Our ref: DOC21/25242
Your ref: MP06_0295-Mod-14

Emily Murray
Senior Environmental Assessment Officer
Planning and Assessment Group
Resource Assessments
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Dear Ms Murray

Cadia Valley Operations – MOD 14 – Processing Rate Modification

Thank you for your request dated 14 January 2021 to the Biodiversity Conservation and Science Directorate (BCS) requesting advice on the Cadia Valley Operations modification 14 (MP06_0295-Mod-14).

The main project components include physical works to improve tailings management (and associated changes to the final landform footprint), relocation of the Belubula pipeline, upgrades to existing ore processing infrastructure and an increase in the processing rate and water demand. The proposal will impact 22.6 hectares of native vegetation plus approximately 96 'paddock' trees.

BCS has reviewed the biodiversity development assessment report (BDAR) for the project. The BDAR has not yet demonstrated that the requirements of the Biodiversity Assessment Method (BAM) have been met. BCD's biodiversity recommendations are provided in **Attachment A** and detailed comments are provided in **Attachment B**.

If you require any further information regarding this matter, please contact Erica Baigent, Conservation Planning Officer, via erica.baigent@environment.nsw.gov.au or (02) 6883 5311.

Yours sincerely

Renee Shepherd
Acting Senior Team Leader Planning North West
Biodiversity Conservation and Science

18 February 2021

Attachment A – BCS's Recommendations

Attachment B – BCS's Detailed Comments

BCS's recommendations

Cadia Valley Operations Mod 14 – Environmental Impact Statement

1.1 The accredited assessor must contact Biodiversity Assessment Method (BAM) Support for guidance on how to use the updated BAM Calculator (BAM-C) for a BAM 2017 paddock tree streamlined assessment. The BAM-C case must be updated as necessary based on the advice from BAM Support.

1.2 The Biodiversity Development Assessment Report (BDAR) must be revised to address all issues raised by BCS and be certified by the accredited assessor within 14 days of the date shown on the finalised credit report generated using the BAM-C and attached to the BDAR. The certification page should clearly reference which version of BAM the BDAR has been prepared in accordance with.

1.3 Ensure that the final BDAR meets the minimum information requirements set out in Tables 25 and 26 of Appendix 10, BAM 2017.

2.1 Support any Category 1–Exempt Land designation via multiple pieces of evidence. This evidence might include:

a) publicly available data sets on SEED, such as:

- *NSW Landuse 2017*
- *NSW Native Vegetation Extent 5m Raster v1.2* (2018 woody extent layer)

b) Category 2–sensitive and Category 2–vulnerable land from the Native Vegetation Regulatory Map

c) aerial photography and landholder records of land use (e.g. diaries, photos that show clearing or cropping activities)

d) plot data already obtained.

2.2 Clearly justify the final land categorisation by:

a) combining data from the above mapping products, aerial photography of the site, on-site photographs, any data from within the footprint and available records of land use history

b) linking the results to the specific components of the land category definitions in the LLS Act

c) reviewing the published *Native vegetation regulatory map: method statement* to determine how the datasets in recommendation 2.1 (a) above can be best interrogated to support any identification of Category 1–Exempt land.

2.3 Present the final land categorisation on a map within the BDAR.

3.1 Additional information should be presented in the BDAR to justify the allocation of each Plant Community Type (PCT).

4.1 State in the BDAR which component(s) of the paddock tree definition are applicable to the site and provide supporting information to demonstrate that the paddock tree streamlined assessment module may be used.

4.2 Ensure that mapped 'paddock trees' occurring within the native vegetation zones are not assessed using the paddock tree streamlined assessment module.

5.1 Note the BCS concerns regarding the application of the paddock tree module to identified species credit species habitat and await further advice from BCS.

6.1 Review vegetation zone stratification for each PCT within the subject site.

6.2 Detail the basis on which each PCT was delineated into condition states (vegetation zones), including plot/spot sample data analysis, site photos, and any other relevant data collected from the site and field assessment methods to justify zone allocations.

6.3 Ensure that all zones have the required number of appropriately located BAM plots and that the correct data is included in the BDAR and BAM-C.

6.4 Present a rationale regarding the use of BAM plots from zone PCT 277 'Moderate' for 'PCT 277 Plantings' to adequately demonstrate that this approach would not result in an underestimation of the credits required to offset impacts to these areas.

7.1 Ensure each BAM-C entry for a vegetation zone by patch size has the same plot data (i.e. all plot data collected for the applicable vegetation zone described in the BDAR should be entered for each different patch size applying to that zone).

8.1 The assessor should:

a) check all patch size mapping against the requirements of BAM.

b) check all patch size data entered into the BAM-C

then update the BDAR and BAM-C case as necessary.

9.1 Supply the information required by s.10.2.2 the BAM, to allow a determination of whether the proposal will have serious and irreversible impacts on the Box-Gum Critically Endangered Ecological Community within the meaning of the BC Act and Regulation.

10.1 Remove statements on page vi and 10 of the BDAR which suggest that targeted flora surveys were undertaken.

10.2 Present adequate supporting information for the exclusion of:

a) small scurf-pea (*Cullen parvum*), *Euphrasia arguta,* hoary sunray (*Leucochrysum albicans var tricolour*), small purple pea (*Swainsona recta*) and silky swainson-pea (*Swainsona sericea*)

b) eastern pygmy possum (*Cercartetus nanus*)

from further consideration on the basis of their known microhabitats being degraded to the point those species will no longer be present.

11.1 Ensure that the species polygon extent (within native vegetation) in the BDAR matches the areas entered for each species in the BAM-C. If the BDAR has updated the species polygons as mapped by BMS (2020) the rationale and the revised polygons must be presented in the BDAR.

12.1 Update the assessment of prescribed impacts with specific reference to s.6.7 and s.9.2 of the BAM and s.2.5 of the BAM Stage 2 Operational Manual. Ensure that all requirements are met.

12.2 Map the location and extent of all applicable prescribed impacts within the BDAR, including where these extend outside of the mapped vegetation zones. The BMS (2020) survey results, habitat assessments and species polygons should be utilised.

12.3 Clarify the extent of suitable habitat for the pink-tailed legless lizard, addressing the inconsistencies between the conclusions of the BDAR and the BMS (2020) habitat assessment and species polygons.

12.4 Explicitly identify the residual prescribed impacts following implementation of avoidance, minimisation and mitigation measures. Provide evidence-based justification for conclusions and discuss any limitations to data, assumptions and predictions about impacts on biodiversity.

13.1 Ensure that the BDAR has fulfilled the requirements of s.9.3 of the BAM regarding mitigation measures, with specific consideration of s.26 of the BAM Operational Manual Stage 2.

13.2 Ensure all mitigation measures proposed for direct, indirect and prescribed impacts are adequately described in the BDAR. A single consolidated summary of the measures proposed for implementation is recommended.

BCS's detailed comments

Cadia Valley Operations Mod 14 – Environmental Impact Statement (EIS)

Glossary

BAM 2017*	The Biodiversity Assessment Method released on 31 August 2017.
BAM 2020	The Biodiversity Assessment Method released on 22 October 2020.
BDAR	Biodiversity Development Assessment Report
BOAMS	Biodiversity Offsets and Agreement Management System
BAM-C	Biodiversity Assessment Method Calculator (a component of BOAMS)
BC Act	*Biodiversity Conservation Act 2016*
BC Reg	*Biodiversity Conservation Regulation 2017*
BCS	Biodiversity Conservation and Science Directorate of the Department of Planning, Industry and Environment.
LLS Act	*Local Land Services Act 2013*
LLS Reg	*Local Land Services Regulation 2014*
PCT	Plant Community Type

***The BDAR states that the assessment has used the Biodiversity Assessment Method (BAM) dated 2017**. Therefore, unless otherwise stated all references to the 'BAM' in the Biodiversity Conservation and Science (BCS) comments below refer to the requirements of BAM 2017.

The following information was considered in the BCS review:

- Documents comprising the Cadia Valley Operations Modification 14 application, particularly Appendix C Biodiversity Development Assessment Report (BDAR) prepared by Premise.
- GIS shapefiles provided via Newcrest on 18 December 2020 for the project disturbance footprint, vegetation mapping and species polygons for the pink-tailed legless lizard, striped legless lizard, squirrel glider and superb parrot.
- GIS shapefiles provided via Resource Strategies on 29 January 2021 for the BAM plot/spot sample locations, native vegetation mapped within the 1500m buffer of the development site, patch size mapping, superb parrot and squirrel glider sightings and paddock trees identified on site.
- The applicable BAM Calculator (BAM-C) cases submitted by Premise on 27 January 2021 (major project assessment) and 29 January 2021 ('paddock tree' assessment).
- Clarifying information provided by Sally Kirby[1] of Premise (phone conversation with Renee Shepherd[2] of BCS on 27 January 2021 and phone conservation and email to Erica Baigent[3] of BCS on 3 February 2021).

BCS has had insufficient time to review raw plot data and all data entry in the BAM-C for this project.

BCS also notes that the EIS has not undertaken an assessment of significance for all Matters of National Environmental Significance (MNES) known or likely to occur under the Commonwealth *Environment Protection and Biodiversity Conservation Act (1999)*, to determine whether the proposal constitutes a Controlled Action under that legislation.

[1] Sally Kirby, Senior Ecologist at Premise

[2] Renee Shepherd, A/Senior Team Leader Planning, BCS North West Branch

[3] Erica Baigent, Conservation Planning Officer, BCS North West Branch

1 There are administrative matters and transitional arrangements yet to be properly addressed in the BDAR.

Transitional arrangements following the release of BAM 2020

A BDAR for a State Significant Development may be prepared using BAM 2017 for 12 months from 22 October 2020 (cl.6.31 *Biodiversity Conservation Regulation 2017* (BC Reg)). The BDAR for this project indicates that BAM 2017 has been used.

Because the Biodiversity Offsets and Agreement Management System (BOAMs) has been updated for the BAM 2020 settings, an assessor continuing to prepare a BDAR under BAM 2017 should consult the Release Notes to ensure the correct BAM-C settings are applied.

Where an assessor is applying BAM 2017 to a scattered tree (formerly paddock tree) or small area streamlined assessment, they must contact BAM Support for guidance on how to use the BAM-C to apply the transitional arrangements[4]. Sally Kirby (phone conservation on 3 February 2021) indicated that no advice was sought by Premise from BAM Support on this matter as data was entered into the BAM-C prior to 22 October 2020.

Certification of the BDAR

A BDAR cannot be submitted for an application unless the accredited person certifies in the report that the report has been prepared on the basis of the requirements of (and information provided under) the BAM as at a specified date and within 14 days of the date the report is so submitted (s.6.15(1) *Biodiversity Conservation Act 2016* (BC Act)).

This means the BDAR must be certified within 14 days of the date on the finalised credit report generated using the BAM-C. However no finalised credit report has been submitted with the BDAR. The final BDAR signed by the accredited assessor is dated 7 December 2020 and the BAM-C cases applying to the project were finalised and submitted on 27 and 29 January 2021.

Some additional explanatory information has been provided by Sally Kirby of Premise during the BCS review (as referenced within these comments). Ms Kirby is not a BAM accredited assessor. These matters will need to be incorporated within a revised BDAR certified by an accredited assessor.

Minimum information requirements for BDARs.

The BCS comments provided in this response highlight the main deficiencies in the BDAR. BCS also refers the assessor to Tables 25 and 26 (Appendix 10) of the BAM which set out the minimum information requirements for a BDAR. The revised BDAR should ensure that these minimum information requirements have been met.

Recommendations

1.1 The accredited assessor must contact BAM Support for guidance on how to use the updated BAM-C for a BAM 2017 paddock tree streamlined assessment. The BAM-C case must be updated as necessary based on the advice from BAM Support.

1.2 The BDAR must be revised to address all issues raised by BCS and be certified by the accredited assessor within 14 days of the date shown on the finalised credit report generated using the BAM-C and attached to the BDAR. The certification page should clearly reference which version of BAM the BDAR has been prepared in accordance with.

1.3 Ensure that the final BDAR meets the minimum information requirements set out in Tables 25 and 26 of Appendix 10, BAM 2017.

[4] https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/biodiversity-assessment-method

2 Designation of Category 1-Exempt Land must be appropriately supported by evidence and a description of the categorisation method applied

With the exception of prescribed impacts (cl.6.1 of the BC Reg), biodiversity values associated with the impacts of native vegetation clearing and habitat loss on land meeting the definition of Category 1 - Exempt Land are not assessed under the BAM (s.6.8 (3) BC Act and s.2.3.1.1 of the BAM).

The circumstances under which land is to be designated as Category 1 and Category 2 are set out in s.60H-60J of the *Local Land Services Act 2013* (LLS Act) and cl.109-114 of the *Local Land Services Regulation 2014* (LLS Reg). The publicly available Native Vegetation Regulatory (NVR) map[5] does not yet contain Category 1-Exempt or Category 2-Regulated land categories.

Outside of the Plant Community Types (PCTs) identified, the BDAR maps 'exotic pasture' ('exotic dominated grassland') and 'disturbed land', stating these are consistent with Category 1 land. Assessors are expected to present evidence for their land category assessment, including the method used.

To demonstrate the presence of Category 1–Exempt Land, the assessor should analyse the content of the relevant datasets available on the NSW Government SEED Portal[6] in the context of the *Native vegetation regulatory map: method statement*[7]. It is also expected that aerial photography of the site, on-site photographs, plot data, and any other information relating to the land use history of the site would be utilised. Combining relevant aspects of this data will allow a reasonable and justifiable approximation of the different categories of land.

Identification of Category 1-Exempt Land should be precautionary. Where in doubt, or where datasets/information provide contradictory information, caution should be applied and the land categorised as Category 2–Regulated Land.

Recommendations

2.1 Support any Category 1–Exempt Land designation via multiple pieces of evidence. This evidence might include:

a) publicly available data sets on the SEED Portal such as:

- *NSW Landuse 2017*
- *NSW Native Vegetation Extent 5m Raster v1.2* (2018 woody extent layer)

b) Category 2–Sensitive and Category 2–Vulnerable land from the NVR Map

c) aerial photography and landholder records of land use (e.g. diaries, photos that show clearing or cropping activities)

d) plot data already obtained.

2.2 Clearly justify the final land categorisation by:

a) combining data from the above mapping products, aerial photography of the site, on-site photographs, any data from within the footprint and available records of land use history

b) linking the results to the specific components of the land category definitions in the LLS Act

c) reviewing the published *native vegetation regulatory map: method statement* to determine how the datasets in recommendation 2.1 (a) above can be best interrogated to support any identification of Category 1 – Exempt land.

2.3 Present the final land categorisation on a map within the BDAR.

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[5] https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/native-vegetation-regulatory-map

[6] https://www.seed.nsw.gov.au/

[7] https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/native-vegetation-regulatory-map-method-statement-170495.pdf

3 The BDAR must provide adequate justification for the allocation of PCTs

The BDAR has not demonstrated compliance with Section 5.2 of the BAM. Specifically, s.5.2.1.12 of the BAM requires the assessor to provide justification of evidence used to identify the PCT, or the likely PCTs, on the subject land including matching the outputs of the quantitative analysis of existing and new site survey data to PCTs in BioNet. To fulfil the requirements of the BAM a BDAR should ensure all decisions regarding PCT determination have been documented.

Only minimal justification has been provided on how each PCT was assigned, with no specific reference to identifying features like soil types, landscape position, existing vegetation mapping, attributes recorded in field data sheets and how these were used in BioNet searches to arrive at the final PCT allocation. Additional lines of evidence should be provided.

Recommendation

3.1 Additional information should be presented in the BDAR to justify the allocation of each PCT.

4 Appropriate application of the streamlined assessment module for 'paddock trees' has not been demonstrated

These comments are additional to Recommendation 1.1 to seek advice from BAM Support on how to use the updated BAM-C for a BAM 2017 paddock tree streamlined assessment.

The BAM 2017 paddock tree streamlined assessment module (the 'paddock tree module') may only be applied to trees meeting the definition of paddock trees as stated in that module. The information provided by the assessor has not demonstrated that the paddock trees to which this module has been applied meet the BAM definition of paddock trees. The BDAR must specifically state which component(s) of the paddock tree definition is applicable and provide supporting information. The land category assessment referred to under Issue 2 above may be relevant.

It appears all 96 'paddock trees' mapped in the BDAR and GIS shapefile have been entered into the paddock tree case in the BAM-C. However, the data supplied indicates a small number of these trees are located within the native vegetation zones assessed in the other BAM-C case for this project. If so, unnecessary ecosystem credits would be generated by assessing those trees twice.

Recommendations

4.1 State in the BDAR which component(s) of the paddock tree definition are applicable to the site and provide supporting information to demonstrate that the paddock tree streamlined assessment module may be used.

4.2 Ensure that mapped 'paddock trees' occurring within the native vegetation zones are not assessed using the paddock tree streamlined assessment module.

5 Paddock trees have been identified as habitat for species credit species recorded on the development site.

The BDAR assessed 96 paddock trees using the BAM paddock tree module, which calculates ecosystem credits to offset the loss of those trees. Species credit species are not accounted for.

Certain types of paddock trees are known to provide important habitat for the superb parrot and squirrel glider – two species credit species recorded on the development site.

From the GIS shapefiles it appears at least one of the superb parrot sightings on the site may have been in a tree assessed under the paddock tree module. BMS (2020)[8] also assessed the majority of

[8] BMS (2020) *Cadia Valley Operations Processing Rate Modification – Baseline Fauna Survey Report*. Report prepared by Biodiversity Monitoring Services for Newcrest Mining Limited, December 2020. Appendix E of Cadia Valley Operations – Processing Rate Modification Biodiversity Assessment Report, 7 December 2020.

the paddock trees as providing suitable superb parrot breeding habitat as defined in the Threatened Biodiversity Data Collection (TBDC) and included these in the species polygons.

The squirrel glider sightings reported in BMS (2020) appear to be within the mapped vegetation zones assessed under the full BAM. However, BMS (2020) has included a number of paddock trees on the site within the species polygons for the squirrel glider, based on their habitat assessment and information in the TBDC.

BCS has concerns regarding the application of the paddock tree module on a site where species credit species were sighted during the fauna surveys and the subject trees have been assessed as providing suitable habitat for those species.

The BAM 2017 paddock tree module is silent on species credit species preventing its application. Advice subsequently released by the Department[9][10] clarified that the paddock tree module should not be used where there are impacts on threatened species that require species credits.

BCS has sought advice from BAM Support regarding the best approach to address this issue in the context of the specific development site and the BMS (2020) conclusions. Aspects of the advice sought are still pending. BCS will follow up with further advice on this matter as soon as possible.

Recommendations

5.1 Note the BCS concerns regarding the application of the paddock tree module to identified species credit species habitat and await further advice from BCS.

6 Clarity is required on stratification of native vegetation into zones and the use of BAM plot data.

The assessor is required to stratify areas of each PCT that are in different broad condition states into separate vegetation zones. The assessor must describe each vegetation zone in the BDAR to accurately reflect significant and distinct differences in condition (BAM s.5.3.1 and page 16 BAM Operational Manual Stage 1).

The BDAR has divided the native vegetation on the site into four zones (in discontinuous patches across the development site) based on PCT and broad condition state (Table 1 below). The number of BAM plots required was based on the total area of each zone.

Table 1 Vegetation zones listed in the BDAR

Vegetation Zone in BDAR	Area in hectares (ha)(from BDAR)	BAM Plots established*	Additional 'rapid assessment spot samples'*
PCT 266 'Moderate' (10 mapped areas)	10.58	**3** (3 required by BAM)	1
PCT 277 'Moderate' (12 mapped areas)	4.92	**3** (2 required by BAM)	3
PCT 277 'Plantings' (12 mapped areas)	6.09	**Nil** (3 required by BAM). Instead the assessment uses data from plots in zone 'PCT 277 Moderate'.	4
PCT 277 'Derived' (1 mapped area)	1.02	**1** (1 required by BAM)	0

*Additional BAM plots and spot samples were located in 'exotic pasture', 'disturbed' areas and at locations outside of the development footprint. No information is available on the corresponding PCTs for BAM plots or spot samples outside of the development footprint.

[9] Assessor Update No 3 (6 August 2018)

[10] https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/accredited-assessors/assessor-questions-and-answers

Minimal description of each zone is provided in the BDAR and few example photos are provided. No detail or discussion on the condition metric or decision points used to stratify condition states for identified PCTs across the discontinuous patches has been provided in the BDAR.

Within the BAM-C the assessor has generated vegetation integrity scores using data from individual plots within each vegetation zone listed in the BDAR. The vegetation integrity scores based on these individual plots ranges from 19 to 54.6 for PCT 266 'Moderate' and 24 to 59.5 for PCT 277 (Table 2).

Table 2 Condition scores from individual BAM plots entered into the BAM-C for three vegetation zones.

Vegetation Zone in BDAR	BAM Plot	Composition Score	Structure Score	Function Score	Vegetation Integrity Score
'PCT 266 Moderate'	**Q7**	51.5	43.6	72.2	**54.6**
	Q15	19.1	33	69.7	**35.2**
	Q16	3.8	32.8	55	**19**
'PCT 277 Moderate' and PCT 'Plantings'	**Q4**	57.7	43.6	83.8	**59.5**
	Q5	6.1	32.7	70	**24**
	Q11	13.8	32.7	70	**31.6**

A particularly notable anomaly within PCT 266 'Moderate' is plot Q16 which has generated a vegetation integrity score of 19. Sally Kirby has advised (email 3 February 2021) that Premise have no record of the original data sheet and location for Q16, however an additional two plot data sheets (including one for PCT 266) have been located which could be used in place of Q16.

For PCT 277 'Moderate', GIS data indicates that plot Q4 is located in a patch of native vegetation within a pine plantation approximately 2.8 kilometres from the nearest mapped occurrence of PCT 277 'Moderate' on the development site. The BDAR does not discuss how representative that off-site portion of native vegetation is of the zone PCT 277 'Moderate' identified within the development footprint.

Sally Kirby (email 3 February 2021) advised the plantings on the site vary from 10 to 20 years in age. The BDAR has not demonstrated that the grouping of all plantings into a single vegetation zone is appropriate. Furthermore, the BAM data from zone PCT 277 'Moderate' has been used for PCT 277 'Plantings', as no BAM plots were established in the plantings. Premise believe this to be a conservative approach (Sally Kirby, email 3 February 2021) however no rationale is presented in the BDAR to support this.

Recommendations

6.1 Review vegetation zone stratification for each PCT within the subject site.

6.2 Detail the basis on which each PCT was delineated into condition states (vegetation zones), including plot/spot sample data analysis, site photos, and any other relevant data collected from the site and field assessment methods to justify zone allocations.

6.3 Ensure that all zones have the required number of appropriately located BAM plots and that the correct data is included in the BDAR and BAM-C.

6.4 Present a rationale regarding the use of BAM plots from zone PCT 277 'Moderate' for PCT 277 'Plantings' to adequately demonstrate that this approach would not result in an underestimation of the credits required to offset impacts to these areas.

7 The allocation of plot data to vegetation zones within the BAM calculator is not consistent with the requirements of the BAM.

The BAM Stage 1 Operational Manual (page 21) allows that more than one patch size class can be entered into the calculator for a vegetation zone if it is made up of multiple discontinuous patches of different sizes. In that instance separate vegetation zones are entered into the calculator, each with its own patch size.

The BDAR has adopted this approach. Whilst four vegetation zones are defined in the BDAR, multiple entries per patch size have been entered into the BAM-C for each zone (Table 3 below).

Table 3 Comparison of vegetation zones in the BDAR with BAM-C entries

Vegetation Zone in BDAR	Vegetation Zones entered in BAM-C
1. PCT 266 'Moderate'	Zones 1 to 6
2. PCT 277 'Moderate'	Zones 7 to 10 and 20 to 24
3. PCT 277' Plantings'	Zones 11 to 18
4. PCT 277 'Derived'	Zone 19
Total zones = 4	**Total zones = 24**

These is an issue in how the plot data has been entered for each zone. It is important to note that the Stage 1 Operational Manual specifies that each **entry for a vegetation zone by patch size should have the same plot data.**

For example, the vegetation zone PCT 266 'Moderate' required three BAM plots based on the total size of that zone as currently mapped (the total of all discontinuous occurrences of the zone across the development site). There are six separate entries for this zone within the BAM-C to allow for varying patch sizes. Only data for a single plot has been entered for each patch, and the plots chosen for each patch vary. Instead, data from **all three plots** established within PCT 266 'Moderate' must be entered for each patch entered into the BAM-C for that zone. This fulfils the requirement for each entry for a zone by patch size to have the same plot data.

Recommendations

7.1 Ensure each BAM-C entry for a vegetation zone by patch size has the same plot data (i.e. all plot data collected for the applicable vegetation zone described in the BDAR should be entered for each different patch size applying to that zone).

8 There are errors in definition and allocation of patch sizes in the BDAR and BAM-C

A native vegetation 'patch' may extend onto adjoining land beyond the footprint of the subject land, and for woody ecosystems includes native vegetation separated by 100 metres or less from the next area of intact native vegetation. For non-woody vegetation, this gap is reduced to 30 metres or less (BAM definitions page 73 and BAM Operational Manual Stage 1 page 21).

BCS has spot checked the patch size GIS shapefile provided by Premise with the data entered into the BAM-C, and detected the following issues:

- There appear to be some data entry errors in the BAM-C, where the patch size entered into the BAM-C for specific zones does not match the hectare area for the corresponding patch mapped in the shapefile.
- There appear to be some instances where the patch size has been determined incorrectly. For example, application of the BAM patch size ruleset to the Premise data and GIS shapefiles indicates patches P9, P11, P12, P13 and P14 (as named in the GIS shapefile) should be considered a single patch. There may also be instances of other woody native vegetation occurring within 100 metres of mapped patches, based on the shapefile provided for other native vegetation within the 1500 metre buffer area.

Some specific examples of patch size errors are provided in Table 4 and illustrated in Figure 1 below. These are not necessarily the only errors in patch size allocation.

Table 4 Examples where patch size may be incorrect in the BAM-C

Zone number in BAM-C	Broad Vegetation Zone Name (BDAR)	Zone sub-name	Issue
7	PCT 277 Moderate	PCT 277 MODNF11_12_17	BAM-C shows patch size category 1 (<5ha) however the patch mapped in the shapefile is 9.04 hectares (ha). A patch of that size would fall into category 2 (5ha to 24ha). However, the shapefile provided indicates that there are four mapped patches of native vegetation that are within 100m of each other and so should be treated as a single patch - 9.04ha, 10.4ha, 6.8ha and 7.2ha. There is also a 6.7ha mapped patch of non-woody native vegetation within 30m. This would take the patch size to 40.14 ha, corresponding to patch size **category 3** (25ha to 100ha). See Figure 1 below.
8	PCT 277 Moderate	PCT 277 MODNF20	BAM-C shows patch size category 1 (<5ha) however the patch mapped in the shapefile is 10.4ha. A patch of that size would fall into category 2 (5ha to 24ha). However as for PCT277 MODNf11_12_17 above, there are five mapped patches of native vegetation which should be treated as a single patch falling within patch size **category 3**. See Figure 1 below.
10	PCT 277 Moderate	PCT 277 MODNF10	BAM-C shows patch size category 2 (5ha to 24ha) however the patch mapped in the shapefile is 0.03ha. A patch of that size would fall into **category 1.**
11	PCT 277 Planting	PCT 277 PL6	Polygon PL6 has been allocated Category 2 in the BAM-C based on a mapped patch of 7.2ha. However as for PCT277 MODNf11_12_17 above, there are five mapped patches of native vegetation which should be treated as a single patch falling within patch size **category 3**. See Figure 1 below.
12	PCT 277 Planting	PCT 277 PL1_13	Polygons PL1 and 13 have been allocated Category 2 in the BAM-C based on a mapped patch of 6.8ha. However as for PCT277 MODNf11_12_17 above, there are five mapped patches of native vegetation which should be treated as a single patch falling within patch size **category 3**. See Figure 1 below.
17	PCT 277 Plantings	PCT 277 PL4_7_8	BAM-C shows patch size category 1 (<5ha) however the corresponding patch mapped in the shapefile for these polygons is 9.04ha. A patch of that size would fall into category 2 (5ha to 24ha). However as for PCT277 MODNf11_12_17 above, there are five mapped patches of native vegetation which should be treated as a single patch falling within patch size **category 3**. See Figure 1 below.
19	PCT 277 derived	PCT 277 Derived	This zone has bee has been allocated Category 2 in the BAM-C based on a mapped patch of 6.8ha. However as for PCT277 MODNf11_12_17 above, there are five mapped patches of native vegetation which should be treated as a single patch falling within patch size **category 3**. See Figure 1 below.
23	PCT 277 Moderate	PCT 277 ModNF16	This zone is entered into the BAM-C but is not included in Table 4 of the BDAR. BAM-C shows patch size category 1 (<5ha) however the patch mapped in the shapefile is 6.82ha. A patch of that size would fall into **category 2.**

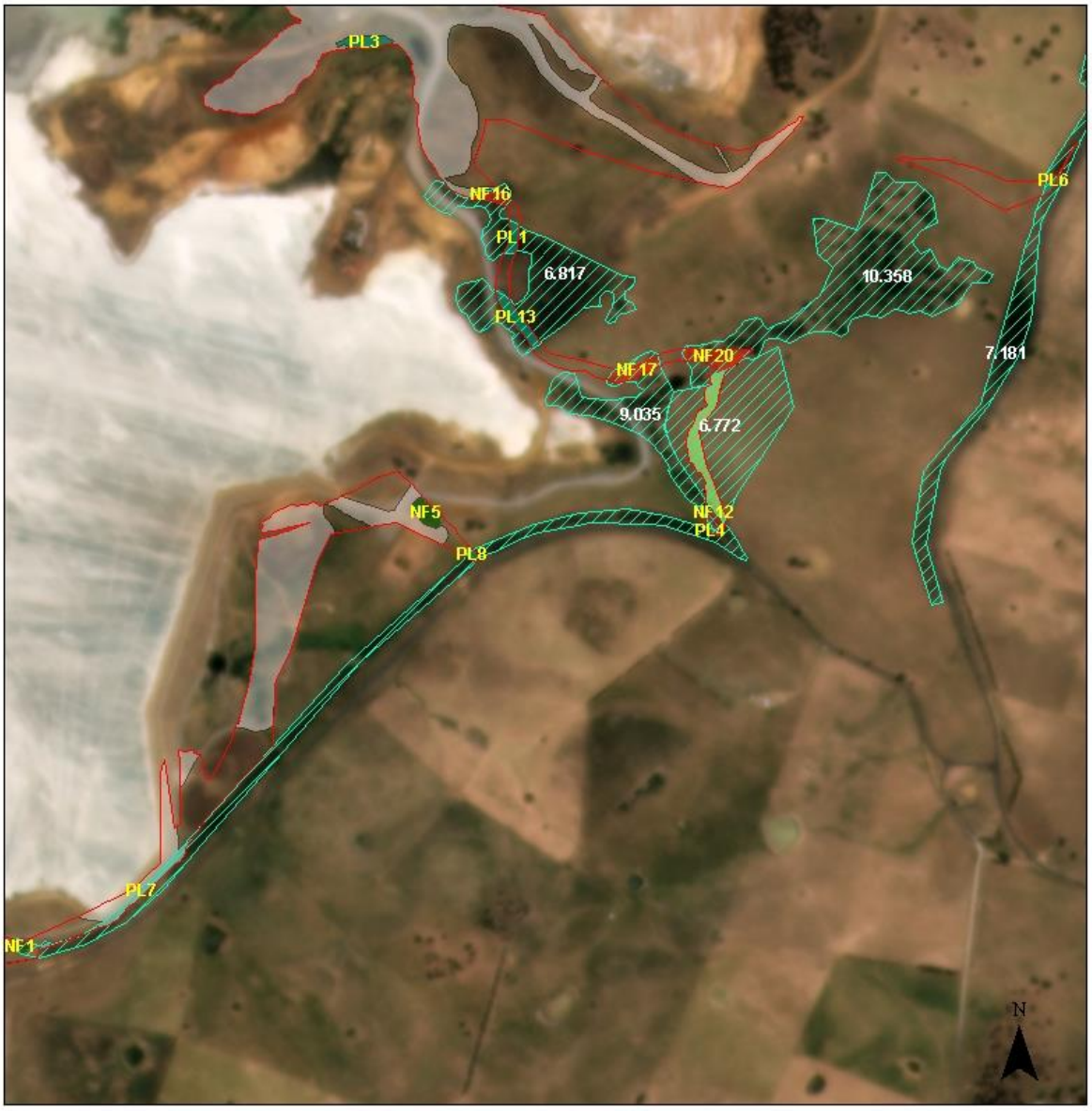

Figure 1 Examples of native vegetation zones and patch size polygons from Premise shapefiles where patch size may have been incorrectly defined (as highlighted in Table 4 of this response).

Patch size class is used as a filter to predict threatened species likely to occur or use habitat on the subject land. Please be aware changes in the patch size categories in the BAM-C may result in changes to the predicted and candidate species lists.

Recommendations

8.1 The assessor should:

a) check all patch size mapping against the requirements of BAM

b) check all patch size data entered into the BAM-C

then update the BDAR and BAM-C case as necessary.

9 The requirements of the BAM for assessing 'Serious and Irreversible Impacts' have not been addressed for White Box-Yellow Box – Blakely's Red Gum Critically Endangered Ecological Community (Box-Gum CEEC).

The project will impact a candidate entity for 'serious and irreversible impacts' (SAII) within the meaning of the s.6.5 of the *Biodiversity Conservation Act 2016* (BC Act).

Under the BC Act, a determination of whether an impact is serious and irreversible must be made by the decision maker in accordance with the principles prescribed in s.6.7 of the BC Regulation. Guidelines have been developed to assist decision maker's in this process[11].

The BDAR identifies that PCTs 266 and 277 on the development site fall within the description of the Box-Gum CEEC. This entity is identified as a 'potential' SAII entity in the SAII guidance document and BAM-C.

To assist the decision maker to evaluate the nature of an impact to a potential entity at risk of SAII, the BDAR must contain specific details of those impacts in accordance with the assessment criteria set out in s.10.2.2 of the BAM. The assessor has not provided all of the required information.

Recommendation

9.1 Supply the information required by s.10.2.2 the BAM, to allow a determination of whether the proposal will have serious and irreversible impacts on the Box-Gum CEEC within the meaning of the BC Act and Regulation.

10 Additional explanation for excluding certain species credit species from further assessment is required.

In accordance with the BAM, removal of a species from the candidate list of species credit species for further assessment can only occur if the species:

a) has habitat constraints listed in the Threatened Biodiversity Data Collection (TBDC) and none of these constraints are present on the site; or

b) has geographic limitations listed in the species' NSW profile and the site is outside of the defined geographic area; or

c) is vagrant to the area; or

d) the habitat constraints listed in the TBDC or known microhabitats that the species requires to persist or use, are degraded to the point where the species will no longer be present.

Where species are excluded from further assessment on this basis, the BDAR is expected to present a description of the field technique used to assess the presence and condition of the specific constraint or microhabitat and any other data or information used to make the decisions on the final candidate list (e.g. reference to attribute scores from assessment of vegetation integrity illustrate poor site condition, together with site history and reference to peer-reviewed or other published information relating to the microhabitats used by the species, photographic evidence and maps etc).

[11] https://www.environment.nsw.gov.au/research-and-publications/publications-search/guidance-to-assist-a-decision-maker-to-determine-a-serious-and-irreversible-impact-2019

If none of the above factors are applicable, a targeted survey must be undertaken or the species must be assumed present.

Threatened Flora

Whilst pages vi and 10 of the BDAR state that a targeted flora survey was undertaken, Premise (Sally Kirby *pers. comm.* phone conversation 27 January 2021 and email 3 February 2021) advises that no such survey was undertaken and references to flora surveys in the BDAR refer to the collection of BAM plot data and rapid assessment plot data only. This field work was undertaken in late autumn and early winter - outside of the recommended survey times for a number of the threatened flora species considered.

Conclusions regarding which candidate species credit species that require further assessment are presented in Table 7 of the BDAR (from page 28). Some species were removed from further assessment based on factors a) and b) above however most species were removed using factor d).

The BDAR has not supported all flora species credit species conclusions effectively.

For species removed from further assessment the 'likelihood of occurrence' was generally rated 'nil' in Table 7. For a small number of species (e.g. the small purple pea (*Swainsona recta)* and silky swainson pea (*Swainsona sericea*) the likelihood of occurrence was listed as 'low' in Table 7, however those species were still excluded from further assessment. If a species is still considered to have a low likelihood of occurrence, the BDAR has not concluded that the species would no longer be present on the site (for comparison, where candidate fauna species credit species were rated as having a 'low' likelihood of occurrence on the site, the species was either surveyed for or assumed present (BDAR Table 8)).

Threatened Fauna

The majority of candidate species credit species were subject to targeted surveys undertaken by BMS (2020). Only a small number of these species were removed from further consideration on the basis of factor d) above. Of these, minimal information is presented in BMS (2020) regarding the exclusion of the eastern pygmy possum (*Cercartetus nanus*) from further consideration. Table 8 of the BDAR (but not the BMS report) states that the native plantings on the study area have a small potential to support this species but it is unlikely to occur. As noted under Issue 6 above, minimal information has been presented regarding PCT 277 'Plantings' to support this statement.

Recommendations

10.1 Remove statements on page vi and 10 of the BDAR which suggest that targeted flora surveys were undertaken.

10.2 Present adequate supporting information for the exclusion of:

a) small scurf-pea (*Cullen parvum*), *Euphrasia arguta,* hoary sunray (*Leucochrysum albicans var tricolour*), small purple pea (*Swainsona recta*) and silky swainson-pea (*Swainsona sericea*)

b) eastern pygmy possum (*Cercartetus nanus*)

from further consideration on the basis of their known microhabitats being degraded to the point those species will no longer be present.

11 Species polygons in Appendix D of the BDAR do not align with the species credit species area entries in the BAM-C.

The BMS (2020) report was prepared by a BAM accredited assessor and evaluates the candidate fauna species credit species for further assessment, describes the targeted fauna survey methods and results, and maps species polygons for the final species credit species.

Surveys were undertaken for all but two candidate species credit species for further assessment (pink-tailed legless lizard and striped legless lizard) which were instead assumed present. A further

two species credit species (squirrel glider and superb parrot (breeding)) were confirmed on site by BMS.

The species polygons mapped by BMS are not specifically referenced in the BDAR. BCS has compared the BMS (2020) species polygons with the hectare areas and vegetation zones entered into the BAM-C to calculate the species credits required. These do not fully align with the BCS polygons within the mapped vegetation zones, with no justification provided. For example:

- **Pink-tailed legless lizard** – zones PL 5 and PL10 (PCT 277 'plantings') are not included in the species credit calculations for this species, however the species polygons mapped by BMS (2020) include part of these two vegetation zones.
- **Superb parrot** – the vegetation zone PCT 277 'derived' is not included in the species credit calculations for this species, however the species polygons mapped by BMS extend into approximately one third of this vegetation zone.

Recommendation

11.1 Ensure that the species polygon extent (within native vegetation) in the BDAR matches the areas entered for each species in the BAM-C. If the BDAR has updated the species polygons as mapped by BMS (2020), the rationale and the revised polygons must be presented in the BDAR.

12 The BDAR has not fulfilled the requirements of the BAM for prescribed impacts

Prescribed impacts (listed in cl 6.1 of the *Biodiversity Conservation Regulation 2017*) are the impacts on biodiversity values which are not related to, or are in addition to, native vegetation clearing and its associated habitat loss. Even where a site meets the definition of Category 1-Exempt Land under the LLS Act, biodiversity impacts on that land must be assessed if they constitute a prescribed impact.

Section 6.7 of the BAM requires the BDAR to identify potential prescribed biodiversity impacts on threatened species as a result of the development, including the identification of certain geological, hydrological, human-made and non-native habitat types including their location and the relevant candidate threatened species. Consideration of avoidance, minimisation and mitigation measures to address the identified prescribed impacts is also required (BAM s.8.2).

The identified prescribed impacts must be assessed in accordance with s.9.2 of the BAM. Generally, this requires consideration of the following for each prescribed impact identified:

- The entities likely to use of inhabit the feature(s)
- The nature, extent and duration of the impact
- The importance of the features(s) to the persistence of the entity and the consequences to the entity if the impact proceeds.

Evidence-based justification for all conclusions is expected.

The assessment of prescribed impacts presented in the BDAR has not adequately fulfilled all requirements of s.6.7 and s.9.2 of the BAM:

- The BDAR has not clearly identified and described the prescribed impacts associated with the development.
- The BDAR has not identified the location of the prescribed impacts, including polygons identifying the extent of the impact, on the site and/or location maps (BAM s.6.7, Stage 2 Operational Manual s.2.5.2). The species credit species polygons mapped in BMS (2020) have not been utilised.
- In some cases, it appears conflicting information is presented on the presence and characteristics of a feature. For example, the BDAR states that no rocky areas occur within the study area apart from human-made rock containment bunds, concluding that the only

pink-tailed legless lizard habitat to be impacted is native grassland between trees. However, BMS (2020) refers to 'mapped rock outcrops' being considered in defining suitable habitat for the pink tailed legless lizard on the development site. The shapefile for the corresponding species polygon suggests the use of buffers around rock habitat spread throughout the exotic pasture and some native vegetation within the development footprint.

- The BDAR has not addressed all of the factors listed in S.9.2 of the BAM for each of the relevant prescribed impacts.
- The BDAR has not clearly listed the relevant candidate species likely to use the or inhabit the identified features that relate to prescribed impacts.
- The BDAR incorrectly concludes that the loss of non-native vegetation habitat for the striped legless lizard has been accounted for in the offset obligation. The BAM only generate biodiversity credits in native vegetation zones. The BMS (2020) species polygons for the striped legless lizard extend beyond those zones and include areas mapped as 'exotic pasture' and 'disturbed areas'.
- Two candidate species that were recorded on site (superb parrot and squirrel glider) are not specifically considered in the assessment of prescribed impacts. The BDAR comments on loss of foraging habitat and hollow-bearing trees for these species only and states these have been accounted for in the offset obligation. These are not prescribed impacts. Potential prescribed impacts for these species would relate to connectivity (s 9.2.1.5) and movement (s.9.2.1.6).
- The BMS (2020) report identifies habitat features on the development site, including creek lines and dams (Table 4-1). This is not acknowledged in the consideration of the impacts of the proposal on water bodies and hydrological processes on page 54 of the BDAR.
- The BDAR has not clearly set out consideration of avoidance, minimisation and mitigation measures for the relevant prescribed impacts, followed by identification of the residual impact.

Prescribed impacts are used by the decision maker to inform the determination and conditions of consent for developments, including the biodiversity credits to be retired, or other conservation measures to be taken. Residual prescribed impacts (i.e. remaining after avoidance, minimisation and mitigation have been applied) may be required to be offset using additional biodiversity credits (above the credit requirement generated by BAM-C for direct impacts) and/or other conservation measures.

Recommendations

12.1 Update the assessment of prescribed impacts with specific reference to s.6.7 and s.9.2 of the BAM and s.2.5 of the BAM Stage 2 Operational Manual. Ensure that all requirements are met.

12.2 Map the location and extent of all applicable prescribed impacts within the BDAR, including where these extend outside of the mapped vegetation zones. The BMS (2020) survey results, habitat assessments and species polygons should be utilised.

12.3 Clarify the extent of suitable habitat for the pink-tailed legless lizard, addressing the inconsistencies between the conclusions of the BDAR and the BMS (2020) habitat assessment and species polygons.

12.4 Explicitly identify the residual prescribed impacts following implementation of avoidance, minimisation and mitigation measures. Provide evidence-based justification for conclusions and discuss any limitations to data, assumptions and predictions about impacts on biodiversity.

13 The sections of the BDAR detailing mitigation measures require improvement

The BAM requires consideration of mitigation measures for direct, indirect and prescribed impacts. (s.9.3).

Page 54 of the BDAR states that the vegetation clearance protocol from the Cadia Valley Operations (CVO) Landscape and Biodiversity Management Plan will be implemented. However in Table 13 *'Avoidance and Minimisation Measures, Responsibility and Timing'*, only a limited number of actions from the vegetation clearance protocol are included for implementation during the construction and post-construction stages for the current proposal.

The relocation of bush rock into adjacent areas to enhance habitat (proposed in the indirect impacts section of the BDAR on page 57) has not been included in the sections of the BDAR setting out mitigation actions (sections 3.1.3 to 3.1.6 and Table 13).

Recommendations

13.1 Ensure that the BDAR has fulfilled the requirements of s.9.3 of the BAM regarding mitigation measures, with specific consideration of s.26 of the BAM Operational Manual Stage 2.

13.2 Ensure all mitigation measures proposed for direct, indirect and prescribed impacts are adequately described in the BDAR. A single consolidated summary of the measures proposed for implementation is recommended.