintain the Burralow formation aquifers that sustain these swamps.
- The dimensions of the longwalls could be changed so that they have narrower longwall panel widths and wider longwall pillar widths. This would assist in reducing subsidence impacts across the project area.

Recommendation

1.1 A review of longwall dimensions and layout should be conducted that focuses on avoiding impacts on swamps, streams, aquifers and associated threatened species.

2 Biodiversity assessment of surface disturbance is required

Director-General's requirements (DGRs) were issued for the Angus Place Mine Extension Project on 6 November 2012. A subsequent letter to Centennial Coal from the Department (23 October 2019) requested an amendment report to the original 2014 environmental impact assessment be prepared, including an *"updated assessment of potential biodiversity impacts, including impacts to*

listed swamp communities *under the Biodiversity Conservation Act 2016 and Environment Protection Biodiversity Conservation Act 1999"*

As the project is a transitional project under Clause 28(1) of the *Biodiversity Conservation (Savings and Transitional) Regulation 2017,* the amendment report (section 1.3) states that it has been developed in accordance with the relevant biodiversity assessment guidelines in force at the time the DGRs were issued.

BCD note that field investigations have not yet commenced for areas within the surface infrastructure impact envelope. An indicative ecosystem credit liability is presented in Table 13 of the biodiversity impact analysis (BIA), but no flora plots or targeted species surveys have been conducted.

The BIA states that, following confirmation that surface disturbance activities can be undertaken within the impact envelope, detailed design of infrastructure will be undertaken. Post clearance surveys will then be carried out to calculate the 'actual' offset liability requirements.

BCD notes that the proponent proposes to assess all surface impacts in accordance with the Biodiversity Assessment Method (BAM) and then offset. BCD recommends that calculation of biodiversity offset credit requirements for clearing of native vegetation for surface infrastructure should be done prior to any impact (not post clearance) on biodiversity values. This information should be presented in a biodiversity development assessment report.

As a precautionary measure, offsets should be calculated for the maximum area that will potentially be impacted (50.48 hectares). If no flora plots are to be conducted in accordance with the BAM, plant community type (PCT) benchmarks should be used for credit calculations. If targeted species surveys are not conducted for calculation of species credits, the area of each PCT associated with predicted or recorded species should be used to generate the species polygons for credit calculations.

BCD advise that the retirement of credits for impacts of surface infrastructure could be staged. This would require the proponent to provide a clear schedule for clearing of native vegetation for surface infrastructure.

Recommendations

2.1 Biodiversity offset credits should be calculated for the 50.48 hectares of native vegetation within the surface infrastructure impact envelope.

2.2 The proponent should provide a clear schedule for clearing of native vegetation for surface infrastructure so that stages can be identified.

2.3 Biodiversity offset requirements should be calculated for each stage in accordance with the Biodiversity Assessment Method and presented in a biodiversity development assessment report.

3 Further information is required to support the swamp offset strategy

The swamp offset strategy (SOS) provided with the amendment report lacks information to support the calculations of maximum offset liability for subsidence impacts on swamps. While the SOS addresses offset requirements for Angus Place and Springvale mines, BCD is only commenting on the components relating to Angus Place in this response.

Angus Place maximum offset liability calculations

The maximum offset liability for Newnes Plateau Shrub Swamps (NPSS) at Angus Place has been calculated using BAM for both ecosystem and species credits. As for the Springvale calculations, only a summary of credits has been provided.

BCD requested the maximum offset liability calculation report for Angus Place with all supporting documentation, including spatial files on 24 March 2020. This documentation was provided by Centennial Coal on 16 April 2020.

BCD's detailed review of the report, RPS (2019) *Newnes Plateau swamp – maximum offset liability: Angus Place mine extension*, RPS 15 May 2019 is provided in **Attachment C**. The following is a summary of BCD's main concerns with the calculation of maximum offset liability for Angus Place:

- The approach taken of calculating ecosystem and species credits by longwall rather than by swamp is confusing, making it extremely difficult to verify credit calculations presented in the maximum offset liability report for Angus Place mine extension.
- In some cases, only a part of a swamp has been included, rather than the full swamp. This has not been explained or justified.
- A subset of plot data has been used to calculate maximum offset liability. Data from 75 plots was collected, only 33 plots were used in the BAM calculator. The maximum offset liability report states that, where BAM plots exceed the BAM plot number requirement, the plots with the highest vegetation integrity scores were used. However, there is no summary list of all plots, including those not used, with their locations and vegetation integrity scores, so this assertion cannot be verified.
- Vegetation has been zoned into low and high condition. A table of vegetation integrity scores contains 'low' condition zones that have higher vegetation integrity scores than some 'high' condition zones. Allocation to high and low condition has not been defined.
- It is unclear which species credit species are associated with each swamp. This makes verification of maximum offset liability calculations difficult.
- The threatened species *Carex klaphakei*, which has been recorded in Tri Star and Twin Gully swamps, has not been included in species credit calculations. There is no explanation provided for this species omission.

The report also notes that in the future, species polygons for Deane's boronia will be delineated using colour-based classification of aerial imagery. Spectral reflectance of the species when flowering would be analysed to identify potential populations of the species.

BCD notes that this method was developed and optimised as part of the *Boronia deanei research and management program: 2017 Boronia deanei monitoring report* prepared for Centennial Coal, Springvale (RPS 2019). BCD questions how this method will be applied at Angus Place given the impacts of recent bushfires on flora.

Recommendations

3.1 The maximum offset liability report for Angus Place should be reworked so that ecosystem and species credit calculations are presented for each individual Newnes Plateau Shrub Swamps and Newnes Plateau Hanging Swamps rather than by longwall.

3.2 This report should follow the format of a biodiversity development assessment report consistent with the Biodiversity Assessment Method.

3.3 Credit liability calculations should be presented for each individual swamp. All swamps should be individually identified, categorised as Newnes Plateau Shrub Swamps or Newnes Plateau Hanging Swamps, and labelled for clarity.

3.4 A summary list of all plots, including those not used in the Biodiversity Assessment Method calculations, be provided. This should include the location of each plot, the swamp it is in and the vegetation integrity score.

3.5 Definitions should be provided for ‘high’ and ‘low’ condition swamps.

3.6 A table clearly showing each individual Newnes Plateau Shrub Swamp and Newnes Plateau Hanging Swamp, the threatened species associated with that swamp, total area of the swamp, area of the swamp used for the species polygon, and the species credits generated for the swamp, be provided. A clear map should also be provided showing the locations of each Newnes Plateau Shrub Swamp and Newnes Plateau Hanging Swamp.

3.7 Species credits be calculated for Klaphake’s sedge (*Carex klaphakei).*

3.8 A copy of *Boronia deanei research and management program: 2017 Boronia deanei monitoring report* prepared for Centennial Coal, Springvale (RPS 2019) be provided to BCD.

4 The swamp offset strategy does not adequately offset impacts

BCD provides the following comments on the components of the SOS that directly relate to the Angus Place mine extension project:

Payment into the Biodiversity Conservation Trust for Angus Place

The SOS proposes payment into the NSW Biodiversity Conservation Fund for impacts to NPSS, Newnes Plateau Hanging Swamps (NPHS) and their associated threatened species associated with Angus Place mine extension project.

This approach meets NSW offset requirements provided ecosystem and species credits are calculated correctly using BAM. However, BCD’s review of the maximum offset liability report for Angus Place has concluded that, due to the way the information is presented, we are unable to verify the credit calculations.

Support for a transfer of State Forest land to State Conservation Area

BCD note that transfer of land is proposed for Angus Place in the SOS to satisfy the EPBC offset requirements. Any proposal to transfer land from state forest to state conservation area should be discussed by the relevant government agencies prior to approval of the SOS. BCD understands such discussions are occurring at a whole of government level in NSW.

Ongoing monitoring program

The monitoring program presented as part of the SOS is required by the Springvale consent (SSD 5594) and Springvale’s EPBC approval (2013-6881).

Principle four of the NSW Biodiversity Offsets Policy for Major Projects, and principle six of the EPBC offset policy, require that offsets must be additional to other legal requirements. As the monitoring presented in the SOS is a legal requirement for Springvale mine, it should not be considered as an additional offset component. Should the Angus Place extension project be approved, and a monitoring program is required by the consent, it should not be considered a component of the SOS.

Recommendations

4.1 Any proposal to transfer land from state forest to state conservation area should be discussed by the relevant government agencies before the swamp offset strategy is approved. BCD understands such discussions are occurring at a whole of government level in NSW.

4.2 Components of the swamp offset strategy that are required by NSW and Commonwealth consents should not be considered as offset components.

5 EPBC offset calculations require review

The EPBC Act Environmental Offsets Policy requires that a minimum of ninety per cent of the offset requirements for any given impact must be met through direct offsets.

The SOS (tables 1 and 2) presents area calculations that conclude that the SOS will satisfy 110.75% of the offset requirements for Temperate Highland Peat Swamps on Sandstone (THPSS) and blue mountains water skink (BMWS), and 135.08% of offset requirements for *Boronia deanei*.

These offset calculation results are based on an assumption that impacted swamps will not be totally destroyed but will have their vegetation integrity reduced through subsidence impacts.

The calculations combine the entire area of the Newnes State Forest swamps including the impacted swamps at Angus Place and Springvale. The impacted swamps are included at a reduced condition, therefore contributing a partial offset.

The analysis is underpinned by BioBanking Assessment Methodology (BBAM 2014) plot data collected in Gang Gang and Carne West swamps before and after mining. This data calculated that average vegetation integrity score for the two swamps reduced by 37.5% post-mining.

BCD has concerns regarding this approach, particularly as it does not take into consideration the ability of impacted swamps to recover from catastrophic events such as the recent bushfires. As illustrated in the review by DPIE Science Division (**Attachment D**), early indications are that the impacted swamps are not recovering from bushfire in the same way as unimpacted swamps. There is uncertainty regarding whether the impacted swamps will fully recover.

These undermined, desiccated and now burnt swamps may no longer remain peat-forming swamp communities. In contrast, while non-undermined swamps were also burnt in the recent 2019-2020 fires, water is still readily observable in the swamps, soil moisture remains high, vegetation regrowth is already advanced and BMWS populations remain viable.

In addition, it is not clear whether impacts on NPHS have been considered in these calculations. This is important given that both the NPSS and NPHS are components of the Commonwealth-listed THPSS.

The offset figures also include consideration of averted loss which is defined as the likely further reduction in quality as a result of continued degradation associated with forestry, mining and recreational use. It should be noted that, as they are currently on public land the swamps currently have some degree of protection. Transferring land from state forest to state conservation area will still allow both recreation and mining.

Recommendations

5.1 EPBC Temperate Highland Peat Swamps on Sandstone swamp offset calculations for the swamps and associated threatened species should assume total loss of Newnes Plateau Shrub Swamps.

5.2 An analysis of the scale of impacts of mining at Springvale on Newnes Plateau Hanging Swamps should be provided. This information should be incorporated into offset calculations for Temperate Highland Peat Swamps on Sandstone.

6 Impacts on the World Heritage Area have not been fully considered

The northern boundary of the Angus Place project application area abuts Gardens of Stone National Park. This national park is part of the Greater Blue Mountains World Heritage Area (WHA).

While longwalls have been shortened to provide a minimum setback of 1000 m to reduce the risks of subsidence related impacts on the WHA, the amendment report does not consider the wider impacts of the proposal on world heritage values.

Of particular concern are the potential impacts on surface and groundwater that will affect the WHA.

Groundwater

The groundwater impact assessment supporting the amendment report predicts that groundwater drawdown will extend to the east and northeast, well into the WHA. This includes predicted drawdown in the uppermost water table, with drawdown 'hotspots' identified in Carne Creek within the WHA.

Modelled results in the groundwater impact assessment predict that, at 38 years post mining there is no significant increase in the extent of drawdown at the uppermost water table, there is also no significant recovery. This indicates that impacts to the uppermost water table are likely to be permanent. The implications of potentially permanent change to groundwater in the WHA have not been examined in the amendment report.

Surface water

The surface water impact assessment supporting the amendment report concludes that the magnitude of change predicted in surface flow in Carne Creek is relatively minor, and the impact is not considered to be significant as the flow volume is much higher.

The DPIE Science Division review (**Attachment D**) considers that there will likely be surface to seam fracturing above the longwalls in the vicinity of the eastern ends of the longwalls. This will drain the Burralow Formation aquifers that feed the swamps and springs in this area. It is likely water in the swamps will be drained and there will be no flow downstream to Carne Creek except after significant rain events.

Significant loss of flow has already occurred in the upper reaches of Carne Creek (i.e. Sunnyside East Swamp, Carne West Swamp, Gang Gang East and West Swamps associated with Springvale operations). The cumulative loss of all these flows has not been accounted for in the surface water impact assessment, but calculations by Science Division based on previous flow monitoring data indicate that these losses may be of the order of at least 6ML/day. These flows no longer report to Carne Creek which subsequently flows to the WHA.

The conclusions presented in the amendment report about relatively minor impacts to Carne Creek are not considered credible. The changes to hydrology will have an impact on flows to the WHA, affecting the World Heritage values.

Recommendation

6.1 The impacts of groundwater drawdown and loss of surface flow to Carne Creek and other streams flowing into the World Heritage Area on World Heritage values should be fully assessed.

7 There are deficiencies in the information presented in the amendment report

BCD and Science Division have found that there are deficiencies in the information presented in the amendment report, biodiversity, groundwater, surface water and subsidence impact assessments. These deficiencies mean that impacts on NPSS, other biodiversity values, and World Heritage values have not been adequately assessed, and conclusions are not well supported.

Deficiencies in the information presented in the amendment report and associated impact assessments include:

- The amendment report does not consider the cumulative impact of Springvale and Angus Place mines on groundwater, surface water and associated biodiversity values. The review by DPIE Science Division estimates that Springvale and Angus Place mines combined will impact on 18% of the entire NPSS in existence. The amendment report should also include a clear map showing the longwalls and all swamps (delineating NPSS and NPHS) at both Springvale and Angus Place mines to provide context.
- The extent of Sunnyside Swamp has been reduced (mapping it outside the project boundary) compared with other mapping which shows it extending much closer to longwall 1002. Potential impacts to Sunnyside Swamp, which extends into the southern portion of the amended project application area, have not been assessed.
- The Stuttering frog (*Myxophyes balbus*) has been recorded just downstream of Sunnyside Swamp. Impacts on this species should be assessed.
- Impacts on NPSS are likely to be more significant than presented in the amendment report. This particularly applies to Wolgan River, Wolgan River Upper, Twin Gully and Crocodile Swamps, where the amendment report concludes changes will be insignificant.
- Little information is provided for the majority of NPHS above and adjacent to the project.
- Many NPHS appear to have been incompletely mapped.
- Subsidence impacts to streams, particularly Wolgan River and Carne Creek, are likely to be more significant than stated in the amendment report. Lineaments (geological fault lines) associated with these streams will amplify subsidence impacts.
- Extent of surface to seam fracturing due to subsidence has been underestimated leading to underestimation of the extent of groundwater drawdown and the associated draining of swamps.
- An assessment of potential impacts to threatened species that have habitat associated with caves, cliffs and pagodas has not been provided.
- The reference list in section 12 of the biodiversity impact analysis does not include all references used in the document (e.g. BCD 2019c, Hines et al 2004).

Recommendation

7.1 All of the deficiencies listed above should be addressed.

Aboriginal Cultural Heritage

8. Aboriginal consultation for the revised cultural heritage assessment is adequate

BCD have reviewed the consultation undertaken as documented in the revised cultural heritage assessment report (Niche 2019) and have not identified any significant issues. The proponent has applied the consultation requirements as prescribed in the SEARs with reference to the Aboriginal consultation heritage requirements for proponents (DECCW 2010). BCD note the responses from the proponent to the issues raised by two Registered Aboriginal Parties (RAPs) on the assessment methodology, and also recognise the comments from the RAPs supportive of the methodology (Niche 2019: Table 4). BCD further note that the proponent is committed to on-going consultation with the RAPs.

Recommendation

8.1 Maintain consultation with the Registered Aboriginal Parties

9. Improving the quality of ACH information within the project area

Aboriginal Heritage Information Management System (AHIMS) site 45-1-2689 (stone arrangement)

The development of robust site-predictive statements for Aboriginal cultural heritage is necessary in order to establish appropriate management responses that can be adequately regulated, and must therefore, be reliant on steadfast information. Examination of the AHIMS site card description of 45-1-2689 informs BCD that the validity of the Aboriginal stone arrangement located within the project boundary is not conclusive. The site record states that it was registered only as a precaution (OzArk 2010). BCD recommend that a professional appraisal of AHIMS 45-1-2689 is undertaken in participation with the RAPs.

Aboriginal cultural significance

The criteria for cultural significance used for all sites recorded within the project area consists of 2 categories, ‘high significance’ and ‘extremely high significance’. BCD understand the criteria was established through workshops with the RAPs in preparing the Western Regional Aboriginal Cultural Heritage Management Plan (WRACHMP). Approval decisions that may authorise harm to sites under either category will be difficult without knowing how to measure the appropriate and proportionate mitigation. BCD recommend that the proponent also assess the significance (degree) of harm to sites to determine if the harm to a site of high value to the RAPS is minimal, moderate or high so as to determine the appropriate mitigation.

Recommendations

9.1 Determine the validity of AHIMS 45-1-2689

9.2 Establish the significance (degree) of harm to any sites listed at threat from the project development in consultation with the RAPs.

10. Excavate AHIMS rock shelter site 45-1-0084

The revised cultural heritage assessment concludes that AHIMS 45-1-0084 is at risk of collapse from the proposed expansion of underground tunnelling based on the results of the engineer subsidence predictions (MSEC 2019 in Niche 2019). BCD urge that an archaeological excavation

of AHIMS 45-1-0084 is undertaken and completed before any underground mining works commence, especially works that would destabilise or make unsafe any site monitoring and management possible. The excavation must be undertaken to extract information that is to be used to characterise the site and assessed on how it contributes to the local and regional archaeological record. The excavation must be to a professional standard with assistance by the RAPs.

The proposed management recommendations of monitoring the rock shelters over time and reporting if any cracks occur to BCD for advice, is rejected. The proposed recording of rock shelters during and post underground tunnelling may compromise safety to those people undertaking recordings. BCD strongly advise therefore that recordings are undertaken before underground works commence.

Recommendations

10.1 Undertake archaeological excavation of rock shelter AHIMS 45-1-0084 before underground tunnelling commences.

10.2 The proposed assessment report recommendation of detailed recordings of identified rock shelters (with less risk of collapse) must be undertaken before underground works commence.

11. BCD seek proportionate off sets to mitigate harm to ACH

The ACH investigation of the project area is important for understanding the local and regional archaeological context and provide opportunities for Aboriginal people to gain and share knowledge from that endeavour. Notably, Aboriginal people participating in the project must have ample information to form an appropriate cultural response to site management, based on the principles of intergenerational equity. However, the environmental impact assessment investigations are not exclusive for the purpose of seeking project approval but carry relevance for future generations widely. BCD therefore recommend a research proposal if the project is approved.

Archaeological research of sand bodies associated with select swamps on the Newnes Plateau

The Newnes Plateau and its various swamps have significant potential to reveal Aboriginal occupation trends across the Holocene and Late Pleistocene. Studies reveal ancient sediments that are showing patterns of natural and possible cultural fire regimes over many thousands of years (Hesse 2003, Black et al 2008). BCD believe that archaeological excavations targeting sand bodies associated with the swamps on the Newnes Plateau is a worthy endeavour to expand on an Aboriginal history for the Blue Mountains precinct and to improve our understanding collectively of the AHIMS sites listed within the mine project area. BCD recommend an archaeological research program of reasonable scope and scale in partnership with the RAPs as a proportionate response to offset harm to ACH.

Recommendation

11.1 Develop and undertake a research excavation program of select Newnes swamps in partnership with the RAPs.

ACH References

Black M, Mooney Scott, Attenbrow V. 2008	Implications for a 14 200 contiguous fire record for understanding human - climate relationships at Gooches Swamp, New South Wales.
Hesse Paul 2003.	Late Quaternary aeolian dunes on the presently humid Blue Mountains, Eastern Australia. In Quarternary International 108(1) 13-32 December 2003