Our ref: DOC22/1013577
Your ref: SSD-33083358

Gen Lucas
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Dear Gen

Moolarben Open Cut 3 Extension – Environmental Impact Statement

Thank you for your e-mail dated 14 November 2022 to the Biodiversity, Conservation and Science Directorate (BCS) inviting comments on the Environmental Impact Statement (EIS) for the Moolarben Open Cut 3 Extension project (the project). BCS and the NSW National Parks and Wildlife Service (NPWS) (hereafter referred to collectively as the Environment and Heritage Group (EHG)) have consulted closely and provide this consolidated response setting out our advice and recommendations for the project.

EHG has reviewed the EIS and Biodiversity Development Assessment Report (BDAR) prepared for the project. The project proposes to extend the open cut operations of the Moolarben Coal Complex to allow for extraction of additional coal resources. Mining operations for the extension are predicted to operate between 2025 to 2034 and include:

- the creation of five open cut pits using conventional open cut mining methods such as drilling and blasting; and
- construction of associated ancillary infrastructure including haul roads, hardstands, run-of-mine pads, construction material and soil stockpiles and water management structures.

The project proposes to extend mining extraction into a vegetated valley which is bordered on three-sides by Munghorn Gap Nature Reserve. The valley itself is well connected to the extensive areas of native vegetation within Munghorn Gap Nature Reserve to the east, south and west, and Goulburn River National Park, located 10 kilometres to the north via vegetated hills and ridgelines. The development footprint, including open cut mining pits, are proposed to be located 50 metres or less from the boundary of Munghorn Gap Nature Reserve. At its closest, the development footprint is proposed to be located less than one metre away from the nature reserve boundary.

Due to its native vegetation, context in the landscape and the immediate adjacency to Munghorn Gap Nature Reserve, the project area has exceptionally high biodiversity value. This is evident from the significant number of threatened species and their habitats which have been detected on site during surveys, including twenty-two threatened species of fauna, three species of threatened flora and two Threatened Ecological Communities (TECs).

It is understood that the project proposes direct clearance of approximately 625 hectares of native vegetation and threatened species habitat. Of the threatened entities mentioned above, five are listed Serious and Irreversible Impact (SAII) entities. These are threatened species and ecosystems which are at greatest risk of extinction from development impacts or activities, and include:

- Broad-headed Snake – 38.24 hectares of habitat,
- Regent Honeyeater– 184.41 hectares of Important Habitat,
- Large-eared Pied Bat – 230.56 hectares of habitat,
- Eastern Cave Bat – 230.56 hectares of habitat; and
- Box Gum Woodland – 477.75 hectares of woodland extent

EHG has analysed the status of the entities above and consider that the direct impacts proposed by the project, as currently presented, would meet the criteria for SAII. As such, in accordance with the document *Guidance to assist a decisionmaker to determine a serious and irreversible impact* (DPIE 2019), we consider that there is a real possibility that the proposed project, if approved as currently presented, would significantly contribute to these entities becoming extinct in NSW.

Of the listed entities above, the most concerning is the substantial loss of Regent Honeyeater "Important Habitat" proposed. "Important Habitat" is defined as habitat which is considered essential to support critical life stages of the species and maintain the survival of the species in the wild. This species has been well studied and is known to be on a trajectory of steep decline. The Mudgee-Wollar breeding population, reliant on habitat within the project area, is currently estimated to be comprised of only 150 individuals. EHG advises that the proposed loss of 184 hectares of Regent Honeyeater "Important Habitat" is likely to be a significant loss for this species, which is already close to extinction.

In addition to the above impacts to SAII entities, the project will also result in a direct loss of 230.56 hectares of occupied Koala and Squirrel Glider habitat. The EIS identifies that the Koala population within the Study Area has survived recent and historical temperature increases, drought and bushfires successfully and suggests habitats within the Study Area could be critical to the survival of the species. EHG agree with this determination and have highlighted further concerns related to the cumulative impact and continued loss of habitat surrounding Munghorn Gap Nature Reserve as a result of vegetation clearing.

In addition to the significant direct impacts proposed, EHG has serious concerns about the potential indirect and prescribed impacts on the surrounding threatened species habitat, including those protected by Munghorn Gap Nature Reserve.

As set out in our interim response, by the nature of its tenure, all natural values, inclusive of water resources both within and underneath Munghorn Gap Nature Reserve, geological features within the nature reserve and biodiversity occupying the nature reserve are legislatively protected under the *National Parks and Wildlife Act 1974* (NPW Act). EHG consider that the EIS has not adequately assessed the potential impacts proposed mining operations will have on the surrounding nature reserve.

The effects from blasting, including airblasts and vibration damage are especially concerning. Based on the information presented in the EIS, EHG have identified that the project could:

- irreversibly degrade and/or destroy at least an additional 653 hectares of fragile sandstone geological features and habitat such as caves, cliffs and overhangs, via vibration damage; and
- disturb at least an additional 2,481 hectares of threatened species habitat via operational noise, artificial light and airblast disturbance.

The EIS does not contain sufficient analysis of the actual impact likely to occur, or the consequences of these impacts to threatened species. Appropriate assessment of these matters will require additional survey work, modelling, additional mapping of impacts, updates to the BAM Calculator and spatial data, and additional assessment and justification in the BDAR.

Based on the magnitude of indirect impacts which are predicted to occur and the immediate adjacency of the project to Munghorn Gap Nature Reserve, the BDAR does not provide adequate evidence that these impacts could be appropriately managed, such that impacts to the nature reserve can be avoided.

EHG recommends that the proponent revise the current development footprint and avoidance and minimisation strategies to significantly reduce impacts of the proposed development to both Munghorn Gap Nature Reserve and threatened biodiversity.

EHG welcomes the opportunity to continue to work with the proponent to ensure the full extent of impacts of this proposal are identified and appropriate avoidance measures determined. We recommend that the proponent seeks agreement from EHG and other relevant NSW Government agencies on the assessment approach and proposed avoidance strategies prior to progressing further.

EHG's consolidated recommendations are provided in **Attachment A.** BCS's detailed comments and recommendations are provided in **Attachment B**. NPWS's detailed comments and recommendations are provided in **Attachment C**.

We ask that you upload our interim response dated 14 December 2022 and this detailed response to the Major Projects Portal as soon as you are able to do so, for completeness of the public record.

If you require any further information regarding this matter, please do not hesitate to contact Ben Ellis, Principal Project Manager, via ben.ellis@environment.nsw.gov.au or (02) 8275 1838.

Yours sincerely

Sarah Carr
Director North West
Biodiversity, Conservation and Science Directorate

15 March 2023

Attachment A – EHG's Consolidated Recommendations

Attachment B – BCS's Detailed Comments and Recommendations

Attachment C – NPWS's Detailed Comments and Recommendations

Attachment A

EHG's Consolidated Recommendations

Moolarben Open Cut 3 Extension – Environmental Impact Statement

BCS Recommendations

The total impact resulting from the project has not been adequately assessed

1.1. Undertake habitat mapping for sandstone specialist threatened species habitat within the areas likely to receive vibration impacts from blasting. This should be undertaken after a revised damage criterion is established, as recommended in Heading 2.

1.2. Describe the nature, extent, frequency, duration and timing of prescribed impacts that may occur for each species in accordance with Section 8.3 of the BAM.

1.3. For areas outside of NPWS estate, offset residual prescribed impacts in accordance with Section 6.1.2(b) of the *Biodiversity Conservation Regulation 2017* and Section 8.6 of the BAM.

1.4. For areas within NPWS estate that will receive vibration impacts, establish setbacks between open-cut pits and all geological features, such that no impacts are expected to occur. This should be undertaken after a revised damage criterion is established, as recommended in Heading 2.

2.1. Undertake a ground-truthing survey for sensitive geological features surrounding the project which are expected to receive vibration impacts.

2.2. Prepare a site-specific vibration damage analysis, inclusive of revised damage criterion, modelled for the actual context of the project and its surrounding geological complexity.

3.1. Determine an appropriate airblast criterion for threatened taxa within the vicinity of the project.

3.2. Describe the nature, extent and duration of short-term and long-term impacts for each threatened taxa likely to be disturbed, in accordance with Section 8.2 of the BAM.

3.3. If there is uncertainty related to the expected impacts that airblast disturbance may cause, a worst-case scenario should be assumed.

4.1. Describe and justify, in detail, how vibration damage to biodiversity and geodiversity values are expected to be managed during the operation of the project, such that no impacts will occur.

5.1. Describe and justify, in detail, how noise impacts to threatened species and their habitats are expected to be managed during the operation of the project, such that no impacts will occur.

6.1. Confirm that the total clearing required for the development has been included in the BDAR and accounted for in the BAM-C or that a worst-case scenario has been assumed.

SAII criteria have been met and further avoidance of impacts should be undertaken

7.1. The consent authority note BCS advice in relation to SAII criteria for Microbats and the Broad-headed Snake when considering the adequacy of avoidance and minimisation to biodiversity impacts proposed, conditioning of the project and potential project approval.

7.2. The proponent revise the currently presented development footprint and avoidance and minimisation strategies proposed to further reduce SAII to Microbats and the Broad-headed Snake.

8.1. The consent authority note BCS advice in relation to SAII criteria for Box Gum Woodland when considering the adequacy of avoidance and minimisation to biodiversity impacts proposed, conditioning of the project and potential project approval.

8.2. The proponent revise the currently presented development footprint and avoidance and minimisation strategies proposed to further reduce impacts to Box Gum Woodland.

9.1. The consent authority note BCS advice in relation to SAII criteria for Regent Honeyeater when considering the adequacy of avoidance and minimisation to biodiversity impacts proposed, conditioning of the project and potential project approval.

9.2. The proponent revise the presented development footprint and avoidance and minimisation strategies proposed to significantly reduce proposed impacts to the Regent Honeyeater.

Further justification and revision in the BDAR is required, inaccuracies in the BDAR can affect impact and credit outcomes

10.1. The proponent assess the potential impacts of the depletion of seasonal foraging, breeding and refuge resource within the project for the Koala and Squirrel Glider.

10.2. The proponent assess the cumulative impacts of vegetation clearance and connectivity disruption for the Koala and Squirrel Glider.

10.3. The proponent revise the presented development footprint and avoidance and minimisation strategies proposed to reduce proposed impacts to the Koala and Squirrel Glider.

10.4. The consent authority note BCS advice in relation to impacts to the Koala and Squirrel Glider when considering the adequacy of avoidance and minimisation to biodiversity impacts proposed, conditioning of the project and potential project approval.

11.1. Provide an explanation for the identification of Bush-stone Curlew within the proposed project.

11.2. If the species has been recorded on site prepare a species polygon in accordance with Section 5.2.5 of the BAM.

11.3. If the records have been erroneously detailed, update the appendix and apply to remove these records from BioNet.

12.1. Update the BDAR to account for the identification of the Gang-gang Cockatoo within the proposed project.

12.2. If the species recorded were exhibiting breeding behaviour prepare a species polygon in accordance with Section 5.2.5 of the BAM.

13.1. Revise the species polygon for *Pomaderris cotoneaster* to be in accordance with the BAM.

14.1. In the absence of data supporting CEEC absence, land be designated as Category 2 – regulated land.

14.2. If the proponent wishes to collect further evidence to justify the absence of Box Gum Woodland/Box Gum Grassland from portions of the project site, liaise with BCS to determine an acceptable approach.

15.1. Provide additional field verified evidence to support allocation of Category 1 land in areas which do not appear to have received IGGAM survey.

16.1. Quantify credits to be offset for the Pink-tailed Worm Lizard habitat that will receive residual prescribed impacts resulting from the project.

16.2. Consult with BCS to determine a method for the quantification of residual prescribed impact credits that will adequately compensate for the maximum potential impact resulting from the proposal.

17.1. Revise the BDAR to appropriately assess the nature, extent and duration of short-term and long-term impacts and predict the consequences to GDEs and threatened entities reliant upon GDEs.

17.2. Offset any residual prescribed impacts in accordance with Section 6.1.2(b) of the *Biodiversity Conservation Regulation 2017* and Section 8.6 of the BAM.

18.1. Review and provide additional justification for PCT selection as per Table 1.

19.1. Review vegetation zone stratification for PCT 281 within the subject site and provide justification on plot allocation.

20.1. Provide additional justification for use of plot data outside of the subject land.

21.1. Provide additional justification for exclusion of threatened frog species from habitat within the project area.

21.2. If impacts to threatened frog species has the potential to occur, undertake further survey, assume presence or prepare an expert report.

22.1. Provide additional information to justify the presence/absence of potential Large Bent-winged Bat breeding habitat.

22.2. If impact to Large Bent-winged Bat breeding habitat has the potential to occur, undertake further survey, assume presence or prepare an expert report.

23.1. Demonstrate adequate survey effort is compliant with the Department's guide *Surveying threatened plants and their habitats* (and Commonwealth survey guidelines where necessary) during optimal conditions for the species identified in Table 2.

23.2. Alternatively undertake additional targeted survey in the correct survey period and survey conditions, assume presence, or obtain an expert report for these species.

24.1. Conduct further targeted survey to determine the presence or absence of the Eastern Pygmy Possum and Brush-tailed Rock Wallaby from previously unsurveyed areas within the project site, obtain an expert report or assume presence.

25.1. Correct the specific spatial and BAM-C errors identified in this response.

25.2. Audit all values of VI plot data, GIS shapefiles and data entered into the BAM-C and ensure these align with the BDAR.

NPWS Recommendations

26.1. Update mapping in the EIS to show that there will be no encroachment onto NPWS land.

27.1. Establish appropriate setbacks within the development site boundary to ensure an appropriate buffer between NPWS lands and mining operations, such that impacts to NPWS estate are avoided.

28.1. Amend the assessment to consider the extent of any direct or indirect adverse impacts on Munghorn Gap Nature Reserve. Including, but not limited to, vibration, noise and air quality.

29.1. Incorporate the impacts observed from the UG2 Modification into modelling scenarios to establish the likely impacts if both modifications are to be given approval.

29.2. Provide clarification on any potential groundwater mounding and if this may have impacts on groundwater flow in Munghorn Gap Nature Reserve.

29.3. Provide clarification if any change in flow will facilitate contaminant transport pathways from mine spoil etc. that may impact Munghorn Gap Nature Reserve.

29.4. Install additional groundwater monitoring sites to include monitoring on:

- Triassic sandstone on the Eastern side of the project area
- The various Illawarra Coal Measure layers around the project area. Including the southern side of the project for the Ulan Seam and the whole project area for the other Permian layers
- The cumulative impacts of the UG2 Extension modification.

29.5. Clarify if there is a risk of the perched aquifers within Munghorn Gap Nature Reserve cracking from far field earth movements as part of Moolarben Coal Complex activities.

29.6. Incorporate the storage of brine and mine water in the UG4 void into groundwater modelling.

29.7. Confirm if there are any impacts on Goulburn River National Park (and associated GDEs) due to potential changes in water quantity/quality in both surface water and groundwater.

29.8. Ensure no impact on groundwater in Munghorn Gap Nature Reserve and Goulburn River National Park.

30.1. Additional monitoring is required to confirm the presence of, or lack of, stygofauna in the area. Given that no sampling regime guidelines are currently in force for proposals in NSW, any sampling regime should be consistent with best practice from other state government agencies and technical bodies.

30.2. Include stygofauna sampling to the southern end of the proposed project area in, or on the boundary of, Munghorn Gap Nature Reserve.

30.3. Confirmation is required of the location of the 23 hectares of GDEs within the 2 metres of drawdown area and the impacts that may occur on these GDEs over the period of mining operation (30 years).

30.4. Clarification is required as to whether any GDEs within Munghorn Gap Nature Reserve are to be impacted, including areas with less than 2 metres of drawdown.

31.1. Amend the EIS to assess the extent of edge effect impacts on Munghorn Gap Nature Reserve, noting the natural values of the nature reserve, and provide an adequate setback to the nature reserve to mitigate such impacts.

31.2. Ensure adequate protection from bushfire to the mine site and to adjacent lands such as Munghorn Gap Nature Reserve.

32.1. Amend the EIS to assess the extent of blasting and airblasting impacts on Munghorn Gap Nature Reserve, noting the recreational, cultural and natural values of the nature reserve, and provide an adequate setback to the nature reserve to mitigate such impacts.

33.1. Consider sites of Aboriginal cultural heritage across the landscape and in proximity to the proposal area (including any sites in Munghorn Gap Nature Reserve) rather than just within the Subject Area and update assessment to consider potential impacts to those sites.

33.2. Consider the need for greater buffers to shelter sites (including any identified in Munghorn Gap Nature Reserve) as an avoidance measure to Aboriginal cultural heritage impacts.

33.3. Amend the ACHA to accurately reflect the cumulative impacts of proposed damage to Aboriginal cultural heritage the locality (including to Munghorn Gap Nature Reserve) and provide updated avoidance and mitigation measures proportionate to those impacts.

34.1. NPWS is to be included in the notification and consultation requirements (i.e. TARPs) for any circumstances that occur in or under NPWS land or with potential to impact NPWS land.

BCS's Detailed Comments and Recommendations

Moolarben Open Cut 3 Extension – Environmental Impact Statement

The total impact resulting from the project has not been adequately assessed

1. The prescribed impacts on threatened biodiversity values have been inadequately assessed

BCS have serious concerns that prescribed impacts upon the threatened species habitat surrounding the project may be of an equal or greater quantum to the direct impacts of vegetation clearance.

The Blasting Impact Assessment (SLR 2022)[1] states:

"It is noted that significant natural geological features (i.e. cliff habitat) that potentially form habitat for threatened bat species are also located near to the Project open cut mining area and coal blast design MIC of 400 kg and overburden blast design MICs of 1,500 kg, 3,000 kg and 4,500 kg would also exceed the relevant damage vibration criteria.

Up to two blasts per day and up to nine blasts per week, averaged over any calendar year, would occur cumulatively at the Moolarben Coal Complex and the Project (until approximately 2034)".

From review of the Blasting Impact Assessment, the maximum distance where the current vibration damage criterion would be exceeded is up to 357 metres away from the project, extending well into the habitats protected by Munghorn Gap Nature Reserve. This has been displayed in Figure 1 below (As stated in Heading 2 below, this total area of vibration impact may be underestimated).

[1] *SLR Consulting Australia Pty Ltd (2022) Noise and Blasting Impact Assessment the Moolarben Coal Complex Open Cut 3 Extension Project*

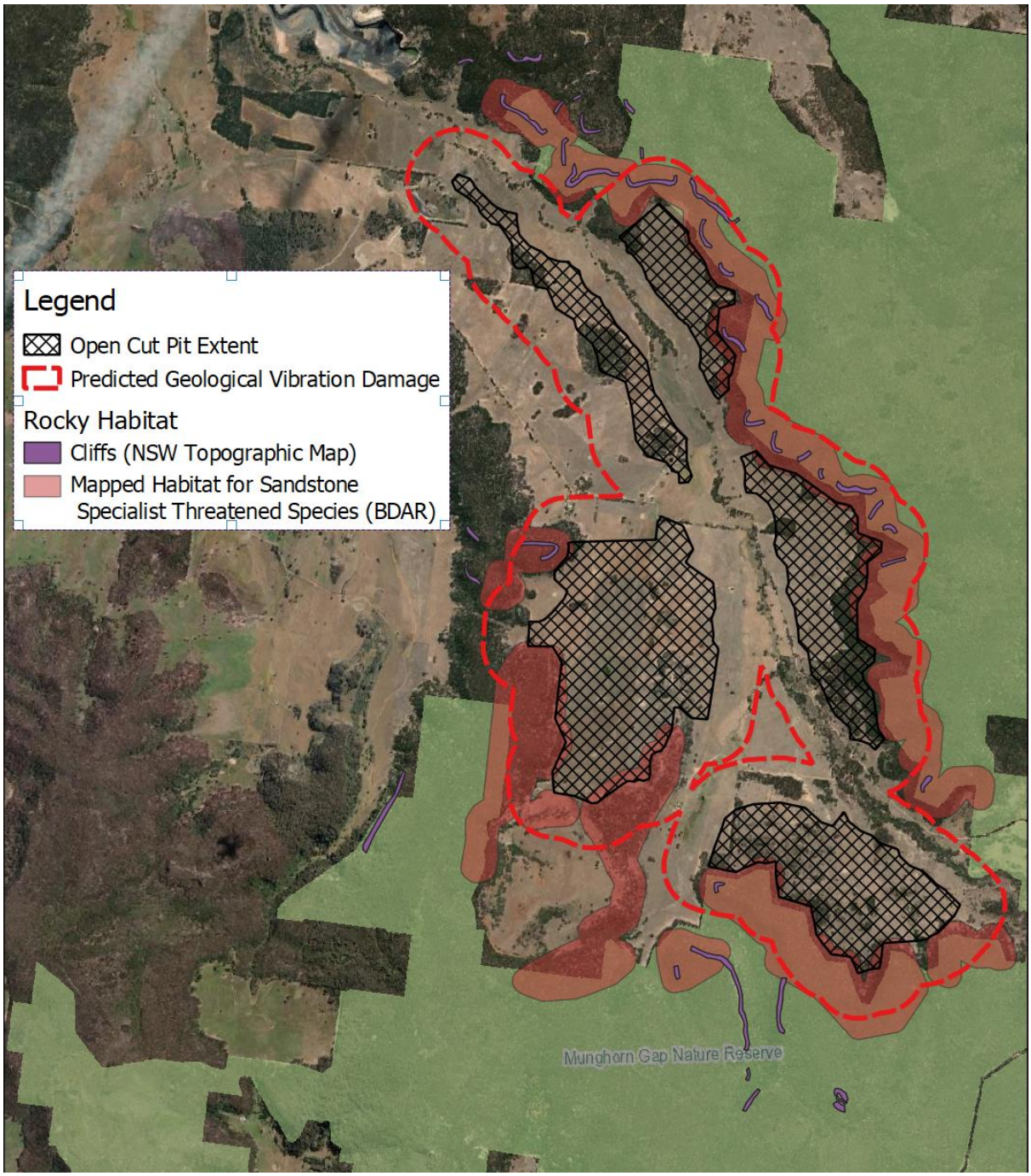

Figure 1: Predicted Geological Vibration Damage

As BCS understands, there has been no survey for biodiversity values or their habitats undertaken across the total areas surrounding the project which are expected to receive impacts from blasting vibration. However, based on BioNet records and the presence of potential habitat, a large diversity of sandstone habitat specialist fauna species are likely to be present. All of which are reliant on the abundant cliff, cave and crevice habitat present within the area for breeding and refuge.

This includes, but is not limited, to:

- threatened microbats, such as Large-eared Pied Bat, Large Bent-wing Bat, Little Bent-wing Bat and Eastern Cave Bat;
- reptiles and amphibians, including Pink-tailed Legless Lizard, Broad-headed Snake, and Red Crowned Toadlet; and
- mammals, including Spotted-tailed Quoll and Brush-tailed Rock Wallaby.

This sandstone habitat is sensitive to vibration induced impacts via cracking, fissure dilation, shearing, rock fall, cave collapse etc. The consequences of vibration impact to this habitat could include direct mortality of fauna, decrease in breeding and refuge habitat within the subject land and reduction in abundance. BCS considers that impacts of this nature would represent a residual prescribed impact to the threatened species occupying sandstone habitats surrounding the project.

For areas outside of NPWS estate, given that a residual prescribed impact has been identified to occur, BCS recommends that further assessment and potential offsetting via biodiversity credits (outside of the credit requirement generated by BAM-C for direct impacts) occurs in accordance with Section 6.1.2(b) of the *Biodiversity Conservation Regulation 2017* and Section 8.6 of the BAM.

Given that there is currently no set methodology for the quantification of residual prescribed impacts, BCS encourage the proponent to consult with relevant BCS officers to determine a method of assessment and credit quantification which will be adequately commensurate to the maximum potential impact resulting from the proposal.

The quantification of impacts should not be limited to those species which will receive mortality from vibration damage to habitat, rather it should consider the short- and long-term impacts for all sandstone specialist fauna which may have aspects of their lifecycle and future persistence disrupted via vibration impacts.

For areas within and protected by NPWS estate, no impacts to geological features should be occurring, as by the nature of its tenure, all biodiversity values within NPWS estate are legislatively protected. We recommend that set-back areas are established between open-cut pits and all geological features within Munghorn Gap Nature Reserve. BCS suggest that this set-back should be at least 500 meters, or greater if vibration damage to geological features within Munghorn Gap Nature Reserve is still a possibility.

Recommendations

1.1. Undertake habitat mapping for sandstone specialist threatened species habitat within the areas likely to receive vibration impacts from blasting. This should be undertaken after a revised damage criterion is established, as recommended in Heading 2.

1.2. Describe the nature, extent, frequency, duration and timing of prescribed impacts that may occur for each species in accordance with Section 8.3 of the BAM.

1.3. For areas outside of NPWS estate, offset residual prescribed impacts in accordance with Section 6.1.2(b) of the *Biodiversity Conservation Regulation 2017* and Section 8.6 of the BAM.

1.4. For areas within NPWS estate that will receive vibration impacts, establish setbacks between open-cut pits and all geological features, such that no impacts are expected to occur. This should be undertaken after a revised damage criterion is established, as recommended in Heading 2.

2. The expected impacts to biodiversity values and their habitats from blasting vibration may be underestimated

In relation to the bast vibration damage criteria, the Blasting Impact Assessment (SLR 2022) states:

"There are no regulatory criteria nominated in Australia for the assessment of damage to Aboriginal rock shelter sites or geological features from vibration. Research, however, has been undertaken by the United States (US) Army Corps of Engineers into the effects of large surface blasts on the dynamic stability of nearby unlined tunnels of various diameters in sandstone and granite (Blast Vibration Monitoring and Control [Dowding, 1985])[2]. The results of the research indicated that intermittent rock fall or observable damage was not observed until vibration levels exceeded 460 mm/s.

This assessment therefore adopts a conservative blast design vibration damage criterion of 250 mm/s Peak Particle Velocity (PPV) (5% exceedance) applicable to Aboriginal rock shelters as adopted in the MCO BMP based on available science plus (related) field observations, but absent of site-specific damage analysis."

It is unclear to BCS:

- why the 1985 North American article referenced above was considered the most appropriate and relevant reference to define the blast damage criterion for geological features surrounding the project,
- why a damage criterion of 250 mm/s Peak Particle Velocity (PPV) is considered both appropriate and conservative for the context of the project; and
- why a site-specific damage analysis was not undertaken by the proponent

BCS have serious concerns related to the generalised assumption provided that any vibration levels less than 250 mm/s PPV will have no effect on the incredibly complex and fragile sandstone geological features and associated threatened species habitat surrounding the project.

We note that other mines of a similar landscape position to the project have set significantly lesser vibration criterion for geological features. For example, the approved Invincible Coal Mine has a similar abundance and complexity of sensitive features, such as sandstone cliffs, caves, overhangs and rock towers. The Blasting Impact Assessment for the Invincible Coal Mine Southern Extension Project[3] (See Figure 2), set the following vibration damage criteria were set for geological features:

- *Sandstone Pagodas – 50 mm/s PPV*
- *Cliff lines 25 mm/s PPV*

In this assessment, sensitive geological features in proximity of the Invincible Mine site were surveyed and a context specific predictive model was developed for the identified features.

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[2] *Dowding, C.H. (1985) Blast Vibration Monitoring and Control: Prentice-Hall Inc., New Jersey.*

[3] *Enviro Strata Consulting Pty Ltd (2016) Invincible Southern Extension Project – Blasting Impact Assessment. Valentine NSW*

Table 3: Summary of Blast Emission Assessment Criteria

Location	Vibration Criteria (mm/s)	Airblast Criteria (dBL)
Private residences[(1)]	5 / 10	115 / 120
Public roads	100	n/a
Concrete bridges	100	n/a
Power transmission lines[(2)]	50 / 100	n/a
Surface infrastructure - occupied	25	133
Surface infrastructure - unoccupied	100	133
Historical sites (Miners Cottages, Cullen Bullen Public School, Royal Hotel, Sandstone Building Footings)	5	133
Sandstone pagodas	50	n/a
Cliff line	25	n/a

(1) - Specified in the existing Project Approval PA 07_0127-2008;
(2) - 50 mm/s applies to tension towers, 100 mm/s applies to free standing towers.

Figure 2: Extract from Invincible Southern Extension Project – Blasting Impact Assessment

BCS consider it essential, given the projects adjacency to the natural values legislatively protected by NPWS estate, that a site-specific damage analysis is undertaken. This should include an appropriately precautionary vibration criterion which is modelled for the actual context of the project and its surrounding geological complexity. This modelled criterion should be informed by ground-truthing and survey of the geological features surrounding the project, rather than rely solely on broad-scale topographic mapping and desktop review.

Recommendations

2.1. Undertake a ground-truthing survey for sensitive geological features surrounding the project which are expected to receive vibration impacts.

2.2. Prepare a site-specific vibration damage analysis, inclusive of revised damage criterion, modelled for the actual context of the project and its surrounding geological complexity.

3. The indirect impacts of airblasts on fauna beyond the development footprint have not been adequately assessed and may be underestimated

The Blasting Impact Assessment (SLR 2022) states that:

"In a study by Casaday and Lehmann (1967) (Responses of Farm Animals to Sonic Booms) animal installations were selected for observations on animal behaviour under sonic boom conditions. The number of animals observed in this study included approximately 10,000 commercial feedlot beef cattle, 100 horses, 150 sheep and 320 lactating dairy cattle.

The researchers developed a summary by species and farms, indicating that the few abnormal behavioural changes observed were well within the range of activity variation within a group of animals. They defined these changes as horses jumping up and galloping around the paddock, bellowing of dairy cattle, and increased activity by beef cattle (Casaday and Lehmann, 1967). In order to provide for a conservative assessment, the lowest airblast exposure studied (125 dB) was adopted as a criterion for the purposes of assessment of livestock impacts."

In accordance with Table 27 in the Blasting Impact Assessment, the maximum distance where the airblast livestock disturbance criterion of 125 dBL would be exceeded is up to 1.3 km away from the project, extending well into the habitats legislatively protected by Munghorn Gap Nature Reserve. This has been displayed in Figure 3 below.

Table 27 Livestock Ground Vibration and Airblast Safe Working Distances

Blast Design	Blast MIC	Stockyard Livestock Vibration[1] (200 mm/s)	Stockyard Livestock Airblast[1] (125 dBLpk)
Coal	400 kg	66 m (5%)	1,300 m (5%)
Overburden	4,500 kg	279 m (5%)	1,000 m (5%)

Note 1: The distance from blast to where the ground vibration or airblast is predicted to meet the relevant livestock disturbance criteria.

No private land is located within 1,300 m from the Project open cut mining area. Subsequently, the relevant ground vibration and airblast criteria for livestock are predicted to not be exceeded for the Project.

Figure 3: Extract from Blasting Impact Assessment

From review of the BioNet Atlas records of threatened species within the vicinity of the project, a high diversity of threatened fauna have been detected within the expected livestock disturbance airblast range. For example, an occupied Masked Owl breeding tree, containing nestlings, was identified by the project ecologists less than 200m from the edge of a proposed blasting area. All threatened species records have also been provided in Figure 4 below.

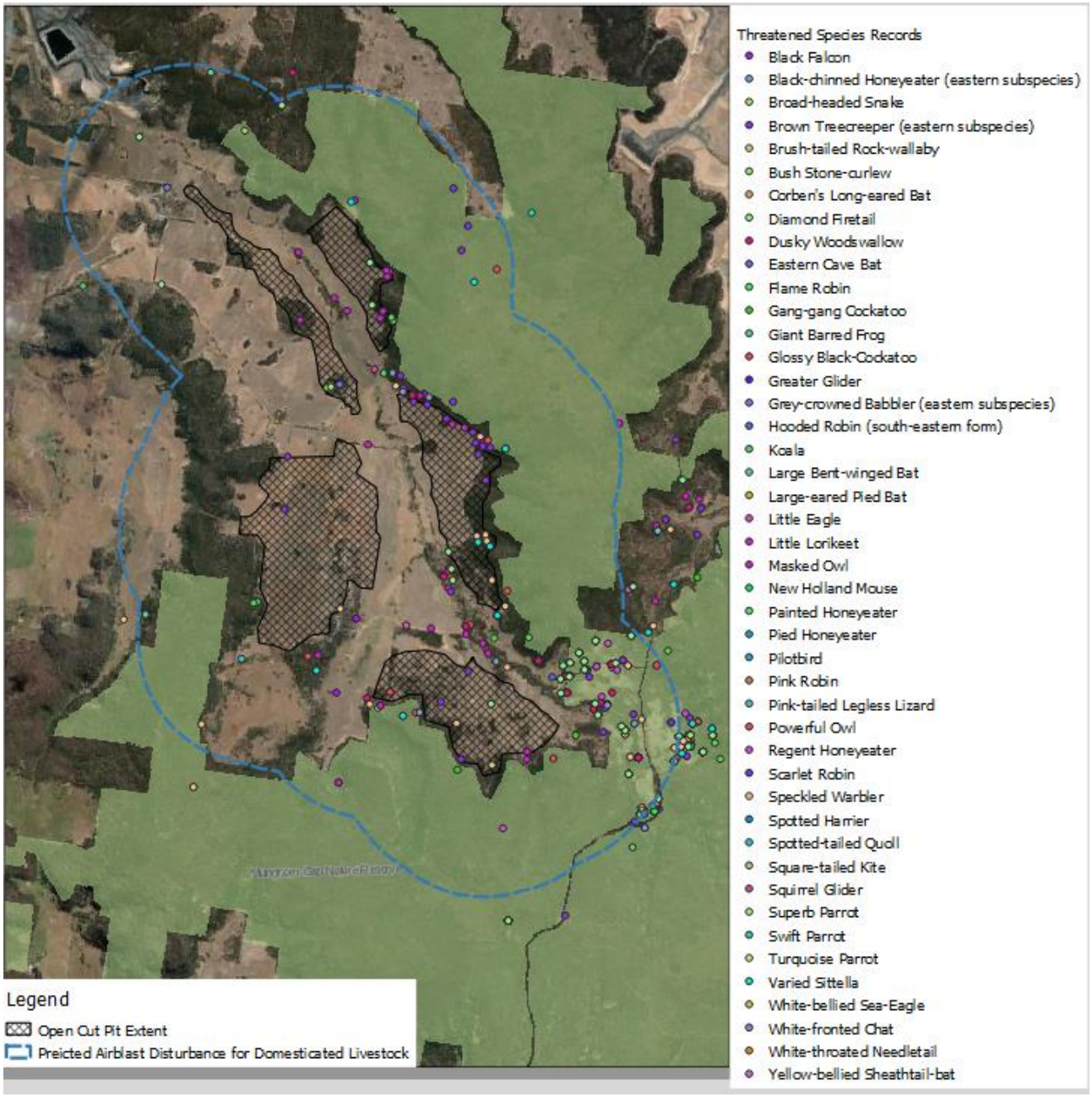

Figure 4: Threatened species located within the predicted airblast disturbance area (for domesticated livestock)[4].

The BDAR prepared for the project only provides general statements regarding the potential indirect impacts which could occur to threatened species surrounding the project. Impacts resulting from airblasts produced by the project should be rigorously assessed and quantified for each threatened species likely to be disturbed.

Of the high diversity of threatened species within the disturbance airblast range, there may be some species that are more sensitive to noise impacts than typical domesticated livestock. As such, there is the potential that the noise disturbance from airblasts to native fauna may reach far greater than what is depicted within Figure 4. As such, an airblast criterion for each taxon of fauna likely to be disturbed by the project i.e., owls, mammals, frogs, woodland birds etc. should be

[4] *NSW BioNet Atlas < https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/nsw-bionet> Data Sourced January 2023*

established. This analysis should refer to available peer-review literature, where available, on species biology to determine an appropriately precautionary airblast disturbance range.

Once an appropriate airblast criterion has been determined, the BDAR should be updated to identify threatened taxa and their habitats likely to be affected by airblasts and describe the nature, extent and duration of short-term and long-term impacts for species likely to be disturbed, in accordance with Section 8.2 of the BAM. If there is uncertainty, a worst-case scenario should be assumed.

Recommendations

3.1. Determine an appropriate airblast criterion for threatened taxa within the vicinity of the project.

3.2. Describe the nature, extent and duration of short-term and long-term impacts for each threatened taxa likely to be disturbed, in accordance with Section 8.2 of the BAM.

3.3. If there is uncertainty related to the expected impacts that airblast disturbance may cause, a worst-case scenario should be assumed.

4. How blasting vibration impacts to biodiversity, their habitats and geological values will be managed is unclear

BCS understands that the current 250mm/s PPV damage criterion is expected to be exceeded by a significant magnitude in areas less than 357 meters away from proposed blasting sites.

For example, as stated in Table 28 of the Blasting Impact Assessment, there is a predicted PPV level of 11,275 mm/s for Aboriginal rock shelters approximately 40 meters from proposed blasting locations (under a 4,500kg overburden blasting scenario). This is greater than 45 times the currently set damage criterion.

The same predictions as displayed in Table 28 (reproduced in Figure 5 below) have not been provided for other geological features within Munghorn Gap Nature Reserve, i.e. caves, cliffs and overhangs. However, it is stated in the Blast Impact Assessment and BDAR that:

"Significant natural geological features (i.e. cliff habitat) that potentially form habitat for threatened bat species are also located near to the Project open cut mining area and coal blast design MIC of 400 kg and overburden blast design MICs of 1,500 kg, 3,000 kg and 4,500 kg would also exceed the relevant damage vibration criteria.

Blast design and execution would be adjusted as required for blasts located in close proximity to identified sensitive features (e.g. Aboriginal rock shelters, significant geological features) to maintain compliance with relevant vibration or airblast criteria."

Table 28 Predicted PVS Ground Velocity Vibration Levels at Aboriginal Rock Shelter Sites (mm/s)

Aboriginal Rock Shelter ID	Approximate Nearest Point to Project mining area	Coal MIC 400 kg		Overburden MIC 1,500 kg		Overburden MIC 3,000 kg		Overburden MIC 4,500 kg	
		50%	5%	50%	5%	50%	5%	50%	5%
S1MC403[1]	-	-	-	-	-	-	-	-	-
S1MC403[1]	-	-	-	-	-	-	-	-	-
S1MC508	80	416	807	409	1,298	747	2,372	1,063	3,375
S1MC509[1]	-	-	-	-	-	-	-	-	-
S1MC510	120	204	396	202	641	369	1,171	525	1,667
S1MC511	40	1,408	2,731	1,365	4,335	2,495	7,924	3,550	11,275
S1MC512[1]	-	-	-	-	-	-	-	-	-
S1MC513	70	526	1,021	516	1,637	942	2,992	1,341	4,258
S1MC514	60	690	1,339	674	2,141	1,232	3,913	1,753	5,568
S1MC515	80	416	807	409	1,298	747	2,372	1,063	3,375
S1MC516	70	526	1,021	516	1,637	942	2,992	1,341	4,258
S1MC517	40	1,408	2,731	1,365	4,335	2,495	7,924	3,550	11,275
S1MC518	50	951	1,845	926	2,940	1,692	5,374	2,408	7,647
S1MC538	190	91	176	91	288	166	526	236	749
S1MC540	60	690	1,339	674	2,141	1,232	3,913	1,753	5,568

Note 1: Located within proposed indicated open cut mining area.

Note 2: Predicted ground vibration level complies with Aboriginal rock shelter vibration criterion of 250 mm/s.

Figure 5: Extract of the Blasting Impact Assessment showing the magnitude of predicted vibration damage exceedance

As displayed in Figure 1 of this response, proposed open cut pits will require removal of mapped sandstone habitat for threatened species. This would leave a large extent of connected sandstone habitat immediately adjacent to proposed open cut pits. Given the expected magnitude of potential blast damage for geological features, it is unclear how blasting can be realistically managed such that no additional damage will be caused to threatened species habitat surrounding open cut pits. This is also inclusive of the habitats legislatively protected within Munghorn Gap National Park, which are located approximately 50 metres away or less from proposed open cut pits.

BCS notes that, in instances where cracking impacts have occurred to sandstone geological features[5], undertaking remediation works, in an attempt to repair impacts to geological features, may cause further damage and potentially outweigh the benefits of undertaking this work. As such, it is considered that any impacts to geological features should be considered irreversible.

It is critical that the proponent describes, in detail, how vibration damage to threatened species and their habitats are expected to be managed during the operation of the project. BCS considers that provision of this detail should not be deferred to post-consent management plans, given the potential significance of the impact to the biodiversity and geodiversity values protected within Munghorn Gap Nature Reserve.

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[5] *NPWS and BCS (2022) Airly Coal 2 – Airly Extraction Plan – Modification 2 – Supplementary Response to Submissions*

Recommendation

4.1. Describe and justify, in detail, how vibration damage to biodiversity and geodiversity values are expected to be managed during the operation of the project, such that no impacts will occur.

5. How noise impacts to biodiversity and their habitats will be managed is unclear

In relation to the management and mitigation of airblast impacts, Section 8 of the Blasting Impact Assessment states:

"Compliance with the PNTLs and the Project Approval (05_0117) and Project Approval (08_0135) noise limits are achieved at all private residences and non-residential receivers during standard and noise enhancing meteorological conditions during the day, evening and night.

Table J4.5(A) and Table J5.4(A) of AS 2187 provide airblast and vibration limits for human comfort for occupied noise sensitive sites of 125 dBL.

Operational noise levels are also predicted to comply with the relevant project noise trigger levels and Project Approval criteria at all community facilities."

However, the Blasting Impact Assessment does not mention the noise criteria for Munghorn Gap Nature Reserve detailed in Table 1 of Project Approval 05_0117 and Table 3 of Project Approval 08_0135, which defines an upper limit of 50 dB(A) for the entire nature reserve.

The Blasting Impact Assessment also does not reference Condition 15 of Project Approval 08_0135, which does not permit any blasting within 500 metres of any land not owned by the proponent, unless:

- *"a blast management plan (BMP), ensures safety of people and avoids damaging of infrastructure,*

  AND

- *BMP includes specific additional measures to manage land within 500m,*

  OR

- *a written agreement with the landholder is made".*

Given the expected magnitude of potential airblast disturbance i.e., exceeding 125 dBL upwards of 1.3 kilometres from the edge of proposed open cut pits, BCS question how the "*Project Approval Noise Limits*" referenced in the Blasting Impact Assessment are expected to be realistically managed for Munghorn Gap Nature Reserve and the biodiversity values it protects (located less than 50 metres away from proposed blasting areas).

It is critical that the proponent describes and justifies, in detail, how airblasts and disturbance to threatened species and their habitats surrounding open cut pits are expected to be managed during the operation of the project. BCS considers that provision of this detail should not be deferred to post-consent management plans, given the potential significance of the impact to Munghorn Gap Nature Reserve.

Recommendation

5.1. Describe and justify, in detail, how noise impacts to threatened species and their habitats are expected to be managed during the operation of the project, such that no impacts will occur.

6. Provide confirmation that the total direct impact required for the project is captured in the EIS

Section 1.1.2 of the BDAR states:

"The Subject Land, hereafter referred to as the Development Footprint, is the indicative surface disturbance extent of the Project and encompasses approximately 825.58 hectares (ha) of land, which is zoned RU1 (Primary Production) in the Mid-Western Regional Local Environmental Plan (NSW Government 2012)."

Figures within the BDAR display an "*Indicative Surface Disturbance Extent*" proposed to be impacted by the project. It is unclear if the Indicative Surface Disturbance Extent represents the maximum total clearance required for the project.

All activities and development components which will result in surface disturbance to biodiversity values, i.e. direct clearing, must be accounted for in Stage 2 of the BDAR and included within BAM-C calculations. If the final impact resulting from the project has yet to be determined for the biodiversity values that may be impacted, a worse-case scenario should be assumed, and a maximum credit obligation calculated accordingly.

Recommendation

6.1. Confirm that the total clearing required for the development has been included in the BDAR and accounted for in the BAM-C or that a worst-case scenario has been assumed.

SAII criteria have been met and further avoidance of impacts should be undertaken

7. Further avoidance should be implemented to reduce SAII to Cave Dwelling Microbats and the Broad-headed Snake

Two threatened SAII microbats, namely the Large Eared Pied-bat and Eastern Cave Bat, were recorded utilising the airspace within the project area and breeding within the study area. In addition, a sandstone specialist species, Broad-headed Snake, was also identified within the development footprint. These species are listed as candidate SAII entities under Principle 4 in accordance with Section 6.7 of the *Biodiversity Conservation Regulation 2017*.

Principal 4 states:

"An impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct because —

the impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable."

The Threatened Biodiversity Database Collection (TBDC) profile for both microbat species states:

“Any impacts on breeding habitat used by this species could be considered potentially serious and irreversible.”

Similarly, the Broad-headed Snake is also listed as candidate SAII entity under Principle 4

The TBDC profile for this species states:

“*Key threats are land clearing, such as access tracks for mining, and the disturbance of sites*.”

It is understood that the direct impacts of the project would include the following:

- Broad-headed Snake – 38.24 hectares of habitat
- Large-eared Pied Bat – 230.56 hectares of habitat
- Eastern Cave Bat – 230.56 hectares of habitat

In accordance with Principle 4, based on the best current ecological knowledge of the life history traits and characteristics of these species, they require habitat components that cannot be re-created within offset sites. In this case, the essential habitat component they require are geological features, such as the abundant cliff, cave, overhang and crevice habitat present within and adjacent to the project. These features are irreplaceable within an offset site, examples of habitat identified on site is provided in Figure 6 below.

Plate 9 Roosting habitat features in the western slopes and ridges

Plate 8 Roosting habitat features in the southern slopes and ridges

Figure 6: Extract from BDAR showing cave complexes and sandstone habitat immediately adjacent to the project

As stated above, of even greater concern for these species is the additional prescribed and indirect impacts that may occur to a much more significant extent of breeding habitat surrounding the project and the ability to adequately manage these impacts.

The size of the local populations of each species surrounding the project is unknown, as comprehensive survey has not occurred across the area expected to receive vibration and noise impacts from blasting. However, substantial cave complexes and sandstone habitat is known to occur for all SAII species. The proximity of the fragile geological features and cave complexes immediately adjacent to proposed blasting areas will likely exacerbate the impact on breeding habitat for these species. These prescribed impacts could be on-going for over 10 years whilst blasting is occurring for the project.

The sensitivity of these species to blasting and mining impacts has been well studied in the regional area. For instance, in the Ulan mining lease area 8 kilometres to the north of the project, microbat roosting and breeding caves have been monitored as part of approval conditions since 2011, focusing on the potential impacts of Ulan West and No. 3 underground areas, as well as the open cut mine.

In the 2019 report *Microbat Monitoring of the Ulan Coal Mine Lease during 2019*[6] it was highlighted that a significant decline in microbat activity has been detected as compared to pre-mining conditions, this is summarised from the following excerpts of the report:

"There were a number of declines in target microbat species activity at impact sites above the longwalls of Ulan West and Ulan Underground. This included declines in excess of 10% of the average pre mining activity as recorded by echolocation call, and was referenced against changes in activity at control sites over the same time period.

It is uncertain when, or if, declines in activity detected at longwalls during the current monitoring will return to pre-mining levels. Analyses undertaken for this report indicate that the Large-eared Pied Bat has declined for at least four years post-mining across the impact sites monitored.

Monitoring will give us information on how long until bats return to disturbed clifflines (if at all), but doesn't solve the problem of temporary habitat displacement/loss."

BCS considers that the project could irreversibly disturb and/or destroy at least an additional 653 hectares of potential habitat via vibration damage, based on the data presented in the Blasting Impact Assessment. As stated in Heading 1, this impact could be far greater than 653 hectares, as we have concerns that the current the 125mm/s PPV damage criterion for geological features is based on generalised assumptions rather than site-specific analysis.

Given the above, BCS considers that the direct loss of:

- a cumulative 230.56 hectares of habitat for SAII microbat species; and
- 38.24 hectares of sandstone habitat for the Broad-headed Snake; and
- at least an additional 653 hectares of potential impact to cave and sandstone habitat via vibration damage

would meet the criteria detailed within SAII Principle 4 and as such the proposed project, if approved as currently presented, would significantly contribute to the risk of these entities becoming extinct within NSW.

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6 *G.A. Hoye, A. Lothian & N.Tong (2020) Microbat Monitoring of the Ulan Coal Mine Lease during 2019 A report to Ulan Coal Mines Limited Fly By Night Bat Surveys Pty Ltd*

It is recommended that the proponent revise the currently presented development footprint, and avoidance and minimisation strategies proposed, to further reduce impacts of the proposed development to SAII microbats and the Broad-headed Snake.

BCS suggest that appropriate avoidance and minimisation of impacts to these species would be best achieved by applying set-backs between proposed open-cut pits and known/potential breeding habitat. BCS suggest that this set-back should be at least 500 meters (or greater if vibration damage to roosts are still expected), as this would significantly reduce the direct loss of habitat and also create a commensurate reduction in blasting vibration impacts.

Recommendations

7.1. The consent authority note BCS advice in relation to SAII criteria for Microbats and the Broad-headed Snake when considering the adequacy of avoidance and minimisation to biodiversity impacts proposed, conditioning of the project and potential project approval.

7.2. The proponent revise the currently presented development footprint and avoidance and minimisation strategies proposed to further reduce SAII to Microbats and the Broad-headed Snake.

8. Further avoidance should be implemented to reduce SAII to Box Gum Woodland

For Box Gum Woodland, the BDAR states that the project will result in a loss of:

- Box Gum Woodland – 84.22 hectares of woodland extent
- Box Gum Grassland – 393.53 hectares of grassland extent.[7]

Although a large proportion of the site is represented as derived native grassland, these areas have been categorised as of a high enough quality to meet *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) condition thresholds.

Box Gum Woodland is listed as a candidate SAII entity under Principle 1 and Principle 2 in accordance with Section 6.7 of the *Biodiversity Conservation Regulation 2017*. These Principles state:

"An impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct because —

Principle 1: it will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline, or

Principle 2: it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size."

The NSW Threatened Species Scientific Committee Final Determination for this community lists the clearing of native vegetation as a key threating process for the Critically Endangered Ecological Community (CEEC). In addition, there is no minimum clearing threshold identified within relevant

[7] It should be noted that some areas of Box Gum Woodland/Grassland within the project area may have been assigned to Category 1 Land and discounted from further assessment. As such, this area may be an underestimate of total impacts.

databases which could be considered an insignificant decline in this community; therefore, any incremental loss in extent would be contributing to the principles set out above.

As such, BCS considers that the loss of a cumulative 477.75 hectares of Box Gum Woodland would be consistent with SAII criteria and the proposed project, if approved as currently presented, would significantly contribute to the risk of this entity becoming extinct within NSW.

It is recommended that the proponent revise the currently presented development footprint and avoidance and minimisation strategies proposed to further reduce impacts of the proposed development to Box Gum Woodland.

Recommendations

8.1. The consent authority note BCS advice in relation to SAII criteria for Box Gum Woodland when considering the adequacy of avoidance and minimisation to biodiversity impacts proposed, conditioning of the project and potential project approval.

8.2. The proponent revise the currently presented development footprint and avoidance and minimisation strategies proposed to further reduce impacts to Box Gum Woodland.

9. Further avoidance should be implemented to reduce SAII to Regent Honeyeater

For Regent Honeyeater, the BDAR states that the project will result in a loss of 184.41 hectares of intact woodland mapped as “Important Habitat” for the species within the Mudgee-Wollar breeding area. “Important Habitat” is defined as habitat which is considered essential to support critical life stages of the species and maintain the survival of the species in the wild.

Regent Honeyeater is listed as a candidate SAII entity under Principle 1 and Principle 2 in accordance with Section 6.7 of the *Biodiversity Conservation Regulation 2017*. These Principles state:

“An impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct because —

Principle 1: it will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline, or

Principle 2: it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size.

In accordance with Principle 1 and 2, based on the best current ecological knowledge of the life history traits and characteristics of the Regent Honeyeater, the species has historically undergone a rapid rate of decline and is currently comprised of a very small population size of few remaining individuals. The total Regent Honeyeater population is thought to currently comprise 250 to 350 mature individuals. It is estimated that the Greater Blue Mountains population is currently comprised of 150 individuals (Heinsohn et al. 2022[8]).

[8] *Heinsohn et al (2022) Population viability in data deficient nomadic species: What it will take to save regent honeyeaters from extinction. Biological Conservation, Volume 266*

As stated in Heading 3 of this response, of equal concern to the significant amount of habitat loss being proposed, is the additional indirect disturbance that is likely to occur as a result of the operation of the project.

Appendix D of the BDAR states:

"It is also uncertain how the Regent Honeyeater may be impacted by noise and artificial light from the Project. Artificial light as an edge effect has been studied in combination with traffic noise, mostly in the context of road ecology. In this context it has strong negative effects on many nocturnal taxa, mammal species richness increases at the point where light levels return to ambient darkness, and bird diversity increases with distance from the road (Haddock et.al. 2019a; Haddock et.al. 2019b). Haddock's (2019a) study suggests that birds are likely impacted by noise and artificial light, thus there is potential for the Project to further preclude the Regent Honeyeater from adjoining areas of habitat through noise and artificial light. Blasting may cause a temporary short-term behavioural change such that the animals may flee as a result of the noise. Should the species be breeding in close proximity, blasting may cause the parents to leave a nest either temporarily or possibly permanently deserting the nest."

As displayed in Figure 4, BCS is concerned that the project could disturb at least an additional 2,480 hectares of Important Habitat via operational noise, artificial light and airblast disturbance, including that which is legislatively protected within Munghorn Gap Nature Reserve. Due to the status of the Greater Blue-Mountains Regent Honeyeater population, all future breeding events will be critical to the species on-going survival.

Given the above, BCS considers that the direct loss of:

- 184.41 hectares of woodland defined as habitat which is considered essential to support critical life stages of the species and maintain the survival of the species in the wild; and
- an additional disturbance to 2,481 hectares of potential habitat via operational noise, artificial light and airblasts

would be consistent with the SAII criteria under Principle 1 and 2 and the proposed project, if approved as currently presented, would significantly contribute to the risk of the Regent Honeyeater becoming extinct within NSW.

The proposed loss and disturbance of "Important Habitat" is likely to be a significant loss for this species which is already close to extinction. It is recommended that the proponent revise the currently presented development footprint and avoidance and minimisation strategies to significantly reduce impacts of the proposed development to this species.

The consent authority should also note that, the retirement of offset credits for such significant impacts to the Regent Honeyeater under the like-for-like rules is not likely to be possible due to a lack of significant areas of suitable breeding habitat within the Mudgee and Wollar region, and elsewhere in NSW. The remaining "Important Habitat" for this species is largely located in national parks, Crown land, or areas of private land already under conservation agreements.

In addition, restoration techniques are not yet able to increase the carrying capacity of current protected areas to support regent honeyeater populations over the long term (Heinsohn et al 2022; Watson 2011[9]). Further, recent drought and fire impacts to habitat in the Greater Blue Mountains

[9] Watson, D.M., 2011. A productivity-based explanation for woodland bird declines: poorer soils yield less food. Emu, 111(1), pp.10-18.

region has reduced the quality of remaining habitat (Crates et al 2022[10]), impacting the ability to identify offsetting sites.

Recommendations

9.1. The consent authority note BCS advice in relation to SAII criteria for Regent Honeyeater when considering the adequacy of avoidance and minimisation to biodiversity impacts proposed, conditioning of the project and potential project approval.

9.2. The proponent revise the presented development footprint and avoidance and minimisation strategies proposed to significantly reduce proposed impacts to the Regent Honeyeater.

10. The cumulative impact of mining operations on the local populations of Koala and Squirrel Glider should be further assessed

Both the Koala and Squirrel Glider have been identified as utilising habitat within the project. In the case of the Koala, individuals and evidence of presence were recorded on seven occasions.

The impacts of the project to both species have been assessed in many parts throughout the BDAR. In relation to the project's potential impacts on these species' movement and the connectivity of habitat it is stated that:

"The open pit and haul roads associated with the Development Footprint would create an impediment across the valley floor to species such as the Koala which are less mobile and rely on connectivity features such as remnant vegetation or scattered trees to move between habitats. While connectivity of woodland habitat would be retained around the edge of the Development Footprint, movement from one side of the valley to the other would be restricted by the development for some species."

In relation to the depletion of resources for both species the BDAR states:

"The Project would result in removal of habitat across the valley floor, reducing the area of habitat and foraging resources available to the species as well as restricting movement between patches of vegetation in the east and west. Koalas would be displaced over the life of the mine as habitat is progressively cleared."

In the case of the Koala, the population within the project area was identified within the EIS to have survived recent and historical temperature increases, drought and bushfires and was considered to be a 'climate-robust' breeding population located within a well-connected landscape. As such, the habitat and population within the project area was identified to be critical to the survival of the species and the adverse impacts of the project to the species were likely to be significant.

BCS consider that the significance of the impact to both species may be of a greater quantum to that detailed within the BDAR. We have concerns that the valley floor vegetation to be directly impacted by the project may represent a critical seasonal foraging, breeding and refuge resource for both species. The valley floor woodland habitat is comprised of unique and separate vegetation types which are not present within Munghorn Gap Nature Reserve. Maintaining connectivity to a

[10] Crates, R., Rayner, L., Stojanovic, D., Scheele, B.C., Roff, A., MacKenzie, J. and Heinsohn, R., 2022. Poor-quality monitoring data underestimate the impact of Australia's megafires on a critically endangered songbird. Diversity and Distributions, 28(3), pp.506-514.

diversity of foraging and breeding resources within the landscape is likely to be a critical aspect to the continued persistence of the local populations.

In addition, the BDAR has not recognised the cumulative impact associated with the continued loss of habitat surrounding Munghorn Gap Nature Reserve, via vegetation clearance. Currently connectivity to the surrounding landscape is heavily impeded by Ulan mine and the Moolarben Coal Complex to the north and the Wilpinjong Mine to the east. The isolation of this population would be further exacerbated by the project's proposed location to the west of Munghorn Gap Nature Reserve.

BCS recommends that the seasonal foraging resources within the project area and cumulative impacts of vegetation clearance from mining operations for these species are further assessed and described within the BDAR. We also recommend that the proponent revise the presented development footprint and avoidance and minimisation strategies proposed to reduce proposed impacts to the Koala and Squirrel Glider.

Recommendations

10.1. The proponent assess the potential impacts of the depletion of seasonal foraging, breeding and refuge resource within the project for the Koala and Squirrel Glider

10.2. The proponent assess the cumulative impacts of vegetation clearance and connectivity disruption for the Koala and Squirrel Glider

10.3. The proponent revise the presented development footprint and avoidance and minimisation strategies proposed to reduce proposed impacts to the Koala and Squirrel Glider.

10.4. The consent authority note BCS advice in relation to impacts to the Koala and Squirrel Glider when considering the adequacy of avoidance and minimisation to biodiversity impacts proposed, conditioning of the project and potential project approval.

Further justification and revision of the BDAR is required, inaccuracies in the BDAR can affect impact and credit outcomes

11. Provide an explanation for the identification of Bush-stone Curlew within the project

Table 15 of the BDAR states that targeted survey was undertaken for the Bush-stone Curlew within the project and that the species was not detected. As such, no species polygon was prepared.

Appendix B of the Baseline Fauna Survey Report lists the Bush-stone Curlew as being detected during surveys. In addition, three separate BioNet records of the species have been uploaded within habitat proposed to be directly impacted, this includes the following records:

- BioNet Sighting Key SPJGI7325145 – Bush-stone Curlew
- BioNet Sighting Key SPJGI7325146 – Bush-stone Curlew
- BioNet Sighting Key SPJGI7325144 – Bush-stone Curlew

All of the above records have a location description of "*Moolarben Coal Mine Lease Area located approximately 26 km East from Gulgong, NSW".* All of the records were detected during August 2021, which coincides with targeted survey dates listed within the baseline fauna survey report. In addition, the observers listed against each sighting include field personnel which participated in fauna surveys for the project.

If the species has been recorded on site, a species polygon must be prepared in accordance with Section 5.2.5 of the BAM. Further, it is recommended that Table 15 is revised to account for the recorded sightings of the individuals mentioned above.

If the records have been erroneously detailed in both Appendix B of the Baseline Fauna Survey Report and in the BioNet Atlas, the Appendix should be updated and the field staff who detected these records should apply to have them removed from BioNet.

Recommendations

11.1. Provide an explanation for the identification of Bush-stone Curlew within the proposed project.

11.2. If the species has been recorded on site prepare a species polygon in accordance with Section 5.2.5 of the BAM.

11.3. If the records have been erroneously detailed, update the appendix and apply to remove these records from BioNet.

12. Revise the BDAR to account for the identification of Gang-gang Cockatoo within the project

Table 15 of the BDAR states that targeted survey was undertaken for the Gang-gang Cockatoo within the project and that the species was not detected. As such, no species polygon was prepared.

Appendix B of the Baseline Fauna Survey Report lists the Gang-gang Cockatoo as being detected during surveys. In addition, four separate BioNet records of the species have been uploaded within habitat proposed to be directly impacted, this includes the following records:

- BioNet Sighting Key SPJGI7325277
- BioNet Sighting Key SPJGI7325278
- BioNet Sighting Key SPJGI7325279
- BioNet Sighting Key SPJGI7325280

It is unclear if these recorded sightings of Gang-gang Cockatoos within the project site were of individuals exhibiting breeding behaviour, as per the criteria for generating species credits defined by the TBDC.

It is recommended that Table 15 is revised to account for the recorded sightings of the individuals mentioned above and that further information is provided detailing if the individuals recorded within the project site were exhibiting breeding behaviour.

Recommendations

12.1. Update the BDAR to account for the identification of the Gang-gang Cockatoo within the proposed project.

12.2. If the species recorded were exhibiting breeding behaviour prepare a species polygon in accordance with Section 5.2.5 of the BAM.

13. Revise the species polygon for *Pomaderris cotoneaster*

Section 3.4.1.1 of the Baseline Flora Survey Report identifies that *Pomaderris cotoneaster* was recorded on a range of sedimentary rock derived substrates, landscape positions and an altitude between 520 and 580 metres. Within the Subject Land, *Pomaderris cotoneaster* was recorded within PCT 281, PCT 1610 and PCT 1629, which are all present across the Subject Land. Furthermore, Table 9 of BDAR indicates that PCT 481 is also suitable habitat according to the TBDC.

The species polygon for *Pomaderris cotoneaster* has been applied according to the method for "Count Species". *Pomaderris cotoneaster* is an "Area Species" and as such the species polygon should include the individuals detected, in addition to all suitable habitat, in accordance with Section 5.2.5 of the BAM 2020 and the detail contained within Section 4.4.5 of the BAM Operational Manual Stage 2.

Recommendation

13.1. Revise the species polygon for *Pomaderris cotoneaster* to be in accordance with the BAM.

14. The land categorisation of CEEC extent requires revision

Section 1.3 of the BDAR states:

"A total of 20 IGGAM transects were undertaken to assess the proportion of native and exotic perennial groundcover species in accordance with Section 3.2.3 of the IGGAM, and a native species assessment was undertaken in accordance with Section 3.3 of the IGGAM to be thorough. All data was inserted into the IGGAM Calculator to determine the conservation value of the grassland and other groundcover. A full description of the Category 1 – exempt land assessment is provided in Appendix C of the ELA (2022)

Baseline Flora Report. Following land categorisation surveys, 191 ha within the Development Footprint was classified as Category 1 – exempt land."

BCS have identified that the land categorisation method may not have first determined if land in the subject site was Category 2 land, prior to assigning areas of Category 1 land.

The *Native Vegetation Land Categorisation for application in the Biodiversity Offsets Scheme* guideline details the method followed to determine a reasonable approximation of Category 2 Regulated Land and Category 1 Exempt Land. In this, where a reasonable approximation it is recommended:

"Land may satisfy the criteria for both Category 1-exempt land (section 60H, LLS Act) and Category 2-regulated land (section 60I, LLS Act). In most circumstances, Category 2-regulated land criteria will determine the categorisation of the land rather than Category 1-exempt land criteria (section 60H(4)(a), LLS Act)."

Section 60I of the *Local Land Services Act 2013* (LLS Act) defines the criteria in which land can be classified as Category 2 – regulated land, this includes land which contains Critically Endangered species of plants or a CEEC.

As a consequence of receiving the vegetation mapping and data for the project area, BCS have concerns that a significant amount of the CEEC *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (Box Gum Woodland/Box Gum Grassland) may

have first been designated as Category 1 land under the Interim Grasslands and other Groundcover Assessment Method (IGGAM) method and discounted from further assessment, despite evidence being collected indicating that the CEEC is present within Category 1 land.

BCS raise these concerns due to the outputs of IGGAM data presented in Appendix C of the BDAR, which has assigned all IGGAM plots to PCT 281 *Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion*. Other than within IGGAM plots, this PCT has been identified as representative of both state and National forms of the CEEC Box Gum Woodland across the entirety of the project site.

Based on the extensive matrix of Box Gum Woodland vegetation present within the project site BCS recommends that a precautionary approach is followed, and in the absence of data supporting CEEC presence/absence, that land be designated as Category 2 – regulated land and Box Gum Woodland or Box Gum Grassland be assumed present and mapped accordingly.

If the proponent wishes to collect further evidence to justify the absence of Box Gum Woodland/Box Gum Grassland within Category 1 land, BCS recommends that the proponent liaise with us to discuss a method of floristic data collection which will be acceptable to determine CEEC absence.

Recommendations

14.1. In the absence of data supporting CEEC absence, land be designated as Category 2 – regulated land.

14.2. If the proponent wishes to collect further evidence to justify the absence of Box Gum Woodland/Box Gum Grassland from portions of the project site, liaise with BCS to determine an acceptable approach.

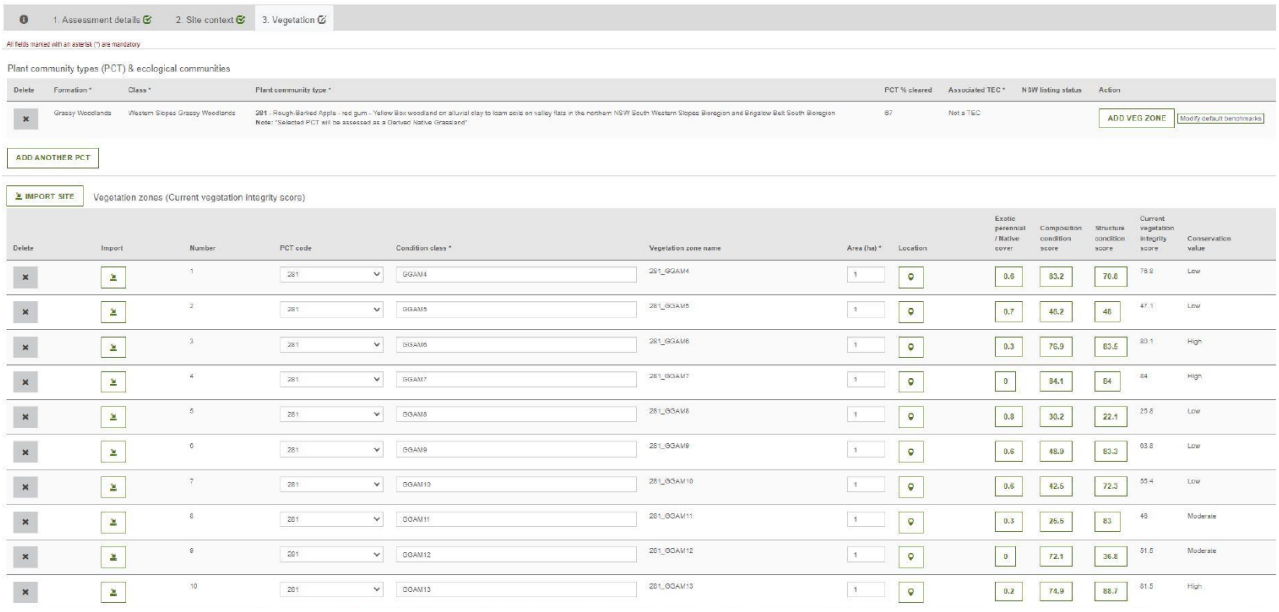

Figure 7: Extract from Appendix C of the BDAR showing IGGAM plots assigned to Box Gum Woodland Equivalent PCT

15. Additional justification for Category 1 land surveys should be provided

Sections 2.2.2 and 3.2 of the Baseline Flora Survey Report details the method, sources reviewed and a summary of IGGAM results used to inform the assessment of Category 1 – exempt land on the subject land.

BCS notes field survey for IGGAM plots were undertaken in December 2021 and January 2022. However, there have been no IGGAM or Vegetation Integrity plots across approximately 48ha of the eastern portions of Category 1 land extent. For example, the south-eastern Category 1 land portion shown in Figure 8, appears to only have been field verified by two rapid data points. The data within these plots were not provided to BCS during the submission of the EIS.

Further justification is required that areas of assigned Category 1 land, which do not appear to have received IGGAM survey, have been comprehensively assessed.

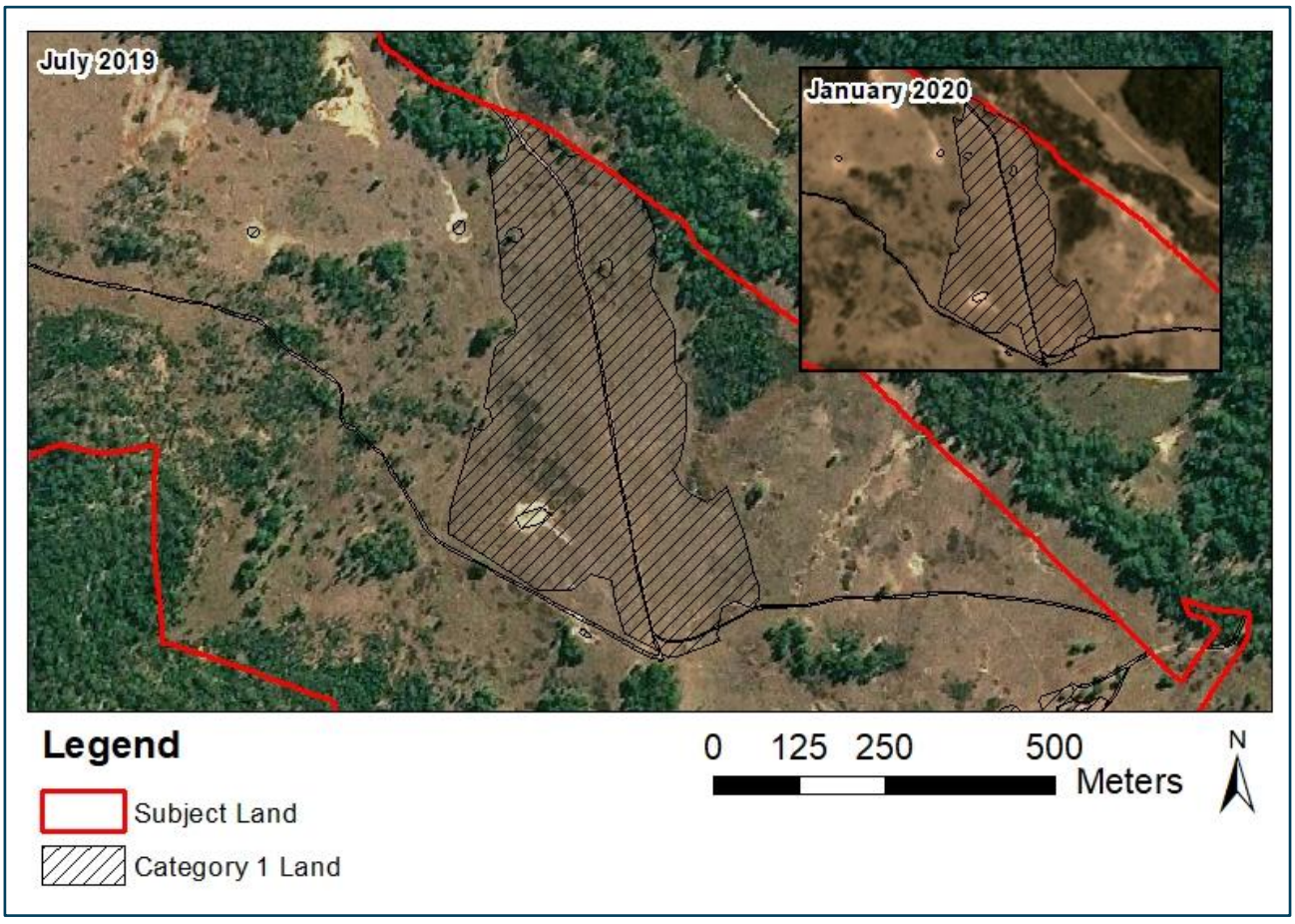

Figure 8: Comparison of aerial imagery from July 2019 to January 2020 on the south-eastern portion of Category 1 land

Recommendations

15.1. Provide additional field verified evidence to support allocation of Category 1 land in areas which do not appear to have received IGGAM survey.

16. The assessment and quantification of residual prescribed impacts for the Pink-tailed Worm Lizard is not adequate and requires revision

Section 3.7 of the BDAR states:

"Approximately 3.1 ha of potential Pink-tailed Legless Lizard surface rocky habitat overlaps Category 1 – exempt land, however when the species 50 m buffer of rocky areas habitat constraint is applied to this rocky habitat, approximately 30.1 ha overlap the Category 1 – exempt land. No credits have been calculated for clearance of potential surface rocky habitat on Category 1 – exempt land as credits cannot be generated within the BAM-C for impacts to non-native vegetation."

Impacts to non-native vegetation and geological features supporting threatened species habitat is a listed prescribed impact under Section 6 of the BAM. Given that a residual prescribed impact of 30.1 hectares has been identified, BCS recommends that potential offsetting via biodiversity credits (outside of the credit requirement generated by BAM-C for direct impacts) and/or other listed conservation measures in accordance with Section 6.1.2(b) of the *Biodiversity Conservation Regulation 2017*.

Recommendation

16.1. Quantify credits to be offset for the Pink-tailed Worm Lizard habitat that will receive residual prescribed impacts resulting from the project.

16.2. Consult with BCS to determine a method for the quantification of residual prescribed impact credits that will adequately compensate for the maximum potential impact resulting from the proposal.

17. The assessment and quantification of residual prescribed impacts for Groundwater Dependant Ecosystems is not adequate and requires revision

Section 5.3.3 of the BDAR states:

"The Groundwater Assessment for the Project concludes that the Project would not result in a long-term reduction in water availability for terrestrial vegetation along Moolarben Creek and associated low-lying areas, as mining areas would be rapidly backfilled to restore pre-mining hydraulic gradients and allow water levels to recover (AGE 2022)."

The Groundwater Assessment states:

- *"A maximum groundwater drawdown of up to approximately 6 m is expected to occur near Moolarben Creek, between adjacent Project open cut pits, which coincides with Plant Community Type 281 (Remnant Woodland);*
- *Approximately 23 hectares of potential terrestrial GDE's have been mapped to occur within the maximum 2 m drawdown extent, but outside of the planned open cut pit footprints;*
- *Modelled drawdown of greater than 2 m is expected to last for up to approximately 30 years, until groundwater levels recover; and*
- *Longer term groundwater levels are predicted to recover to levels higher than pre-mining levels in some areas, which should have a beneficial effect to potential GDE's."*

From review of the groundwater assessment, BCS understands that groundwater drawn down will occur for vegetation within and adjacent to Moolarben Creek and an additional 23 hectares of

potential Groundwater Dependant Ecosystems (GDEs) outside of the proposed open cut pits. This impact is expected to last up to 30 years until groundwater levels recover.

The BDAR does not recognise the potentially permanent impacts and/or ecological shifts which may occur for GDEs within the project over a 30-year period of groundwater drawdown.

Section 8.3.4 of the BAM requires:

"Assessment of the impacts of the proposal on water quality, water bodies and hydrological processes that sustain threatened entities must:

a) *describe the nature, extent and duration of short-term and long-term impacts*
b) *predict the consequences to the threatened entities identified in Subsection 6.1.4*
c) *where the proposed impact is in relation to longwall mining, calculate the maximum predicted offset liability as per the Addendum to NSW Biodiversity Offsets Policy for Major Projects: upland swamps impacted by longwall mining subsidence, using predictions of impacts on water-dependant plant communities and the threatened species they support*
d) *justify predictions of impacts with appropriate modelling (if available), relevant literature and other published sources of information, or consultation with species experts."*

BCS recommends the BDAR is revised to appropriately assess the nature, extent and duration of short-term and long-term impacts and predict the consequences to GDEs and threatened entities reliant upon GDEs. If there is uncertainty in relation to the potential impacts a precautionary approach should be followed and a worst-case scenario should be assumed.

Once the proponent has appropriately assessed the impacts of groundwater drawdown on GDEs within the project, any residual prescribed impacts should be offset via biodiversity credits (outside of the credit requirement generated by BAM-C for direct impacts) and/or other listed conservation measures in accordance with Section 6.1.2(b) of the *Biodiversity Conservation Regulation 2017* and Section 8.6 of the BAM.

Recommendations

17.1. Revise the BDAR to appropriately assess the nature, extent and duration of short-term and long-term impacts and predict the consequences to GDEs and threatened entities reliant upon GDEs.
17.2. Offset any residual prescribed impacts in accordance with Section 6.1.2(b) of the *Biodiversity Conservation Regulation 2017* and Section 8.6 of the BAM.

18. Further justification for the selection of certain Plant Community Types required

Justification for the selection of PCTs present within the project area is provided in Tables 11 to 23 of the Baseline Flora Survey Report. Descriptions of PCTs in terms of landform and recorded species is thorough and considered to be consistent with Section 4.2 of the BAM 2020.

However, two assigned PCTs appear to be inconsistent with the community profile descriptors present within the VIS-C database. Further justification for selection of the two identified PCTs should be provided as per Table 1 below. In particular, discussion of the discrepancies in diagnostic species to BioNet PCT descriptors and additional consideration of other likely candidate PCTs should be provided.

Table 1: Comparison of PCT descriptions from BioNet Vegetation Classification and Baseline Flora Survey Report

PCT Number/Name	BioNet PCT Description	Recorded Vegetation Description
PCT 1655 – Grey Box – Slaty Box shrub – grass woodland on sandstone slopes of the upper Hunter and Sydney Basin remnant woodland	PCT 1655 is described as occurring on rocky sandstone slopes, associated with larger streams. With a canopy dominated by the diagnostic species of Grey Box (*Eucalyptus moluccana*), Slaty Gum (*Eucalyptus dawsonii*) and Black Cypress Pine (*Callitris endlicheri*).	The location of the mapped PCT does not align with watercourses in the minesite. Plot data shows the canopy is dominated by Grey Box and a diversity of non-dominant species such as White Box (*Eucalyptus crebra*), Yellow Box (*Eucalyptus melliodora*), Blakey's Red Gum (*Eucalyptus blakelyi*), which are not associated with PCT 1655.
PCT 1711 – Tantoon - *Lepyrodia leptocaulis* shrubland on sandstone drainage lines of the Sydney Basin	PCT 1711 is a tall shrubland characterised by Tantoon (*Leptospermum polygalifolium*) and the herb *Lepyrodia leptocaulis*.	Neither of these diagnostic species are present in the plot data, or the VZ19 floristic description in Table 23.

Recommendation

18.1. Review and provide additional justification for PCT selection as per Table 1.

19. Allocation of vegetation integrity plots to vegetation zones may require revision

PCT descriptions provided in Tables 11 to 23 of the Baseline Flora Survey Report justify when certain PCTs have been stratified into separate vegetation zones. In review of the BAM-C, BCS has identified a potential discrepancy in vegetation integrity scores for PCT 281 – *Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion.*

PCT 281 is stratified into two Derived Native Grassland (DNG) vegetation zones of 'DNG (low)' and 'DNG (high)'. The method for allocating plots to these zones is unclear as the 'DNG (low)' zone has a higher structure condition scoring than the 'DNG (high)' zone.

BCS recommends that the allocation of plots to each vegetation zone is audited to determine if revisions are required. If no revisions are proposed justification should be provided.

Recommendation

19.1. Review vegetation zone stratification for PCT 281 within the subject site and provide justification on plot allocation.

20. Inclusion of vegetation plots located outside the project footprint should be justified

Section 4.2.1 of BAM 2020 states "*the assessor must perform a plot-based vegetation survey of the subject land to identify the most likely PCTs on the subject land*". A total of 80 Vegetation Integrity (VI) plots were used to inform the PCTs and vegetation zones across the project. Of these 80 plots, approximately 33 plots (41%) are located between 10 metres to 1.1 kilometres outside of the subject land.

A specific example is the PCT 1629 'Remnant Forest' vegetation zone. Six VI plots have been undertaken for this vegetation zone. However, of the six VI plots, only one is located within the subject land. The remaining five VI plots are located approximately 95 to 350 metres outside of the

subject land. The distances between the disjointed vegetation zones are even greater, with a VI plot being used to represent a vegetation zone approximately 3.5 kilometres away from its location.

BCS recognises that alterations to the project layout may have caused plots to be located outside of the subject land. However, where vegetation plots are not located in the subject land, justification should be provided that the vegetation sampled is representative and that the plot data is consistent with other plot data collected in that vegetation zone. This should include, but not be limited to, a table listing:

- each plot located outside of the subject land; and
- justification, referencing appropriate evidence, to demonstrate each plots representativeness of its equivalent vegetation zone.

Recommendation

20.1. Provide additional justification for use of plot data outside the subject land.

21. Further justification for the exclusion of candidate frog species should be provided

BCS notes, Table 10 of the BDAR has excluded the following amphibians from the candidate species list based on lack of suitable micro-habitats and habitat degradation in the BAM-C, this includes:

- Giant Burrowing Frog (*Heleioporus australiacus*).
- Booroolong Frog (*Litoria booroolongensis*).
- Red-crowned Toadlet (*Pseudophryne australis*).

During field surveys, 10 non-threatened species of frog were recorded by AMBS Ecology and Heritage. In addition, the Aquatic Ecology Assessment (Bio-Analysis 2022) states "*The overall condition of aquatic habitats at the sites sampled in Moolarben Creek sites was classified as good to very good...*".

Given the diversity of recorded frog species and variability of aquatic habitat condition within the subject land, additional information should be provided to demonstrate the absence of suitable habitat beyond reasonable doubt.

Section 4.4.3 of the *Biodiversity Assessment Method Operational Manual – Stage 1* gives examples of suitable evidence to support description of degraded habitat, including "*reference to the attribute scores for the VI assessment to illustrate if these conform to the habitat constraint or microhabitats on the site, photographic evidence, maps, etc.*"

Recommendation

21.1. Provide additional justification for exclusion of threatened frog species from habitat within the project area.

21.2. If impacts to threatened frog species has the potential to occur, undertake further survey, assume presence or prepare and expert report.

22. Further justification for the exclusion of Large Bent-winged Bat breeding habitat should be provided

Table 3.2 of the Baseline Fauna Survey Report notes there was “probable” Anabat detection of Large Bent-winged Bat (*Miniopterus orianae oceanensis*) at 11 locations across the Subject Land.

The TBDC defines Large Bent-winged Bat suitable breeding habitat as a cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding. There is a known maternity roost site, located at Wilpinjong Coal Mine, approximately 10 kilometres north-east of the Subject Land. In February 2014, a survey of historical mine adit recorded approximately 145 Large Bent-winged Bats emerging from the adit, including lactating and young individuals (Biodiversity Monitoring Services 2014)[11]. Recent BioNet records confirms the species was still present at this site in 2020.

The nearby mine adit is based on sandstone lithology, as are the extensive caves, crevices and cracks present in the study area. Additional information should be provided justifying why none of the habitat impacted by the project is suspected to be used as breeding habitat for the Large Bent-winged Bat, beyond reasonable doubt.

Recommendations

22.1. Provide additional information to justify the presence/absence of potential Large Bent-winged Bate breeding habitat.

22.2. If impact to Large Bent-winged Bat breeding habitat has the potential to occur, undertake further survey, assume presence or prepare an expert report.

23. Further justification for the presence or absence of certain flora species should be provided

Consistent with section 5.3 of the BAM, flora species surveys must be undertaken in accordance with the Department’s guide *Surveying threatened plants and their habitats*. BCS acknowledges that the threatened flora targeted survey methods were appropriate and conducted within the recommended months for most of the targeted flora species.

However, certain flora species have additional specific survey requirements, which need to be accounted for to demonstrate species presence or absence, beyond reasonable doubt. Details of specific flora species concerns are provided in Table 2.

Table 2: Specific BCS concerns regarding flora species detectability during surveys

Flora Species	Specific Survey Requirement	Comment
Commersonia rosea BC Act and EPBC Act SAII entity	Fire ephemeral species. Survey 18 months post fire. After about 5 years, the species will no longer persist above ground but is likely to be present in the seedbank. Strongly recommend expert report to discount presence or absence if conditions do not meet requirements.	Associated with PCT 1655 as per Table 9 of the BDAR. Surveyed for in the appropriate survey months, however, the optimal survey conditions following fire were not able to be met. Baseline Flora Survey Report estimates approximately 10 years since last fire. As described in section 3.4.1 of the Baseline Flora Survey Report, *Commersonia rosea* has been previously recorded within 20km of the Subject Land in 2005, approximately 2-3 years post-fire. Given suitable habitat of PCT 1655 is present in the Subject Land and specific post-fire survey conditions could not be met, preparation of an expert report or assumed presence may be warranted.

[11] *Biodiversity Monitoring Services (2014) Wilpinjong Extension Project Terrestrial Fauna Baseline Report.*

Flora Species	Specific Survey Requirement	Comment
Bluegrass *(Dichanthium setosum)* BC Act and EPBC Act	Use seed-head to identify. Survey Nov - May, 3 to 4 weeks after effective rainfall.	Bluegrass is associated with PCT 266, PCT 483 and PCT 281 as per Table 9 of the BDAR. While *Euphrasia arguta* is associated with PCT 266 and PCT 281 as per Table 9 of the BDAR. Areas of habitat were excluded as providing potential habitat for both species based on review of soil databases and agricultural land. Additional information regarding soil type and evidence of disturbance history for parts of the Subject Land which were excluded from survey is requested. See section 4.4.3 of the *Biodiversity Assessment Method Operational Manual – Stage 1* for examples of suitable evidence to support description of degraded habitat or microhabitats.
Euphrasia arguta BC Act and EPBC Act SAII entity	Survey after rainfall or in areas with light enhancement (post fire, opening of canopy, on edges etc).	
Kennedia retrorsa BC Act and EPBC Act SAII entity	Use flowers to identify, as easily confused with *Kennedia rubicunda* when in a vegetative state. Survey within 3 years of fire. Strongly recommend expert report to discount presence or absence if conditions do not meet requirements.	Associated with PCT 1655 as per Table 9 of the BDAR. Surveyed for in the appropriate survey months, however, the optimal survey conditions following fire were not able to be met. Baseline Flora Survey Report estimates approximately 10 years since last fire. Section 3.4.3 of BDAR states that fire regimes are unlikely to affect this species. BCS advises that based on available information, the optimal survey time for this species is after recent fire. This is supported by the discovery of large populations of the species shortly after fire e.g. population found in 2013 near Worondi Creek in the Mount Dangar locality. The Environmental Impact Assessment Guidelines – Kennedia retrorsa also state "*Assessment of fire history is essential in the determination of presence/absence of the species at any given site. Viable but dormant Kennedia retrorsa seeds may be present in the soil seedbank irrespective of the apparent absence of the species within the survey area*" and that "*Kennedia retrorsa requires high light levels for maximum growth and is likely to be a successional species in some localities (i.e. being locally abundant for a number of years after fire and gradually declining in numbers due to competition and/or shading from trees and shrubs)"* (NPWS 200)[12]*.* While several other new populations of the species have been recently discovered in the Mount Dangar locality outside of recently burnt areas (Bell and Lamrock 2022)[13], all of these plants have been restricted to sandy alluvium along creek flats where they have likely germinated following abrasion of seed coats experienced during recent flooding events (BOS Helpdesk 2023)[14]. As there has not been any recent fire, or evidence of other possible disturbances (e.g. flooding from nearby watercourses) as described by the BDAR. Field survey of suitable habitat does not appear to meet the specific survey condition requirements for this species.

[12] *NPWS (2000) Kennedia retrorsa Environmental Impact Assessment Guidelines*
[13] *Bell and Lamrock (2022) Multiple lines of evidence infer centurial-scale habitat change and resilience in a threatened plant species at Mount Dangar, Hunter Valley, New South Wales*
[14] *Accountable Officer for Kennedia retrorsa (Biodiversity Offset Helpdesk 2023) DPE-2009 Kennedia retorsa - Potentially incorrect TBDC Survey Requirements*

Further justification will be required to provide, beyond reasonable doubt, that the targeted survey undertaken for candidate flora species was adequate. Where limitations on the detection of species are still considered to be present, further targeted survey, an expert report or assuming species presence will be required in accordance with Section 5.3 of the BAM.

Recommendations

23.1. Demonstrate adequate survey effort is compliant with the Department's guide *Surveying threatened plants and their habitats* (and Commonwealth survey guidelines where necessary) during optimal conditions for the species identified in Table 2.

23.2. Alternatively undertake additional targeted survey in the correct survey period and survey conditions; assume presence; or obtain an expert report for these species.

24. Certain mammal species survey effort may be inadequate

Section 2.1.4 and Table 14 of the BDAR summarises the threatened fauna survey methods detailed in the Baseline Fauna Survey Report. Survey methods and timing (i.e. weather conditions and recommended survey months) employed were suitable. However, BCS has concerns regarding the survey effort to reliably detect Eastern Pygmy Possum (*Cercartetus nanus*) and Brush-tailed Rock-Wallaby (*Petrogale penicillata*) across such a large site as the Subject Land. In the absence of any published species-specific survey guidelines, review of the TBDC for these species has been used to base the suitability of survey effort.

The Eastern Pygmy Possum is described as "*very difficult to detect, especially via spotlighting*". Furthermore, "*They may occupy small patches of vegetation in fragmented landscapes and although the species prefers habitat with a rich shrub understory, they are known to occur in grassy woodlands and the presence of Eucalypts alone is sufficient to support populations in low densities.*". While a broad range of suitable survey methods have been used, the placement of these survey methods is highly localised, resulting in patches of suitable habitat which were not surveyed. Therefore, BCS is concerned the coverage of survey was inadequate to reliably detect or confirm absence of this cryptic species across the 47.8 hectares of disjointed, suitable habitat.

Recommended survey methods for Brush-tailed Rock-Wallaby are listed as "*Systematic feacal pellet surveys and time lapse cameras*" all year round. The Brush-tailed Rock-Wallaby is known to "*Occupy rocky escarpments, outcrops and cliffs*" and "*Browse on vegetation in and adjacent to rocky areas*". The species is described as "*Highly territorial and have strong site fidelity with an average home range size of about 15 ha.*". Table 2.6 of the Baseline Fauna Survey Report shows of suitable survey methods used, camera traps were deployed at 14 sites and targeted scat searches occurred at four sites across the 456.8 hectares of suitable habitat within mine site. Given the highly mobile nature of these species and large extent of suitable habitat BCS is concerned the coverage of survey was inadequate to reliably detect or confirm absence of Brush-tailed Rock-Wallaby.

We recommend that further survey is undertaken for both species to demonstrate, beyond reasonable doubt, their presence/absence within the project area.

Recommendation

24.1. Conduct further targeted survey to determine the presence or absence of the Eastern Pygmy Possum and Brush-tailed Rock Wallaby from previously unsurveyed areas within the project site, obtain an expert report or assume presence.

25. Review and update BDAR, GIS shapefiles and BAM-C to resolve inconsistencies

As part of reviewing the BDAR, BCS conducted an audit of a sub-sample of VI plot data, GIS shapefiles and the values entered into the BAM-C and has noted a few inconsistencies.

These errors include, but are not limited to:

- Zone structure data for all growth forms in BAM-C does not match raw plot data for VI Plot 5.
- Zone composition data for certain species richness in BAM-C does not match raw plot data for VI Plot 19 and VI Plot 11.
- BAM-C Case 2, is missing Creswick Apple Box (*Eucalyptus corticosa*) from candidate list.
- All BAM-C cases have not ticked the 'geographic limitation' habitat constraint box, for removal of Pine Donkey Orchid (*Diuris tricolor*) endangered population.

In addition, Section 1.3 of the BDAR indicates areas of Category 1 land are excluded from the assessment of impacts to clearing of native vegetation and therefore, generation of a credit obligation. However, review of GIS mapping shows sections of Category 1 land mapped which are also mapped as "vegetation impacts requiring offset".

Section 3.7.1 of the BDAR outlines the species polygons for flora species. *Commersonia procumbens,* which is an area species credit species, is associated with woodland formations of PCTs 478, 481, 1610, 1655, 1656 and 1661. However, species polygon mapping in GIS also includes PCT 1629, which adds approximately 31.6 hectares of additional habitat to be added to the BAM-C and offset.

We recommend a full audit of VI plot data, GIS shapefiles and the values entered into the BAM-C is undertaken and all errors detected are updated.

Recommendation

25.1. Correct the specific spatial and BAM-C errors identified in this response.

25.2. Audit all values of VI plot data, GIS shapefiles and data entered into the BAM-C and ensure these align with the BDAR.

NPWS's detailed comments

Moolarben Open Cut 3 Extension – Environmental Impact Statement

The existing mining lease boundary is immediately west of Goulburn River National Park and borders Munghorn Gap Nature Reserve. The project area subject to the current application adjoins Munghorn Gap Nature Reserve with a significant common boundary between the project area and the Nature Reserve. Overall, NPWS seeks to ensure the avoidance of all direct or indirect adverse impacts to lands reserved or acquired under the *National Parks and Wildlife Act 1974* (NPW Act) and their values.

NPWS holds significant concerns over the potential impacts of the proposal on Munghorn Gap Nature Reserve. NPWS is supportive of the comments made by BCS throughout this response, noting concern that all matters raised have potential to impact NPWS land either directly or indirectly. NPWS holds particular concern over the EIS's inadequate assessment of prescribed impacts on threatened biodiversity values, impacts of blasting and airblasting impacts on biodiversity and geological values of the nature reserve and the EIS's insufficient consideration of project impacts to groundwater dependant ecosystems (GDE) in the locality.

NPWS would disagree with the EIS's assessment that most potential indirect impacts of the project would be positive in nature (p. ES-29) given the likely significant indirect impacts on adjacent Munghorn Gap Nature Reserve and impacts to connectivity of the landscape and geological stability generally, representing cumulative impacts to Goulburn River National Park and Munghorn Gap Nature Reserve.

Additional matters relating to impacts of the proposal on NPWS lands are raised below.

26. The cartographic errors within the EIS should be revised

Mapping appears to show the Project Area extending beyond the Exploration Licence Area and onto NPWS land (for instance, see Figures 6-1 and 6-3 of the EIS).

While it is likely this is a cartographic error, NPWS notes that no works are to occur on NPWS estate and that mining is not a permissible land use within land reserved as a nature reserve under the NPW Act. It is recommended that mapping is clarified to more accurately depict the proposed extent of the Project Area being fully contained within the development site.

Recommendation

26.1. Update mapping in the EIS to show that there will be no encroachment onto NPWS land.

27. The use of NPWS land as a buffer between mining operations and other sensitive receivers is inappropriate

In accordance with *Developments adjacent to National Parks and Wildlife Service lands: Guidelines for consent and planning authorities* (DPIE 2020 – Section 2.7, p. 12), NPWS land should not be considered as a buffer zone between a development and other surrounding uses, such as residential areas.

A significant shortcoming of the EIS and project is the consideration of Munghorn Gap Nature Reserve as a buffer between the mining operations and other receivers in the locality. This is evident from ES3.1 (p. 4 of the Executive Summary) which states:

"The location of the Project within the Moolarben Valley and surrounding elevated topography (associated with the Munghorn Gap Nature Reserve and other nearby ridgelines) provides a natural barrier which limits amenity impacts at nearby private residences."

Figure ES-4 and Sections throughout the EIS also refer to Munghorn Gap Nature Reserve as a natural barrier for amenity impacts.

Rather than considering NPWS lands as a buffer between mining impacts and other nearby receivers, the necessary buffers for mitigating impacts should be proposed within the development site for the adjacent NPWS estate.

Currently a 50 metre buffer between Munghorn Gap Nature Reserve and the edge of any open cut pit is proposed. NPWS supports BCS's recommendation that a 500 metre buffer (at minimum) from any open cut pit to Munghorn Nature Reserve be established, with a greater setback where impacts are expected to extend into the nature reserve.

Recommendation

27.1. Establish appropriate setbacks within the development site boundary to ensure an appropriate buffer between NPWS lands and mining operations, such that impacts to NPWS estate are avoided.

28. Insufficient consideration of impacts to the adjacent Nature Reserve

Related to the above, NPWS considers that the EIS does not adequately assess the potential encroachment of impacts proposed mining operations would have on the surrounding NPWS land. In most cases the EIS does not recognise the nature reserve as environmentally sensitive land, requiring consideration of potential impacts and mitigation where any impacts are likely.

In accordance with *Developments adjacent to National Parks and Wildlife Service lands: Guidelines for consent and planning authorities* (DPIE 2020 – Section 1.3, p. 2), developments adjacent to NPWS land should avoid any direct or indirect adverse impacts on that reserved land. The EIS fails to demonstrate that this would be achieved and contains insufficient assessment of impacts to the nature reserve in most instances. This leads to an incomplete understanding of the impacts of the project and means that mitigation measures or project redesign required to avoid these impacts cannot be understood.

While the EIS states that no exceedances of relevant air, noise and blast criteria are predicted at private residences, less certainty is available for NPWS land immediately adjacent to the proposed mining site.

As an example, Table 25 (p. 45) of the Noise and Blasting Impact Assessment (Appendix H) assesses that the 115dBL limit can be achieved at Castle Rocks Walking Track which is approximately 3.7 kilometres away from the blast zone. No assessment appears to have been made for Moolarben Picnic Area which is much closer to proposed blasting. Additionally, no assessment appears to have been made for other areas in the nature reserve closer to the blast sites that are subject to remote bushwalking. This presents potential significant safety risk for bushwalkers in the nature reserve while blasting is being undertaken.

Of particular concern to NPWS is that while impacts to livestock are considered (see Section 9.5, p. 46 of the Noise and Blasting Impact Assessment) and discounted because there is no private land within 1.3 kilometres of the project, no assessment of impacts to fauna within Munghorn Gap Nature Reserve immediately adjacent to the blast sites appears to have been undertaken.

Recommendation

28.1. Amend the assessment to consider the extent of any direct or indirect adverse impacts on Munghorn Gap Nature Reserve. Including, but not limited to, vibration, noise and air quality.

29. Groundwater impacts of mining must not extend in Munghorn Gap Nature Reserve and Goulburn River National Park and how groundwater impacts will be managed is unclear

NPWS notes concern that the cumulative groundwater impacts from the UG2 modification are not considered in modelling for this current proposal's assessment. The Groundwater Assessment report shows that the cumulative impact assessment performed for this proposal does not include the cumulative impacts from the Moorlarben Coal Complex UG2 Modification (see Table 7.1). The OC3 and UG2 modifications cannot be assessed completely independently of each other as their respective drawdown will interact with each other causing further impacts.

Impacts of groundwater mounding also do not appear to have been considered appropriately throughout the assessment. Figure 7.5 of the Groundwater Assessment shows groundwater mounding in the Ulan Seam (and spoil) at the end of the recovery period. In the non-depth restricted parts of Munghorn Gap Nature Reserve, this may lead to changes in groundwater flow directions and enable the transportation of contamination.

The groundwater monitoring program that is presented in Figure 8.1 and Table 8.1 of the Groundwater Assessment shows only 3 monitoring bores for the Triassic sandstone layer. These are all located on the southern side of the project area. There is a lack of monitoring bores for the Triassic sandstone to the east of the project area. This area is particularly important due to the potential cumulative impacts from UG2 and the UG2 extension modification. It is noted from the Groundwater Assessment that the coal seams in the area are predominately responsible for the storage and movement of groundwater. Despite this, the proposed monitoring program does not include sites to monitor the conditions of the Illawarra Coal Measures. The current and proposed monitoring program have no monitoring of the Permian layers and only monitor the Ulan Seam to the north of the OC3 project area.

In Figures 7.3, 7.4, 7.11 and 7.12 of the Groundwater Assessment, predicted drawdown for certain modelling scenarios extends into Munghorn Gap Nature Reserve. No impact to natural features (including groundwater) as a result of mining is permissible within Munghorn Gap Nature Reserve due to its protection under the NPW Act.

As stated in the Groundwater Assessment, the Triassic sandstone layer is likely hosting pockets of perched groundwater. NPWS is concerned about the potential impacts to the silt/clay stone perched aquifers in Munghorn Gap Nature Reserve that support GDEs. It is unclear if these perched systems within the Triassic sandstone layer will be impacted (i.e. cracking and subsequent draining) by fair field earth movements. This is especially concerning noting that the UG2 extension modification currently submitted by the proponent may also impact on these perched aquifer systems.

Section 5.6 of the Surface Water and Flood Impact Assessment states that "*from 2028 onwards, the UG4 underground void will be available for storage of both brine water and mine water*". It is

currently unclear if the groundwater modelling described in the Groundwater Assessment accounts for the storage of this brine and mine water in the cumulative impact assessment of the proposal. This is concerning for NPWS as Section 5.5.4 of the Groundwater Assessment states that "*groundwater flow at UG4 generally occurs towards the north*", which is towards the Goulburn River and Goulburn River National Park. Due to the flow direction at UG4, it is concerning that this stored brine and mine water may result in impacts on groundwater within Goulburn River National Park (and associated GDEs). It is also unclear if there are potential groundwater and surface water interactions in the area that could lead to impacts on surface water quality/quantity in the Goulburn River, that then flows into Goulburn River National Park.

Recommendation

29.1. Incorporate the impacts observed from the UG2 Modification into modelling scenarios to establish the likely impacts if both modifications are to be given approval.

29.2. Provide clarification on any potential groundwater mounding and if this may have impacts on groundwater flow in Munghorn Gap Nature Reserve.

29.3. Provide clarification if any change in flow will facilitate contaminant transport pathways from mine spoil etc. that may impact Munghorn Gap Nature Reserve.

29.4. Install additional groundwater monitoring sites[15] to include monitoring on:

- Triassic sandstone on the Eastern side of the project area.
- The various Illawarra Coal Measure layers around the project area. Including the southern side of the project for the Ulan Seam and the whole project area for the other Permian layers.
- The cumulative impacts of the UG2 Extension modification.

29.5. Clarify if there is a risk of the perched aquifers within Munghorn Gap Nature Reserve cracking from far field earth movements as part of Moolarben Coal Complex activities.

29.6. Incorporate the storage of brine and mine water in the UG4 void into groundwater modelling.

29.7. Confirm if there are any impacts on Goulburn River National Park (and associated GDEs) due to potential changes in water quantity/quality in both surface water and groundwater.

29.8. Ensure no impact on groundwater in Munghorn Gap Nature Reserve and Goulburn River National Park.

30. The aquatic ecology assessment and summary of impacts to groundwater dependent ecosystems require revision

NPWS notes that the Stygofauna sampling locations and method require revision. The identification of stygofauna is important to capture as they are susceptible to the potential impacts caused by mining, including changes to groundwater level/pressure, quality (contamination, salinity, dissolved oxygen or temperature etc.) and pore dimensions from subsidence. They have adapted to steady environmental conditions and have slow recolonisation rates, meaning impacts that may seem small can threatened local stygofauna populations.

NPWS is concerned that the stygofauna sampling method, as specified in Section 3.2.6, Figure 7 and Table 3 of the Aquatic Ecology Assessment, may not be identifying the presence of

[15] *Any monitoring equipment installed on NPWS land, with appropriate approvals, should be telemetered to avoid repeated and on-going site visits.*

stygofauna in the project area. Namely the single survey undertaken in sampling each site and the spatial distribution of sampling sites. This is based on the following:

- The CRC Technical Report for '*Sampling strategies for biological assessment of groundwater ecosystems'*[16], Figure 3 and Section 4.1, states that repeated sampling, weeks apart was required for stygofauna to be found.
- The WA EPA[17] states best practice is to achieve 95% species identification, which can require multiple samples taken over a longer time span (see Section 3.11.1.1 of this report).

The hydrogeologic characteristics of the project area also lends itself to being habitat for stygofauna.

- Hose et al. (2015)[18] found that Stygofauna have been recorded in the fractured Triassic Hawkesbury sandstone – a relatively similar geology to that found in the proposed modification area and in Munghorn Gap Nature Reserve.
- The hydraulic conductivity reported in the Groundwater Assessment Report shows that the hydrogeologic characteristics in the area is within the range for Stygofauna habitat as identified by Hose et al. (2015).

NPWS is also concerned about the lack of sampling performed in the southern section of the project area. Due to the relatively small spatial movement of stygofauna, the sampling (i.e. Figure 7 of the Aquatic Ecology Assessment) is unlikely to have identified potential individuals to the south. This area includes the groundwater springs identified in the GDE Assessment, which have the potential to be stygofauna habitat due to higher oxygen exchange with the surface.

Additionally, Section 5.3 of the Groundwater Dependent Ecosystem assessment states:

"*Approximately 23 ha of potential GDEs have been mapped to occur within the maximum 2 m drawdown extent, but outside of the planned open cut pit footprints, which is expected to last for up to approximately 30 years, until groundwater levels recover*."

It is difficult to understand where the 23 hectares of impacted GDEs are located and the impact that may occur to them, noting that GDEs that are within Munghorn Gap Nature Reserve should not be impacted by this activity.

Recommendation

30.1. Additional monitoring is required to confirm the presence of, or lack of, stygofauna in the area. Given that no sampling regime guidelines are currently in force for proposals in NSW, any sampling regime should be consistent with best practice from other state government agencies and technical bodies.

30.2. Include stygofauna sampling to the southern end of the proposed project area in, or on the boundary of, Munghorn Gap Nature Reserve.

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[16] *Hose, G. C., & Lategan, M. J. (2012). Sampling strategies for biological assessment of groundwater ecosystems - Technical Report 21. CRC Care.*

[17] *WA EPA. (2016). Sampling methods for Subterranean fauna - Technical Guideance. Western Australia Environmental Protection Authority.*

[18] Hose, G. C., Sreekanth, J., Barron, O., & Pollino, C. (2015). Stygofauna in Australian Groundwater Systems: Extent of Knowledge. CSIRO.

30.3. Confirmation is required of the location of the 23 hectares of GDEs within the 2 metres of drawdown area and the impacts that may occur on these GDEs over the period of mining operation (30 years).

30.4. Clarification is required as to whether any GDEs within Munghorn Gap Nature Reserve are to be impacted, including areas with less than 2 metres of drawdown.

31. How edge effect impacts to NPWS land will be managed is unclear

Given limited setbacks are proposed between vegetation clearing on the development site and Munghorn Gap Nature Reserve (including apparent nil setback between some areas of Stage 3 and the nature reserve), NPWS holds significant concerns over likely edge effects resulting from the proposal on the adjacent nature reserve.

The EIS does not provide details on how clearing adjacent to the nature reserve would be managed to mitigate the impact to the natural and cultural values of the park, such as through increased drying of soils and consequent changes to vegetation at the land boundary, decline in fauna species that are sensitive to changes in vegetation along newly created edges and an increase in pest and weed species on NPWS land.

Potential for the proposed operations to introduce bushfire into Munghorn Gap Nature Reserve and the need for adequate bushfire separation distances from environmentally sensitive land (such as through establishment of an Asset Protection Zone (APZ)) does not appear to have been adequately addressed in the EIS (e.g. Section 6.18.2, p. 6-129). Any APZ required to ensure the protection of mining operations and of Munghorn Gap Nature Reserve should be provided on the development site and provided in addition to the buffer from impacts discussed elsewhere in this response.

Additionally, NPWS holds concerns over edge impacts on species such as the Koala (*Phascolarctos cinereus*) and the Regent Honeyeater (*Anthochaera phrygia*) within NPWS estate and across the landscape (including connectivity to habitat in Goulburn River National Park). Section 6.5.3 (p. 6-49) of the EIS provides that "*Just outside of the Project indicative surface disturbance extent, the Munghorn Gap Nature Reserve provides a large amount of high-quality Koala habitat for the species in the wider region*." Introducing an increased buffer between the proposed vegetation clearing and the Nature Reserve would reduce the likelihood of edge effects on the Nature Reserve and impacts to species it is reserved to conserve.

Recommendation

31.1. Amend the EIS to assess the extent of edge effect impacts on Munghorn Gap Nature Reserve, noting the natural values of the nature reserve, and provide an adequate setback to the nature reserve to mitigate such impacts.

31.2. Ensure adequate protection from bushfire to the mine site and to adjacent lands such as Munghorn Gap Nature Reserve.

32. How blasting and airblast impacts to NPWS land will be managed is unclear

BCS's sections above raise concerns over management of blasting and airblast impacts on biodiversity, habitats and geological values. In addition to these impacts, NPWS holds concerns over impacts of the proposal, including

- the safety of visitors to the nature reserve (such as remote bush walkers),

- visitor amenity,
- NPWS park operations,
- geological integrity of the nature reserve including cliff faces,
- integrity of GDE within the nature reserve; and
- impacts to Aboriginal cultural heritage within the park and across the landscape.

As discussed above, a significant shortcoming of the EIS is the lack of consideration of Munghorn Gap Nature Reserve as a sensitive receiver, including to noise, vibrational and air quality impacts, among others. This leads to insufficient assessment of impacts to the nature reserve resulting from blasting and airblasts and also means that any necessary mitigation measures (or whether such measures would be effective) cannot be ascertained from the current assessment. As a result, it appears that insufficient setbacks are provided between the Project Area subject to blasting and Munghorn Gap Nature Reserve.

Recommendation

32.1. Amend the EIS to assess the extent of blasting and airblasting impacts on Munghorn Gap Nature Reserve, noting the recreational, cultural and natural values of the Nature Reserve, and provide an adequate setback to the Nature Reserve to mitigate such impacts.

33. Aboriginal cultural heritage impacts of the proposal would be significant and should be avoided

Aboriginal cultural heritage values extend across the landscape and are not limited to lands protected by Munghorn Gap Nature Reserve.

The Aboriginal Cultural Heritage Assessment (ACHA) does not appear to have accurately assessed the impact of direct disturbance of 79 known Aboriginal heritage sites, including 7 sites with moderate significance and 7 with low-moderate significance, or potential indirect impacts to 11 known Aboriginal heritage sites, including one site of high significance and 4 sites of low-moderate significance. This is concerning given that the Appendix F of the Aboriginal Cultural Heritage Assessment (Executive Summary, p. vi) notes that all Aboriginal heritage sites and Country are considered to have high cultural value by the RAPs consulted.

In addition to the above issues, it does not appear that any survey of adjacent sites (including Munghorn Gap Nature Reserve) was undertaken (e.g. see Figure 9, p. 37 in Appendix F) so potential impacts to any areas of significance proximate to the mining operations on adjacent land do not appear to have been considered in detail.

NPWS also holds concerns that blasting would still occur within 230 metres of shelter sites with limited justification that these sites (or others in proximity but outside the 230 metre radius) would not be impacted. Blast vibration monitoring is proposed as a management recommendation (Section 7.4.1, p. 101 of the ACHA), however monitoring during blasting does not appear to be an appropriate measure to avoid impacts to these sites. If impacted, Aboriginal cultural heritage values are unlikely to restorable through remediation.

The cumulative impacts of damage to sites of Aboriginal cultural heritage and to the landscape generally are also of concern to NPWS and do not appear to have been adequately assessed in the Aboriginal Cultural Heritage Assessment.

Recommendation

33.1. Consider sites of Aboriginal cultural heritage across the landscape and in proximity to the proposal area (including any sites in Munghorn Gap Nature Reserve) rather than just within the Subject Area and update assessment to consider potential impacts to those sites.

33.2. Consider the need for greater buffers to shelter sites (including any identified in Munghorn Gap Nature Reserve) as an avoidance measure to Aboriginal cultural heritage impacts.

33.3. Amend the ACHA to accurately reflect the cumulative impacts of proposed damage to Aboriginal cultural heritage in the locality (including to Munghorn Gap Nature Reserve) and provide updated avoidance and mitigation measures proportionate to those impacts.

34. Consultation and notification with NPWS

NPWS does not appear to be included as a significant stakeholder (adjacent landowner) in many of the proposed Triggers Action Response Plan (TARPs) for the project. For instance, Tables 8.3 and 8.4 of the Groundwater Assessment TARP do not include NPWS as a party that should be notified.

Given such triggers have potential to significantly impact NPWS land, NPWS should be included as a notifiable party for any instances that occur on or under reserved land, or adjacent to reserved land or with potential to impact that land.

Recommendation

34.1. NPWS is to be included in the notification and consultation requirements (i.e. TARPs) for any circumstances that occur in or under NPWS land or with potential to impact NPWS land.