Our ref: DOC22/410756
Your ref: SSD-10461

Natasha Homsey
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Planning and Assessment Group
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Dear Natasha

Valley of the Winds Wind Farm – EIS Exhibition

Thank you for your email dated 19 January 2022 to the Biodiversity, Conservation and Science Directorate (BCS) inviting comments on the EIS Exhibition for the proposed Valley of the Winds Windfarm Project.

BCS have identified numerous instances where the Biodiversity Assessment Method (BAM) has been incorrectly applied or assessment has been inadequate. These matters will require rectification in order to ensure the final biodiversity credit obligation can be calculated correctly. Areas of incorrect BAM application and inadequate assessment include:

- assessment of all entities at risk of Serious and Irreversible Impacts
- mapping of native vegetation, particularly relating to Critically Endangered Ecological Communities,
- creation of BAM-Calculator (BAM-C) cases, potentially resulting in key threatened species not being assessed
- vegetation transects and plots not being representative of the full suite of vegetation conditions and IBRA subregions across the entire project footprint
- Threatened Ecological Communities and species credit species being excluded from assessment without adequate justification
- potentially inadequate survey effort being undertaken for some species credit species
- uncertainty regarding whether the entire disturbance footprint has been assessed for impacts to biodiversity
- assessment and identification of residual impacts from indirect and prescribed impacts

Appropriate assessment of these matters may require additional survey work, the assumption of presence or the preparation of expert reports; more refined vegetation mapping; updates to the BAM-C and spatial data; and additional assessment and justification in the BDAR.

The currently presented development footprint proposes to clear a cumulative 428.52 hectares of the Critically Endangered Ecological Community (CEEC) Box Gum Woodland. BCS considers that this loss would be consistient with both Principles 1 and 2 of Serious and Irreversible Impacts (SAII) and as such would contribute significantly to the risk of Box Gum Woodland becoming extinct in NSW. BCS could not support an impact of this quantum and recomend the proponent revise the currently presented development footprint and avoidance and minimisation strategies to further reduce impacts of the proposed development.

BCS also have concerns that the land categorisation assessment method (allowed for under the *Local Land Services Act 2013*) has failed to be informed by the presence of CEEC extent across

the project area and potentially has underestimated the extent of Box Gum Woodland required to be cleared for the project. BCS are happy to liaise with the proponent regarding this matter in more detail to inform the Response to Submissions (RTS).

Due to the significant amendments required to comply with the BAM, BCS will need to undertake a comprehensive data audit of the revised Biodiversity Development Assessment Report (BDAR) and BAM-C data during the RTS phase.

A summary of BCS's recommendations is provided in **Attachment A**. BCS's detailed comments and recommendations are in **Attachment B**. Information has also been provided for the convenience of the proponent, namely Woodland Mapping Guidance in **Attachment C** and Bilateral Assessment Information and Data Requirements in **Attachment D**.

If you require any further information regarding this matter, please contact Ben Ellis, Principal Project Officer, via (02) 8275 1838 or ben.ellis@environment.nsw.gov.au.

Yours sincerely

Sarah Carr
Director North West
Biodiversity, Conservation and Science Directorate

30 June 2022

Attachment A – BCS's Summary of Recommendations

Attachment B - BCS's detailed comments and recommendations

Attachment C - Woodland Mapping Guidance

Attachment D - Bilateral Assessment Information and Data Requirements

BCS's Summary of Recommendations

Valley of the Winds Wind Farm - EIS Exhibition

BAM	Biodiversity Assessment Method
BAM-C	Biodiversity Assessment Method Calculator
BBAMP	Bird and Bat Adaptive Management Plan
BC Act	*Biodiversity Conservation Act 2016*
BC Regulation	Biodiversity Conservation Regulation 2017
BCS	Biodiversity Conservation and Science Division of the Department
BDAR	Biodiversity Development Assessment Report
BUS	Bird Utilisation Studies
CEEC	Critically Endangered Ecological Community
DCCEEW	Department of Climate Change, Energy, the Environment and Water (formally DAWE)
EEC	Endangered Ecological Community
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
HBT	Hollow bearing tree
HTE	High threat exotic
IBRA	Interim Biogeographic Regionalisation for Australia
MNES	Matters of National Environmental Significance
PCT	Plant Community Type
RTS	Response to Submissions
SAII	Serious and Irreversible Impacts
TEC	Threatened Ecological Community
TBDC	Threatened Biodiversity Data Collection
VI score	Vegetation Integrity Score

Recommendations

Important aspects of BAM-C calculations require revision – errors will impact on the credit obligation

1.1 BAM-C cases must be split between IBRA sub-regions, with separate cases for each sub-region, noting the exception suggested for the Talbragar Valley IBRA subregion.

1.2 Lists of candidate threatened species in each IBRA subregion should be reviewed to determine whether any additional species need to be assessed.

1.3 Plot data be reviewed to ensure the minimum number of plots and transects required for each IBRA subregion has been met.

1.4 Each proposed stage of the development be assigned its own separate BAM-C case and be described in detail within the BDAR.

1.5 Biodiversity credits be recalculated for each IBRA sub-region.

2.1 Undertake an audit of Stem Size Class scores for all plots and for all data which may need manual revision as part of the RTS.

Vegetation integrity plots may not be representative of site context

3.1 Include all plots in the BAM-C or provide justification in the BDAR as to why they have not been entered.

4.1 Revise the plot duplication method to meet the principles outlined in this response.

4.2 Submit a plot duplication proposal for review.

5.1 Where vegetation plots are not located in the project footprint, justification must be provided, including evidence that the plot is in the correct PCT and vegetation zone.

Vegetation mapping and vegetation identification may not be representative of site context

6.1 Conduct an assessment to determine if the benchmarks applied to the vegetation on site are relevant given the extreme fire impact sustained.

6.2 If it is determined that the current benchmarks are not applicable, provide more appropriate local data in accordance with Section 1.4.2 of the BAM.

7.1 In the absence of data supporting CEEC absence, land be designated as Category 2 Regulated Land and Box Gum Woodland be assumed present.

7.2 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.

8.1 Revise all EPBC TEC equivalency assessments to exclude the provisions of the LLS Act.

9.1 Revise vegetation mapping for grassy woodlands within the project site according to the information and advice provided within this response.

10.1 Audit the vegetation zone mapping to identify areas mapped as derived native grassland which contain trees and update the mapping and BAM-C calculations accordingly.

11.1 Provide evidence that all vegetation has been appropriately surveyed in detail to inform TEC equivalency assessments and support the determination of non-equivalence to EPBC Act listed TECs.

11.2 If evidence has not been collected, assume the presence of EPBC Act listed TEC.

12.1 Revise the TEC equivalency assessment of EPBC Act listed Grey Box Woodland TEC extent within the project site according to the advice contained within this response.

12.2 Contact DCCEEW for advice if there are impacts to the EPBC Act representation of this TEC which is not consistent with the TECs BC Act listing.

13.1 Undertake a TEC equivalency assessment for PCT 42.

14.1 Provide explanation in the BDAR why a significant proportion of flora species detected could not be identified to the species level.

14.2 If BAM plots were surveyed during a period which has limited the appropriate identification of flora, provide further justification regarding the applicability of more appropriate local data in accordance with Section 1.4.2 of the BAM.

15.1 Include all areas of native vegetation within the landscape vegetation cover class assessment.

Aspects of the development footprint are not clearly articulated in the BDAR

16.1 Clarify that all development components, which will result in surface disturbance to biodiversity values, have been included within the consolidated development footprint and are reflected in the BDAR.

Candidate species assessed will require review – inadequate exclusion of species will impact on the credit obligation

17.1 Conduct a targeted survey to determine the presence or absence of Brush-tailed Phascogale and Delma impar, obtain an expert report or assume presence.

18.1 Review and/or revise the candidate species exclusion determinations based on the information and recommendations contained within this response.

18.2 For each vegetation zone provide a list of associated species (according to the TBDC), and provide evidence-based justification on species exclusions from each associated vegetation zone, ideally in a tabularised format.

19.1 Review and/or revise species polygons based on the information and recommendations contained within this response.

19.2 Provide evidence-based justification for the exclusion of each vegetation zone from species polygons.

20.1 Conduct a targeted survey to determine the presence or absence of the Koala from previously unsurveyed areas within the project site, obtain an expert report or assume presence.

21.1 Clarify impacts to the Large-eared Pied Bat.

22.1 Provide mapping of rocky habitat so BCS can review the spatial adequacy of targeted reptile surveys conducted.

23.1 Provide a spatial file of the grid points which were surveyed during targeted flora survey and display these grid points within the BDAR.

23.2 Provide clarification regarding the approximate proportion of the direct impact area which was surveyed for each threatened species during the correct survey window.

23.3 If multiple species were simultaneously surveyed together, provide further detail on this giving reference to Section 6.6 of the *Surveying threatened plants and their habitats* guidance document.

24.1 Provide species polygons for species assumed to be present.

24.2 Provide justification on the exclusion of any specific areas and/or vegetation zones from assumed species polygons.

Justification of avoidance and minimisation methods will require revision

25.1 Revise determination on impact avoidance and minimisation after other matters raised in this response are addressed.

25.2 BCS suggest that justification of avoidance could be improved by providing a comparison of the areas of land intersected by the development footprint which contain biodiversity values and areas which contain no biodiversity values.

Avoidance and appropriate assessment of Serious and Irreversible impacts will require revision

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

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

27.1 Undertake an SAII assessment for the Large-eared Pied Bat and Large Bent-winged Bat.

Assessment of prescribed and indirect impacts associated with the operation of the project will require review

28.1 Explanation is required as to why fewer songmeters were analysed than were reported as deployed.

28.2 Justification of the number and placement of songmeters within the Mount Hope turbine cluster is required.

29.1 Flight path data be presented at a scale where flight paths can be clearly seen.

29.2 The location of the bird utilisation survey locations should be provided on these maps and differentiated from diurnal bird surveys so the spatial adequacy of BUS surveys can be reviewed.

30.1 If the Kernel density analysis maps are to be used they should be relevant, presenting meaningful data that will assist in the analysis of migratory pathways.

30.2 Maps be labelled correctly and represent the species intended.

31.1 Definitions of likelihood and metrics applied to the collision risk assessment be amended to better reflect the chances of occurrence.

31.2 If there is an absence of data or impacts are uncertain for specific species apply the precautionary principle and assume a worst-case scenario and/or seek advice from a suitably qualified species expert.

32.1 Further assessment of turbine barrier effects on fauna is required.

33.1 Provide a more detailed BBAMP framework giving reference to the specific points identified in this response and in consultation with BCS.

34.1 Provide further detail regarding the assessment of residual prescribed impacts to connectivity.

34.2 Provide an offsetting method and quantum which is justifiably commensurate to the residual prescribed impacts expected to occur.

35.1 Ecosystem credits be calculated for the indirect impacts of turbine operation on native vegetation and threatened species habitat.

Like-for-like credit reports should be appended to the BDAR – this assists compliance with approval conditions

36.1 The accredited assessor should generate and attach a biodiversity credit report (like-for-like) from the BAM-C to the BDAR.

Information provided for the convenience of the accredited assessor

37.1 Further investigation be conducted, prior to the credit obligation for the project being captured within consent conditions. If access cannot be obtained prior to consent being granted, a worse-case scenario must be assumed, and a maximum credit obligation calculated accordingly.

38.1 Review the supporting guidance document in Attachment D and provide a consistency table to facilitate review of bilateral assessment requirements.

BCS's Detailed Comments and Recommendations

Valley of the Winds Wind Farm - EIS Exhibition

Important aspects of BAM-C calculations require revision – Errors will impact on the credit obligation

1. The site context data for BAM-C cases will require revision according to intersected IBRA subregions

BCS have reviewed both the BDAR and the BAM Calculator (BAM-C) and note that although the project footprint spans across five Interim Biogeographic Regionalisation for Australia (IBRA) subregions an assessment has only been carried out for three IBRA subregions. It should be noted that this is not a BAM compliant method for linear shaped developments. Detail has been provided in Table 1 below.

Table 1 IBRA subregions intersected by the project site

IBRA Region Intersected by the study area	IBRA subregion Intersected by the study area	Proportion of study area within IBRA subregion (ha)	Proportion of study area within IBRA subregion (percentage)	BAM-C Case Identifier
NSW South Western Slopes	Northern Inland Slopes	1021.4	6.08 %	00021961
Sydney Basin	Kerrabee	3444.7	20.53 %	00021960 and 00028366
Brigalow Belt South	Liverpool Range	3401.9	20.27 %	**No BAM-C Case Provided**
	Pilliga	8859.8	52.8 %	00021962 and 00032036
	Talbragar Valley	50.02	0.3 %	**No BAM-C Case Provided**

BAM 2020 (section 5.2.1) requires that, for linear-shaped proposals, habitat suitability for each IBRA subregion must be assessed separately. This is important as the IBRA bioregions and IBRA subregions define:

- Identification of PCTs and benchmarks,
- Habitat suitability for threatened species, and
- The like-for-like offsetting rules associated with a development's offset obligation.

For linear projects, this requires a separate BAM-C case for each IBRA subregion intersected by a proposed linear development. A separate BAM-C case will need to be submitted for the portions of the proposed project which intersects through the Liverpool Range IBRA subregion. As only a very small proportion of the project overlaps with the Talbragar IBRA subregion (0.3%) BCS suggests that an exception could be made in this circumstance and this small proportion of the subject site could be incorporated into the Pilliga IBRA subregion for the purposes of the assessment.

As separate assessments are required for each IBRA subregion the minimum number of plots and transects required per vegetation zone may differ from the number required for the combined assessments which were completed. The minimum plots and transects required by the BAM for each vegetation zone, in each separate assessment area, must be met. Creating a new BAM-C case for the Liverpool Range IBRA subregion may add new species that would require habitat suitability assessments in acoordance with section 5 of the BAM.

If it is proposed to stage the development, in accordance with Section 7.14 of the *Biodiversity Conservation Act 2016* (BC Act), each separate development stage will also require its own BAM-C case. Each separate stage of the development should be clearly represented in relevant figures, described in detail within the BDAR and provided as a spatial file to facilitate review and auditing processes. It is requested that the following information is included in the BDAR:

- name and location of each stage
- area of impact, including area of impact to native vegetation
- each PCT and vegetation zone that is impacted in each stage, the corresponding area of native vegetation and relevant ecosystem credits
- species credit species impacted in each stage, area of impact and each species credit obligation
- all of the above represented on relevant figures and supplied as a spatial file.

Changing the site context of cases will have potential flow on effects for all data input into the BAM-C. As such, BCS have only conducted a preliminary data audit at this stage. BCS will complete a comprehensive data audit once the recommendations in this response have been addressed, to ensure the BDAR aligns with the revised BAM-C. It is important to ensure that the BDAR aligns with the revised BAM-C once the issues identified in this response are addressed.

Recommendations

1.1 BAM-C cases must be split between IBRA subregions, with separate cases for each sub-region, noting the exception suggested for the Talbragar Valley IBRA subregion.

1.2 Lists of candidate threatened species in each IBRA subregion should be reviewed to determine whether any additional species need to be assessed.

1.3 Plot data be reviewed to ensure the minimum number of plots and transects required for each IBRA subregion has been met.

1.4 Each proposed stage of the development be assigned its own separate BAM-C case and be described in detail within the BDAR.

1.5 Biodiversity credits be recalculated for each IBRA subregion.

2. Errors in BAM-C data transcription will require correction

BCS have conducted a preliminary audit on a sub-sample of plots to determine if any data transcription errors between plot data and the BAM-C are present.

As the accredited assessor has used an Excel data collection and direct upload process, most of the plot and BAM-C data is consistent. However, BCS have identified cases of inconsistencies between Stem Size Class function scores within the BAM-C and plot data. These functional scores cannot be directly uploaded into the BAM-C and as such have a higher chance of transcription error.

BCS recommends that an audit of Stem Size Classes for all plots and for all data which may need manual revision as part of the RTS is conducted.

Recommendation

2.1 Undertake an audit of Stem Size Class scores for all plots and for all data which may need manual revision as part of the RTS.

Vegetation integrity plots may not be representative of site context

3. Vegetation plots have been completed but not included in the BAM-C

From reviewing the plot data provided in the BAM-C and the field data sheets it has been identified several vegetation plots that have not been included in the BAM-C. This includes plots 54, 56, 57 and 58, all of which are assigned to PCT 479.

If additional plots have been completed and they are representative of the relevant vegetation zone they should be entered in the BAM-C. If plots have not been used because they are not within the project footprint, or for any other reason, this should be clearly justified in the BDAR.

Recommendation

3.1 Include all plots in the BAM-C or provide justification in the BDAR as to why they have not been entered.

4. Vegetation integrity plots should adequately sample vegetation variability across a vegetation zone and should not be duplicated across IBRA subregions

Section 3.7.1 of the BDAR states that:

A total of 15 vegetation zones were identified on the development site based on the broad condition state of each PCT. A total of 64 vegetation integrity survey plots were collected on the development site consistent with the BAM (Table 11). Vegetation plots for each zone were replicated between the same zone in different bioregional calculations.

No further detail has been provided regarding the proposed duplication of plots across the project. A table should be provided within the BDAR showing which plots have been duplicated for each vegetation zone.

In addition, BCS notes that plots have been duplicated across IBRA region and sub-regional boundaries to meet minimum survey requirements. This method of plot duplication is not detailed within the BAM and has not been discussed with BCS.

It should be noted that BCS are not supportive of duplicating plots across differing IBRA subregions and do not consider it appropriate for this linear and expansive project site.

Whilst the duplication of plots may be accepted in some circumstances, the following principles will need to be met:

- Plots cannot be duplicated for a single vegetation zone spanning across multiple IBRA subregions. If plot duplication is required in this case all duplicated plots will need to duplicate benchmark condition.
- If a vegetation zone has been adequately sampled (within a given IBRA subregion) but a minor number of duplicated plots i.e., 1 or 2, are required to meet minimum plot numbers, the sampled plot with the highest VI score (contained within the same IBRA subregion) may

be proposed to be duplicated. If this is proposed adequate evidence will need to be provided to justify that:

- the vegetation zone within the IBRA subregion has been adequately sampled and is representative of the variability of condition that is present; and
- that the duplicated plot represents the highest vegetation integrity score likely to be present within the portion of the subject site intersecting the relevant IBRA subregion.

If this justification cannot be provided duplicated plots will need to duplicate benchmark condition.

As this method of data replication is not detailed in the BAM, its application to the project is likely to require further discussion and workshopping. BCS recommends a plot duplication proposal is submitted for our review, prior to the submission of the RTS.

Recommendations

4.1 Revise the plot duplication method to meet the principles outlined in this response.

4.2 Submit a plot duplication proposal for review.

5. Inclusion of vegetation plots located outside the project footprint must be justified

BCS notes from review of the project's spatial data that two BAM plots are located a significant distance (between 500m to 1km) from the development footprint, outside of the subject site.

Where vegetation plots are not located in the project footprint/subject site, justification must be provided, including evidence, that the plot is in the correct PCT and vegetation zone 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
- justification, referencing appropriate evidence, to demonstrate each plot's representativeness of its equivalent vegetation zone within the subject land and consistency with other plots collected within the same vegetation zone
- a distance between the plot and the nearest area of vegetation within the subject land the plot is representing
- reference to an informing map.

Recommendation

5.1 Where vegetation plots are not located in the project footprint, justification must be provided, including evidence that the plot is in the correct PCT and vegetation zone.

Vegetation mapping and vegetation identification may not be representative of site context

6. The applicability of using more appropriate local data for severely burnt vegetation within the project area should be discussed in the BDAR

Appendix E of the BDAR states that many of the "Burnt Condition" or "Post-Fire Regeneration" condition classes of vegetation within the project site have been severely impacted by bushfire and are still in the relatively early stages of recovery.

Section 2.1 of the BDAR states:
A significant portion of the development site was devastated by the Sir Ivan Fire in February 2017 which was started by a lightning strike near Leadville, NSW. The greatest intensity of the fire was within the forested area between the towns of Leadville and Uarbry, where the heat of the fire has resulted in near total loss of biodiversity.

The severity of the fire, in a relatively low rainfall area, followed by a severe drought has created an alternate ecosystem, with little post fire recovery (now 4.5 years ago) as shown Photograph 1 and Photograph 2.

Consideration was given to the Guideline for applying the Biodiversity Assessment Method at severely burnt sites (DPIE, 2020), to determine if any areas of the development site were also burned in the 2019- 2020 summer bushfires. No areas of the development site were identified on this map. Following the flow chart in Figure 6, no areas of the subject land include any of the Burnt Area Classes, and so the BAM is to be applied, rather than apply any of the burn severity rules.

BCS agrees that, based on the decision logic flowchart in Figure 6 of the *Guideline for applying the Biodiversity Assessment Method at severely burnt sites,* the project area was unaffected by the 2019- 2020 summer bushfires and the BAM should be applied.

However, Section 1.4.2 of the BAM states more appropriate local data should be considered when assessing a site, this is inclusive of modifying existing benchmarks to better reflect local environmental conditions, such as vegetation severely impacted by bushfire.

BCS considers that, as the benchmarks for the communities assessed are for structurally intact vegetation, there may be merit in applying more appropriate local data, such as modified benchmarks representing the relative condition of vegetation communities recovering from severe bushfire.

It is recommended that an assessment to determine if the benchmarks applied to the vegetation on site are relevant be conducted, given the extreme fire impact sustained.

A useful tool to aid in this assessment could include *the fire intensity, fire severity and burn severity metrics* described in Keeley 2009[1] and summarised in Table 1 of the *Guideline for applying the Biodiversity Assessment Method at severely burnt sites*.

[1] Keeley, J.E. 2009. Fire intensity, fire severity and burn severity: a brief review and suggested usage. *International Journal of Wildland Fire*,18: 116-126

Recommendations

6.1 Conduct an assessment to determine if the benchmarks applied to the vegetation on site are relevant given the extreme fire impact sustained.

6.2 If it is determined that the current benchmarks are not applicable, provide more appropriate local data in accordance with Section 1.4.2 of the BAM.

7. Land Categorisation of CEEC extent requires revision

BCS have identified that the land categorisation method proposed may not have been followed in the context of the project area and the biodiversity values present.

Appendix B details the method followed to determine a reasonable approximation of Category 2 Regulated Land and Category 1 Exempt Land. In this method it is stated that where a reasonable approximation is required:

- *Assessors first identify whether land meets criteria for Category 2 – Regulated Land, prior to Category 1 – Exempt Land.*
    - *In some circumstances, land may meet multiple map criteria i.e. criteria for Category 2 – regulated land, AND Category 1 Exempt Land*
    - *In most circumstances Category 2 – Regulated Land criteria will determine the categorisation of land, rather than Category 1 – Exempt Land criteria.*
- *Where there is uncertainty or data are conflicting, land should be mapped as Category 2 – Regulated Land as a precautionary approach*

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 Critically Endangered Ecological Community.

As a consequence of receiving the vegetation mapping and data for the project area, BCS have concerns that a significant amount of the Critically Endangered Ecological Community (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 and discounted from further assessment, prior to any field verification being conducted and/or despite evidence being collected indicating that the CEEC is present within Category 1 Land.

BCS raise these concerns because of the following lines of evidence:

- Rapid data points collected within the project site, within Category 1 Exempt Land, identify flora species consistent with Box Gum Grassland;
- Vegetation mapping, including Box Gum Grassland extent, which abruptly ends at the interface between Category 2 Regulated Land and land which could otherwise be inferred to be consistent with Category 1 Exempt Land;
- Table 96 of the BDAR identifies Category 1 Exempt Land as a condition metric justifying the exclusion of Box Gum Woodland being present; and
- Plots being undertaken (including, but not limited to, Plot 4, 5, 9, 22, 28 and 45) which identify PCTs 281 and 483 present (consistent with Box Gum Woodland/Box Gum Grassland) within land discounted as Category 1 Exempt Land.

The above issues are not consistent with the method detailed in Appendix B of the BDAR and have the potential to significantly underestimate the amount of CEEC (which can be reasonably inferred to be consistent with Category 2 Regulated Land) required to be cleared for the project.

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 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 from within areas of land which could otherwise be reasonably inferred to be Category 1 Exempt Land, BCS recommends that the proponent/accredited assessor liaise with us to discuss a method of floristic data collection which will be acceptable to determine CEEC absence.

Recommendations

7.1 In the absence of data supporting CEEC absence, land be designated as Category 2 Regulated Land and Box Gum Woodland be assumed present.

7.2 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.

8. The criteria used to identify EPBC Act-listed Box Gum Woodland requires revision

Table 96 of the BDAR defines the quantifiable metrics used to assess the presence of *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed Box Gum Woodland within the project area.

It should be noted that although the Biodiversity Offsets Scheme under the BC Act has been endorsed under the EPBC Act Assessment Bilateral Policy, other NSW legislation has not been similarly endorsed by the Department of Climate Change, Energy, the Environment and Water (DCCEEW), this includes the LLS Act and Regulations.

As such, methods of land categorisation under the LLS Act are not applicable to the assessment of Matters of National Environmental Significance (MNES), such as the EPBC Act-listed representation of Box Gum Woodland. Given the application of land categorisation for MNES is not permissible under the EPBC Act, Category 1 Exempt Land cannot be applied as a filter to exclude the presence of MNES from the project site.

BCS recommends that the Threatened Ecological Community (TEC) equivalency assessment is revised to exclude any provisions of the LLS Act. This should also apply to any other decision points regarding the assessment of all other MNES which have been informed by land categorisation outcomes.

Recommendation

8.1 Revise all EPBC Act TEC equivalency assessments to exclude the provisions of the LLS Act.

9. Mapping of woodland extent within the project area requires review

Several PCTs under the Grassy Woodland Formation have been identified to occur within the project area, this includes:

- PCT 272 White Box - Black Cypress Pine - red gum +/- Mugga Ironbark shrubby woodland in hills of the NSW central western slopes

- 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 461 Tumbledown Gum woodland on hills in the northern NSW South Western Slopes bioregion and southern Brigalow Belt South Bioregion
- PCT 483 Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley

Together these vegetation types form the majority of vegetation across the project area. The grassy woodland formation of these vegetation types is, in general terms, represented by an open canopy formation woodland interspersed with a grassy groundcover. This can be inferred by the canopy cover benchmarks for each PCT, which have been provided below:

Table 2 PCTs and Canopy Cover Benchmarks

PCT	Canopy Cover Benchmark (VIS-C)
272	18-21 % cover
281	18-21% cover
461	18-21% cover
483	18% cover

In addition to the cover benchmark metrics for the PCTs above, both PCT 281 and PCT 483 have been identified as being consistent with Box Gum Woodland/Box Gum Grassland. The BC Act representation of Box Gum Woodland describes the canopy cover of the community as:

White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland is characterised by widely-spaced trees with canopies not touching and projected foliage cover generally less than 30% (Prober et al. 2017).

In addition, the EPBC Act representation of the community defines a given patch of Box Gum Woodland as an open continuous woodland which contains five or more trees in which no tree is greater than 75 m from another tree.

Despite the patches of these grassy woodland types being represented by a naturally occurring open canopy of trees connected by grassy groundcover (as defined in their community benchmarks and the final determination of the Scientific Committee) these areas have been mapped according to a tree-centric method. In general terms this has involved mapping individual polygons around single trees and excluding grassland in-between, rather than integrating the open woodland formation into continuous patches. This has resulted in some cases of unmapped vegetation gaps of less than 5m occurring between individual trees. An example of this is provided in Figure 1 below.

Figure 1 Grassy Open Woodland within the project area mapped according to a tree centric method

The implications of this mapping method have resulted in gaps between individual trees being discounted from continuous open woodland patches and not being incorporated into the vegetation zone's total area. In many cases the gaps between trees have been designated as Category 1 Exempt Land, completely discounting the spaces between trees. Cumulatively this has the potential to significantly underestimate the amount of grassy woodland vegetation required to be cleared for the project.

BCS recommend that all vegetation extent mapping for the grassy woodland formation vegetation be revised to represent the grassy open continuous woodland present across the project site. This should be undertaken in conjunction with the revision of land categorisation mapping, as described previously within this response.

To guide the revised woodland mapping, *BCS North West Branch – Woodland Mapping Guidance* is provided in **Attachment C**. These principles should be applied to all areas consistent with the PCTs identified above. Biodiversity credits should be recalculated accordingly, and additional BAM plots may be required. In addition, any vegetation zones which have been identified as inconsistent with the EPBC Act listing of Box Gum Woodland based on patch size should be reviewed.

Recommendation

9.1 Revise vegetation mapping for grassy woodlands within the project site according to the information and advice provided within this response.

10. Mapping of Derived Native Grassland within the project area requires review

BCS have identified areas mapped as derived native grassland (DNG) that contain trees and would be better described and assessed as woodland. For example, Figure 2 below shows an area mapped as DNG Box Gum Woodland which clearly has trees and would be better incorporated within the surrounding woodland vegetation zone.

Figure 2 Derived Native Grassland Mapping containing trees

BCS recommends that the vegetation zone mapping is comprehensively audited to identify similar instances, as this occurs across the project site.

Recommendation

10.1 Audit the vegetation zone mapping to identify areas mapped as derived native grassland which contain trees and update the mapping and BAM-C calculations accordingly.

11. Mapping of EPBC Act Box Gum Woodland requires revision and further evidence

Section 4.2.1 of the BAM states that '*The assessor must identify and map the distribution of PCTs, or the most likely PCTs, and all TECs on the subject land. The identification of TECs must be consistent with the Threatened Species Scientific Committee Final Determination for the TEC.* This component of the BAM applies to both EPBC Act and BC Act listed representation of TECs.

A quantifiable TEC equivalency assessment against the diagnostic information contained within the listing advice for the EPBC Act representation of Box Gum Woodland has been applied in the BDAR. This involved taking detailed information of a given patch's compositional, functional and structural attributes via plot based survey, including the following diagnostic metrics:

- Overstorey species
- Perennial groundcover species composition (>50%)
- Patch size
- Count of non-grass natives (>12)
- Identification of listed important species
- Count of trees per hectare or identification of natural regeneration

BCS supports the application of quantifiable metrics collected via survey to determine TEC equivalency. However, it is noted that only 22 plots have been conducted across the project area within associated PCTs to collect this data. When reviewing spatial data, BCS notes that a significant amount of Box Gum Woodland extent is present across the project site, containing no vegetation plots, which has determined to be non-consistent with the EPBC Act representation of

the community. This is also the case for areas which have not been accessed during the survey period.

It is unclear what evidence has been relied upon to determine the absence of EPBC Act listed Box Gum Woodland from these areas. Figures 3 and 4 below are provided to compare the spatial coverage of relevant BAM plots and extent of Box Gum Woodland determined to be non-consistent with EPBC Act criteria.

A TEC equivalency assessment for all PCTs identified within the BAM-C as potentially equivalent to a BC Act or EPBC Act listed TEC, should be conducted. TEC equivalency assessments require detailed and systematic comparison of a vegetation patch's compositional, structural and functional attributes against the diagnostic criteria held in both NSW listings and federal conservation advice. As such, without detailed understanding of each vegetation patch within a vegetation zone, informed by survey, a determination of non-equivalence cannot be assumed beyond reasonable doubt.

Equivalency assessments should be supported by evidence and data collected during the field survey. The compositional, structural and functional aspects of a vegetation patch should not be assumed to be non-equivalent if no data has been collected or if access to a patch could not be obtained.

If data has not been collected within a given patch of vegetation a precautionary approach should be followed, and the patch should be assumed as equivalent to both BC Act and EPBC Act TEC listings.

Recommendations

11.1 Provide evidence that all vegetation has been appropriately surveyed in detail to inform TEC equivalency assessments and support the determination of non-equivalence to EPBC Act listed TECs.

11.2 If evidence has not been collected, assume the presence of the EPBC Act listed TEC.

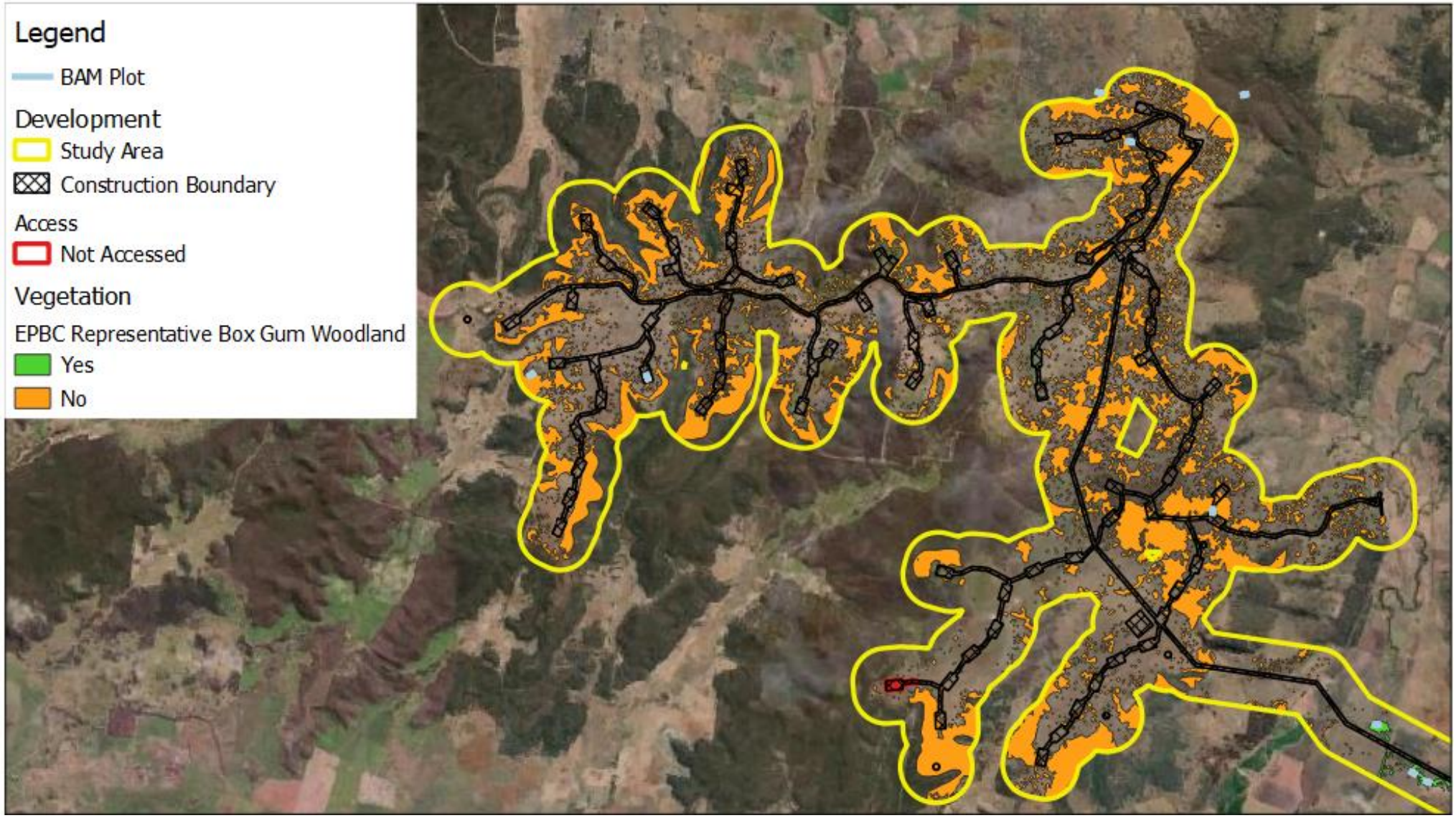

Figure 3 Comparison of EPBC Act Box Gum extent and spatial coverage of informing plots (North)

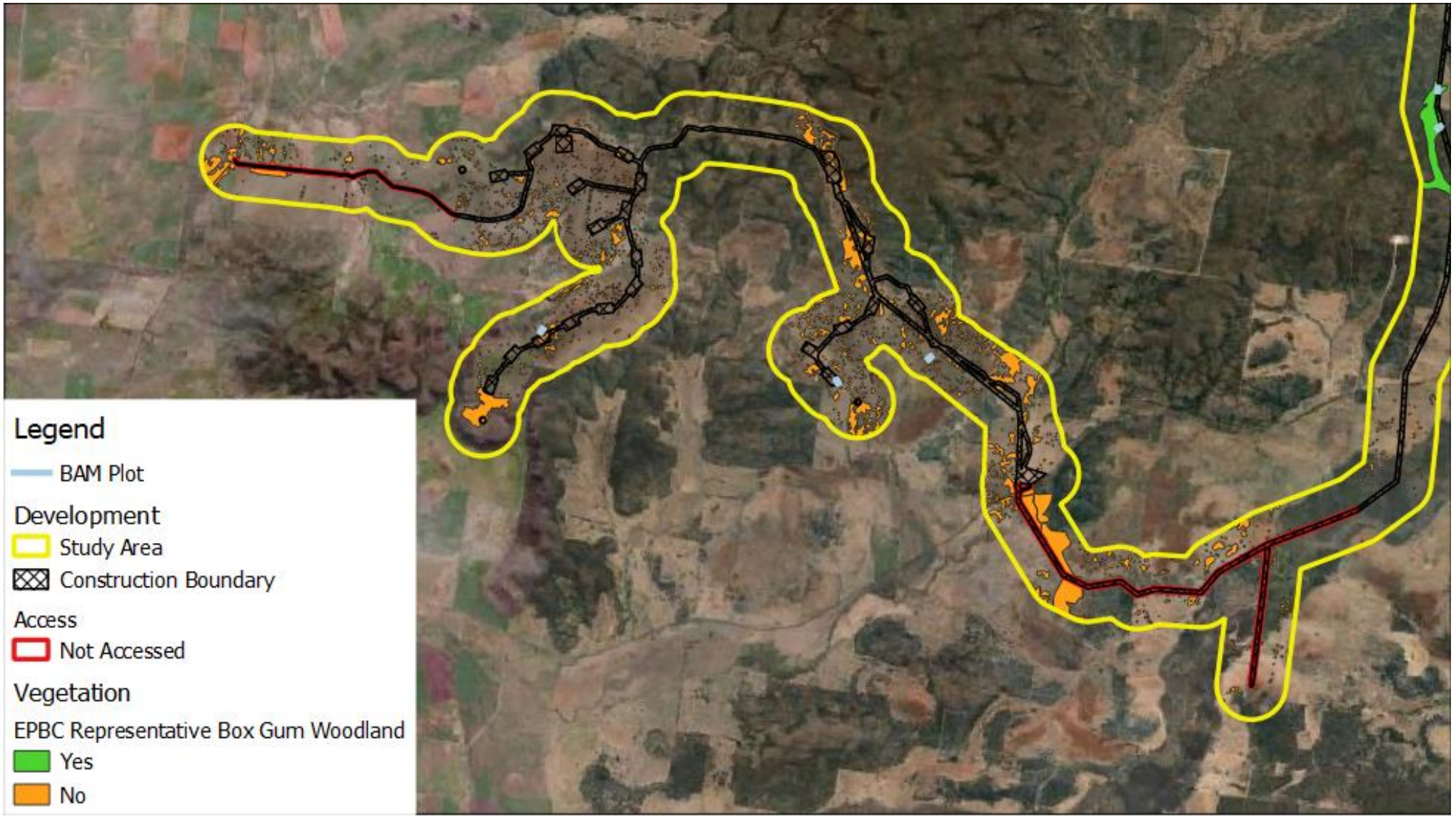

Figure 4 Comparison of EPBC Act Box Gum extent and spatial coverage of informing plots (South)

12. The Inland Grey Box EBPC Act assessment requires revision

Section 3.6.2 of the BDAR states the following:

The guide to identifying Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia (Commonwealth of Australia) (Grey Box Woodland Guide), *identifies that this TEC occurs in the Brigalow Belt South, Darling Riverine Plain, NSW South Western Slopes, Cobar Peneplain and Riverina bioregions within NSW, as identified in the map below (Figure 15).*

As previously identified in Section 3.6.1.1, and shown on Figure 14, the majority of occurrences of this vegetation community are within the Sydney Basin Bioregion, which is outside the extent of the ecological community. Areas within the Brigalow Belt South Bioregion have been assessed against the listing advice for this community.

It should be noted that this is an incorrect interpretation of the Grey Box Woodland Guide. The guide lists bioregions where the community *can* be found, however the guide also adds the following clarification:

However, the distribution cannot be shown accurately on a map of this scale, because the region has not been entirely surveyed in detail and many remnants are now limited to very small, fragmented patches. To determine the presence of a patch of the listed ecological community, please refer to the decision flowcharts.

Step 1 of the decision flowchart states:

Is the property within or near the area shown on the Grey Box Grassy Woodland distribution map on page 13?

As the entire project site is either within or near the Grey Box Grassy Woodland distribution map the exclusion of the TEC based on IBRA bioregional boundaries is not a valid filter for excluding the EPBC Act representation of the TEC.

BCS recommends that the TEC equivalency assessment of EPBC Act Grey Box Woodland extent within the project site be revised. If it is determined that areas of Inland Grey Box Woodland are consistent with the EPBC Act representation of the community, but are not consistent with the BC Act listing of the community, the proponent will need to contact DCCEEW to seek advice on the assessment approach and offsetting requirements for this TEC.

Recommendations

12.1 Revise the TEC equivalency assessment of EPBC Act-listed Grey Box Woodland TEC extent within the project site according to the advice contained within this response.

12.2 Contact DCCEEW for advice if there are impacts to the EPBC Act representation of this TEC which is not consistent with the TEC's BC Act listing.

13. Further clarification is required regarding the exclusion of Hunter Floodplain Red Gum Woodland TEC

Section 3.6.1 of the BDAR states:

15 candidate TECs were identified as potentially occurring. Of these 15 TEC's, many are associated with the Hunter Valley and coastal areas, which does not include any portion of the study area. As such the following nine TECs were ruled out from the assessment due to geographical limitations of the occurrence of the TEC:

- *Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions*

PCT 42 is potentially associated with this TEC, however no further mention of this association has been provided in the BDAR nor has a TEC equivalency assessment been conducted for PCT 42.

Section 6 of this TEC's final determination states that:

Hunter Floodplain Red Gum Woodland has been recorded from the local government areas of Maitland, Mid-Western, Muswellbrook, Singleton, and Upper Hunter but may occur elsewhere within the NSW North Coast and Sydney Basin Bioregions (sensu Thackway and Creswell 1995).

Based on the location of PCT 42 within the Sydney Basin Bioregion, and the definition provided in the TEC's final determination, it is unclear to BCS what geographic limitation is being referring to. From review of the Hunter Valley Catchment Mapping BCS notes that the subject site is very close and/or potentially just within the western extent of the Hunter Valley Catchment. It is recommended that a TEC equivalency assessment is undertaken for PCT 42.

Recommendation

13.1 Undertake a TEC equivalency assessment for PCT 42.

14. Explanation and further discussion should be provided regarding species identification

From review of the floristic data collected in BAM plot surveys BCS notes that there is a significant number of species which have not been identified to the species level (approximately 36% of all flora species detected), this includes, but is not limited to:

- *Eragrostis* spp. 1 to 4
- *Acacia* spp. 1 and 2
- *Cyperus* spp. 1 to 6
- *Aristida* spp. 1 to 3
- Forb sp 1 to 10
- *Lomandra* spp 1-4; and
- *Vittadinia* sp

It is unclear to BCS why such a significant proportion of flora species detected were not identified to the species level. Adequate species identification is an important factor contributing to the data collected under the BAM, as many key aspects of the assessment are informed by species identification, including:

- PCT selection and TEC identification
- vegetation condition mapping
- compositional and structural scores for plots
- targeted flora survey

BCS recommends that an explanation be provided in the BDAR as to why a significant proportion of flora species detected could not be identified to the species level.

If BAM plots were surveyed during a period which has limited the appropriate identification of flora species, as an example during a period of drought or after an intense bushfire, further justification regarding the applicability of alternative benchmarks in accordance with Section 1.4.2 of the BAM

should be provided. A discussion on the limitation this may have had on the results of targeted flora survey should also be provided.

Recommendations

14.1 Provide explanation in the BDAR why a significant proportion of flora species detected could not be identified to the species level.

14.2 If BAM plots were surveyed during a period which has limited the appropriate identification of flora, provide further justification regarding the applicability of more appropriate local data in accordance with Section 1.4.2 of the BAM.

15. The landscape vegetation cover class estimate requires revision

Areas of native vegetation extent have been excluded from Figure 4.1 and the landscape vegetation cover class assessment within the BDAR, despite these areas being identified within the subject site's vegetation zone maps in Appendix G. Native vegetation extent identified and mapped within the subject site is required to be included within the native vegetation cover polygon on the landscape assessment map and the vegetation percent cover class assessment (Section 4.3 of the BAM 2017).

Clarification is provided in the *BAM Operational Manual Stage 1* (page 13) which states that the mapping requirements for the landscape vegetation cover class assessment must mirror that for the subject site and must be inclusive of all areas of native vegetation, including areas which are groundcover only.

Recommendation

15.1 Include all areas of native vegetation within the landscape vegetation cover class assessment.

Aspects of the development footprint are not clearly articulated in the BDAR

16. The proposed development footprint requires clarification and potential revision

Section 1.3 of the BDAR describes the key development components associated with the project. However, all figures within the BDAR only contain a consolidated clearing extent, rather than demarcating individual development components. Representation of the development footprint could be improved and clarified by including a figure which demarcates individual development components i.e. asset protection zones (APZ), transmission lines, roads, material laydown, hardstand etc.

BCS notes that APZs have not been included within the key components detailed within section 1.3 of the BDAR. The Bushfire Risk Assessment prepared for the proposal identifies, in general terms, that a 10m APZ will be required for all infrastructure associated with the project.

Section 8 of the BDAR states that "*There may also be a requirement to clear native vegetation within a construction footprint around the wind turbines, to allow for sufficient space to set down componentry and temporary laydown areas*". It is not readily evident to BCS, based on the consolidated development footprint provided, if APZs and construction laydown areas have been included within the consolidated development footprint.

In addition, Section 8.4 of the BDAR references a 70m wide easement being required within the south of the subject site. From review of the consolidated development footprint, it is difficult to discern where the referenced transmission line is located. However, using GIS, BCS have

identified that the development footprint in the south of the subject site is 60m wide at its maximum.

BCS has also noted specific development components which are unconnected to the development footprint. It is unclear how construction of these components will be achievable without connecting access roads and associated surface disturbance to biodiversity values from construction machinery access. An example of an unconnected development components is provided in Figure 5 below.

Figure 5 Development footprint mapping showing unconnected development components (indicated via red squares)

Table 49 of the BDAR states that the proposed electrical reticulation network for the project will be trenched along access tracks to consolidate areas of ground disturbance. From BCS experience with other similar developments the proposal to trench electrical reticulation within access tracks can be difficult to achieve without significantly impeding construction schedules. The trenching required for electrical cables may not be able to be bypassed by construction machinery without diverting outside of the development footprint. BCS suggests that this is reviewed to ensure that the maximum amount of access track clearing required for construction has been captured within the BDAR.

All development components which will result in surface disturbance to biodiversity values, must be accounted for in the development footprint and calculated in the total direct impact required for the project.

Recommendation

16.1 Clarify that all development components, which will result in surface disturbance to biodiversity values, have been included within the consolidated development footprint and are reflected in the BDAR.

Candidate species assessed will require review – inadequate exclusion of species will impact on the credit obligation

17. The removal of Brush-tailed Phascogale and *Delma impar* is not compliant with BAM

Section 4.2.1 of the BDAR states the following:

In accordance with S. 5.2.1 of the BAM (DPIE, 2020), the following species have been removed from the assessment as they do not meet all of the criteria identified in 5.2.1(2 a- f):

- *Delma impar is removed, as the distribution of the species does not include the IBRA subregion within which the subject land is mostly located (being Kerrabee, Liverpool Range, or Pilliga IBRA subregion; BAM 5.2.1.2.a). This species is associated with Inland Slopes IBRA subregion, however the nearest record within this subregion is 390km south of the study area nearby to Tumut, NSW and is unlikely to occur within degraded habitats present.*
- *Brush-tailed Phascogale, as the distribution of the species does not include the IBRA subregion within which the subject land is mostly located (being Kerrabee, Liverpool Range, Inland ranges, or Pilliga IBRA subregion; BAM 5.2.1.2.a)*

It should be noted that the removal of species based on the application of section 5.2.1.2(a) of the BAM is not applicable to linear developments. This is clarified in section 5.2.1.7 of the BAM which states:

If a vegetation zone covers more than one IBRA subregion, the IBRA subregion in which most of the proposal occurs must be used. For linear-shaped proposals, the assessor must assess the habitat suitability for each IBRA subregion separately.

It should also be noted that the removal of a species based on the relative proximity of a BioNet record is not a valid step to filter candidate species within the BAM. In general terms this is because of two factors:

- Relevant past records, being records which are located within the assessed IBRA subregion, are already used to filter relevant species into the BAM-C as a candidate species. This is an automatic process and is not able to be manually revised (unless assessed as a vagrant record); and
- the absence or paucity of records for a given species within the proximity of a development site may be indicative of a paucity of threatened species survey having previously occurred within the region, rather than being indicative of an absence of the species itself.

Given the exclusion of the species' above is not compliant with the requirements of the BAM it is recommended that a targeted survey is conducted to determine the presence or absence of the species, an expert report is obtained, or the species are assumed present.

Recommendations

17.1 Conduct a targeted survey to determine the presence or absence of Brush-tailed Phascogale and *Delma impar*, obtain an expert report or assume presence.

18. The justification regarding the exclusion of candidate species requires review and/or revision

Several species have been removed from the candidate list (species credits) generated from the BAM-C. The removal of these species is not consistent with the assessment requirements set out in steps 2 and 3 of section 5 of the BAM. A species can only be removed from the list if the species:

a. has habitat constraints listed in the TBDC and none of these constraints are present on the site. Documentation in the BDAR should reflect the TBDC information and evidence that the features are not present (field data); or

b. *where habitat constraints are not listed in the TBDC and the assessor proposes to remove the species based on absence of habitat constraints or known microhabitats that the species requires to persist, the assessor must provide adequate justification in the BDAR. As a minimum, the justification must include;*
    i. *the specific habitat constraint(s) or microhabitat missing on the subject land; and*
    ii. *a description of the field technique used to assess the presence of the constraint or microhabitat (eg the survey effort and technique used to assess hollow-bearing trees) and any other data or information used to make the decision*
c. *has geographic limitations listed in the species' NSW profile and the site is outside of the defined geographic area (note listed geographic limitations may be specific to IBRA sub regions); or*
d. *is vagrant to the area. Vagrancy is taken as the record being well outside the species range or natural distribution. The suspect record will need to be reviewed against the species known distribution and the assessor will need to confirm with species experts that it is likely to be a vagrant. If agreed by experts the assessor should contact BCS to have the record quarantined from BioNet Atlas and re-labelled as vagrant. The BDAR will need to contain supporting information such as who was contacted, when, their credentials and the resultant response from BCS; or*
e. *the habitat constraints listed in the TBDC or known microhabitats that the species requires to persist are degraded to the point where the species will no longer be present. Evidence in the BDAR could include reference to the attribute scores for the vegetation integrity assessment to illustrate the poor condition of the site. Other information sources include peer-reviewed or other published information relating to the microhabitats used by the species, photographic evidence and maps etc that illustrate these features are significantly degraded.*

The BAM 2020 Operational Manual provides clarification on the justification required to exclude a species credit species, by identifying that:

Evidence to support the absence or degradation of habitat features listed in a. and b. above could include 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.

Describing a vegetation zone as degraded or low/poor condition is not adequate justification to remove a candidate species credit species from the generated list. Evidence must support a. and b. above.

There are several species which have been excluded from further assessment which require further information or potential revision. These species and commentary around the determination provided in the BDAR have been provided in Table 3 below.

Table 3 Species credit species requiring revision or review

Species	Reason for exclusion from associated vegetation zones	BCS comment	Recommendation
Eastern Pygmy Possum	Degraded Habitat	No detail or supporting evidence has been provided to support this determination. The information contained within the DPE profile for the species states: *"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".*	Conduct a targeted survey to determine the presence or absence of the species, obtain an expert report or assume presence within all associated vegetation zones.
Pink-tailed Legless Lizard	Absence of habitat constraint – rocky areas	The BDAR has stated that there is a complete absence of rocky areas. BCS question this determination given the variety of habitats including ridgeline sandstone habitat that the development intersects.	Conduct a targeted survey to determine the presence or absence of the species, obtain an expert report or assume presence within all associated vegetation zones.
Booroolong Frog	Reason is unclear	The BDAR states that suitable habitat is absent from the project site but has provided no further explanation.	Provide further justification of species absence from each associated vegetation zone
Euphrasia arguta	Degraded Habitat	No detail or supporting evidence has been provided to support this determination. The information contained within the DPE profile for the species states: *"Plants from the Nundle area have been reported from eucalypt forest with a mixed grass and shrub understorey; here, plants were most dense in an open disturbed area and along the roadside, indicating the species had regenerated following disturbance."*	Conduct a targeted survey to determine the presence or absence of the species, obtain an expert report or assume presence within all associated vegetation zones.
Powerful Owl	Degraded Habitat	No detail or supporting evidence has been provided to support this determination. The BDAR states that "*there are hollow-bearing trees present within scattered paddock trees. This is atypical habitats for this species and unlikely to occur."* However, the site intersects with large patches of woodland vegetation which are mapped as containing hollow-bearing trees. It should also be noted that the minimum patch size associated with this species, according to the TBDC, is *<5ha* and its native vegetation cover class is *fragmented (between 11 and 30% habitat retained)*	Conduct a targeted survey to determine the presence or absence of the species, obtain an expert report or assume presence within all associated vegetation zones.
Stephens Banded Snake	Absence of habitat constraint	The BDAR states that there is an absence of vine thickets within the project site as a basis for excluding this species. The BAM requires that all habitat constraints are determined to be absent from the project site for a species to be excluded based on the absence of habitat constraints (See Section 4.4.2 of the BAM Ops Manual Stage 1 for further detail). This species has the habitat constraint of fallen and dead timber and hollow-bearing trees, which are present within the project site.	Conduct a targeted survey to determine the presence or absence of the species, obtain an expert report or assume presence within all associated vegetation zones

Species	Reason for exclusion from associated vegetation zones	BCS comment	Recommendation
Large Bent-wing Bat	Absence of habitat constraint	The species has been excluded based on the absence of habitat constraints. However, the species was recorded within the project area. BCS agrees that appropriate records identified under the criteria detailed in the TBDC are not present within the vicinity of the subject land. However, a listed habitat constraint for the species also includes the following: *Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding* Table 4.3 of the BDAR states that the project area contains or is within the proximity of 256 ha of potential habitat along cliff lines. No explanation has been provided regarding why this habitat is not suspected breeding habitat for the species.	Provide further justification as to why habitat within or near the project area is not suspected to be breeding habitat, beyond reasonable doubt. If there is an absence of data or matters are uncertain, apply the precautionary principle and assume the presence of breeding habitat.

*It should be noted that the above list of candidate species requiring further justification and evidence may be subject to change once a separate assessment for each IBRA subregion the project intersects has been provided.

The information provided regarding the reasoning for excluding species credit species in general is limited and have not been justified with sufficient evidence.

In addition, BCS notes that many candidate species have been excluded across the project site as a whole, rather than from specific vegetation zones, despite the diversity of vegetation condition zones, habitats and landscapes the project intersect with.

At a minimum a list should be provided for each vegetation zone a candidate species is associated with (according to the TBDC) and justification be provided on exclusion of the candidate species from each separate vegetation zone. Table 15 of the BDAR contains descriptions of habitat features within vegetation zones. It is recommended this information is expanded upon with supporting evidence and linked to each species credit species proposed for exclusion individually in a tabularised format. This information is required for BCS to review the appropriateness of all species credit species exclusions from associated vegetation zones.

Recommendations

18.1 Review and/or revise the candidate species exclusion determinations based on the information and recommendations contained within this response.

18.2 For each vegetation zone provide a list of associated species (according to the TBDC), and provide evidence-based justification on species exclusions from each associated vegetation zone, ideally in a tabularised format.

19. Species polygons for species credit species detected or assumed present require further information and potential revision

Table 30 of the BDAR only contains very high-level information regarding the method undertaken to prepare species polygons and no justification regarding the habitat which has been excluded from species polygons. At a minimum a list should be provided of each vegetation zone a candidate species is associated with and justification be provided on the exclusion of specific areas and/or vegetation zones from a species polygon (See section 18 under this response).

From review of the limited information contained within Table 30 of the BDAR, BCS has identified several potential issues which requires further information and/or revision:

- It is stated that the species polygon for the Masked Owl has been limited to trees which contain *hollows >400mm and more than 3m from the ground.* The relative height of hollows is not a habitat constraint for this species and the TBDC defines the minimum hollow size for Masked Owls as >200mm.
- It is stated that the species polygon for the Barking Owl has been limited to trees *which contain hollows >200mm and >4m above the ground), this has been calculated within the Mount Hope Cluster only.* Similar to the Masked Owl the relative height of hollows is not a listed habitat constraint for the Barking Owl. In addition, it is unclear to BCS why the species polygon for this species has been limited to the Mount Hope Cluster.
- The species polygon for *Dichanthium setosum* has been applied according to the method for "Count Species". *Dichanthium setosum* 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.
- The species polygon for Squirrel Glider includes only *woodland or forest in moderate to good condition, with an intact acacia understorey or variety of winter-flowering eucalypts*. Understorey composition or specific species of flowering Eucalypts are not a defined habitat constraint for this species, in addition the TBDC defines paddock trees as an important habitat feature for the Squirrel Glider.

Recommendations

19.1 Review and/or revise species polygons based on the information and recommendations contained within this response.

19.2 Provide evidence-based justification for the exclusion of each vegetation zone from species polygons.

20. The survey effort conducted for the Koala is inadequate

Section 4.2.10 of the BDAR states that:

Koala Spot Assessment Technique (Phillips and Callaghan 2011) surveys were completed in June 2021 targeting areas that represent the highest quality and most connected habitat across the wind farm….No evidence of Koala was recorded and no further analysis has been undertaken.

It should be noted that while Koalas are currently listed as a dual credit species in the TBDC, they should be treated as a species credit species. For the purpose of the BAM, suitable Koala habitat is any vegetation community containing one or more Koala use trees. For a list of Koala use trees the proponent should first determine which Koala modelling region (KMR) the subject land is located within and then consult the regionally relevant Koala use tree lists in the Koala Habitat Information Base Technical Guide (Tables A.4 – A.12). Where the subject land is located near a KMR border, both Koala use tree lists should be applied.

The subject site is located within the North West Slopes KMR. BCS notes that almost all treed vegetation types across the project area contain one or more identified Koala use tree as a dominant canopy species and as such should be considered potential Koala habitat.

Based on the presence of extensive Koala habitat across the subject site and from review of the spatial coverage of the SAT surveys which have been undertaken, BCS consider that the survey effort for Koala is insufficient to exclude the species from all potential habitat across the entire project site.

For areas of potential Koala habitat, as per the definitions above, BCS recommend that further surveys be conducted to determine the presence or absence of the species, obtain an expert

report or assume presence. It should be noted that the *Koala (Phascolarctos cinereus): Biodiversity Assessment Method Survey Guide* has now been published, and it outlines the minimum requirements for targeted Koala surveys and mapping species polygons.

Recommendation

20.1 Conduct a targeted survey to determine the presence or absence of the Koala from previously unsurveyed areas within the project site, obtain an expert report or assume presence.

21. Impacts to the Large-eared Pied Bat require clarification in the BDAR

Table 54 of the BDAR states for the Large-eared Pied Bat that impacts will include:

- *180.49 ha of potential breeding habitat*
- *4,155 ha of foraging habitats*

In other areas throughout the BDAR it is stated that impacts will be limited to:

- *180.49 ha of foraging habitat*
- *0 ha of breeding habitats*

This discrepancy should be clarified. Specific reference should be given to the information contained within the species TBDC profile on the presence of breeding habitat.

Recommendations

21.1 Clarify impacts to the Large-eared Pied Bat.

22. The survey effort conducted for reptiles requires clarification

Section 4.2.11 of the BDAR states that

Active searches were undertaken for reptiles in all areas of potential rocky habitat at suitable locations in September 2021. Potential habitat was rocky outcrops that contain loosely embedded rock (i.e. rocks that could be turned to search). A total of approximately 50 rocks were turned at each location (if available) across the study area. Other outcrops within the development site only contain larger, deeply embedded boulders and were not considered suitable habitat.

BCS notes from review of the spatial data that a small number of reptile surveys have been undertaken (four in total), however mapping of suitable rocky habitat was not provided in the BDAR or spatial data. Mapping of potential rocky habitat for candidate threatened reptiles should be provided so BCS can review the spatial adequacy of the reptile surveys undertaken.

Recommendation

22.1 Provide mapping of rocky habitat so BCS can review the spatial adequacy of targeted reptile surveys conducted.

23. The survey effort for threatened flora species will require further clarification

Section 4.2.4 of the BDAR states that:

Threatened flora surveys in September were conducted over 14 survey days, assessing areas of suitable habitat. During these surveys, a 100m grid approach was undertaken in accordance with Surveying threatened plants and their habitats (DPIE, 2017).

No spatial data regarding the location of grid points have been displayed within the BDAR or submitted as spatial data to BCS.

Survey tracks have been provided in Figure 22 and 23 of the BDAR and provided in a spatial file submitted with the BDAR. However, from review of the spatial data it is difficult to distinguish between grid point searches, potential pedestrian traverses and traverses potentially undertaken via vehicle whilst driving between search locations.

For BCS to assess the spatial adequacy of the targeted flora survey undertaken a spatial file of the grid points which have been searched must be provided, in accordance with the requirements detailed under Section 4.4.1 of the *Surveying threatened plants and their habitats* guidance document. These points should also be displayed within the BDAR.

BCS also notes that targeted threatened flora surveys have occurred during six survey campaigns spanning across five months. However, some of the survey campaigns undertaken during the months of February, April and May only appear to have covered a small proportion of the project site. This raises some concerns regarding the spatial adequacy of the survey effort undertaken for species which are only detectable during these months, such as *Tylophora linearis, Persoonia marginata, Cynanchum elegans* and *Commersonia procumbens.*

BCS recommends that, in order to provide further certainty regarding the spatial adequacy of the survey undertaken, clarification be provided regarding the approximate proportion of suitable habitat which was surveyed during the appropriate survey window for each species. If multiple species were searched for simultaneously during targeted surveys, detail should also be provided regarding which species were grouped together, in accordance with Section 6.6 of the *Surveying threatened plants and their habitats* guidance document.

Recommendations

23.1 Provide a spatial file of the grid points which were surveyed during targeted flora survey and display these grid points within the BDAR.

23.2 Provide clarification regarding the approximate proportion of the direct impact area which was surveyed for each threatened species during the correct survey window.

23.3 If multiple species were simultaneously surveyed together, provide further detail on this giving reference to Section 6.6 of the *Surveying threatened plants and their habitats* guidance document.

24. The assumption of species presence requires further information

Section 9.5.1 of the BDAR provides some information regarding species which have been assumed to be present within the southern extent of the subject site.

No species polygons for species assumed to be present have been mapped or provided in spatial data submitted with the BDAR. In addition, it is unclear to BCS if some associated habitat in inaccessible areas have been excluded from species polygons and the reasoning behind this.

BCS requests that the species polygons for all species assumed present is provided and that detail regarding the preparation of species polygons for assumed species is provided in the BDAR. Similar to the requirements for species which were detected as present, at minimum a list should

be provided on each vegetation zone a candidate species is associated with, in addition to justification on the exclusion of specific areas and/or vegetation zones from a species polygon.

Recommendations

24.1 Provide species polygons for species assumed to be present.

24.2 Provide justification on the exclusion of any specific areas and/or vegetation zones from assumed species polygons.

Justification of avoidance and minimisation methods will require revision

25. The justifications regarding avoidance measures undertaken will require revision after other matters are addressed

Section 7.1 of the BDAR details the measures undertaken by the proponent to avoid impacts to biodiversity values. For many aspects of the project, avoidance justification has been based on development components being located in areas of identified Category 1 Exempt Land (stated in the BDAR to have little to no biodiversity value) and avoiding larger woodland areas where possible.

As BCS have identified previously in this response, there is concern that significant areas of land within the project site, currently designated as Category 1 Exempt Land, may contain CEEC extent. In addition, the outcomes of revised woodland mapping (according to a non-tree centric method) may also result in much larger than presented patches of continuous open woodland being intersected by the development footprint.

BCS recommends that justification regarding the avoidance of biodiversity impact is revised after the matters identified within this response are addressed.

BCS also suggest that the justification of avoidance could be improved by providing a comparison of the areas of land intersected by the development footprint which contain biodiversity values i.e. open woodland, derived native grassland etc. and areas which contain no biodiversity values (expressed as a percentage of the total development footprint).

Recommendations

25.1 Revise determination on impact avoidance and minimisation after other matters raised in this response are addressed.

25.2 BCS suggest that justification of avoidance could be improved by providing a comparison of the areas of land intersected by the development footprint which contain biodiversity values and areas which contain no biodiversity values.

Avoidance and appropriate assessment of Serious and Irreversible impacts will require revision

26. Further avoidance should be proposed to reduce SAII impacts to Box Gum Woodland

For Box Gum Woodland CEEC, Section 9 of the BDAR states that the project will result in a loss of:

- *234.76 ha of good to moderate woodlands*
- *193.76 ha of poor condition grasslands*[2]

Box Gum Woodland CEEC is listed as a candidate SAII entity under Principle 1 and Principle 2 in accordance with Section 6.7 of the *Biodiversity Conservation Regulations 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 Final Determination for this community lists the clearing of native vegetation as a key threating process for the CEEC. In addition, there is no minimum clearing threshold identified within relevant databases which could be considered an insignificant decline in this community, therefore any incremental loss in extent would be contributing to the Principles above.

As such, BCS considers that the loss of a cumulative 428.52 hectares of Box Gum Woodland would be consistent with the above SAII Principles and the proposed project as currently presented would contribute significantly to the risk of this entity becoming extinct within NSW. BCS could not support impacts resulting in such a significant loss to this CEEC. 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.

Although unrelated to the SAII assessment criteria of Box Gum Woodland, BCS would also like to highlight that the majority of the Box Gum Woodland extent within the project area is represented by a unique formation of the community. The vegetation community within the project area is dominated by an intergrade of *Eucalyptus albens* (White Box) and *Eucalyptus moluccana* (Grey Box) known *as Eucalyptus 'albemol'*. This formation of Box Gum Woodland, based on available information, appears to be regionally restricted to the Merriwa region within the Upper Hunter Valley where the Great Dividing Range is low enough, and the climate suitable for, the incursion of species from the west of the divide (Ollier 1982[3] and McRae and Cooper 1985[4]). BCS considers

[2] It should be noted that this expected clearing extent is potentially subject to being increased as BCS believes that additional Box Gum Woodland within the project area may have either been undermapped and/or assigned to Category 1 Land and discounted from further assessment.

[3] Ollier CD (1982) The Great Escarpment of eastern Australia: tectonic and geomorphic significance. *Journal of the Geological Society of Australia,* 29, 13-23

[4] McRae R.H.D. & Cooper M.G. (1985). Vegetation of the Merriwa area. *Cunninghamia* 1, 351–369.

that preserving the diversity of woodlands representing Box Gum Woodland, especially those which are regionally restricted and rare, to be an important consideration for the future conservation of the CEEC across the state.

Recommendation

26.1 That the consent authority notes BCS advice in relation to SAII impacts to Box Gum Woodland CEEC when considering the adequacy of avoidance and minimisation to biodiversity impacts proposed, conditioning of the project and potential project approval.

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

27. Potential SAII impacts to cave-dwelling microbats should be appropriately assessed

Two threatened SAII microbats, namely Large-eared Pied Bat (*Chalinolobus dwyeri*) and Large Bent-winged Bat (*Miniopterus orianae oceansis*) were recorded utilising the airspace within the project area. These species are listed as candidate SAII entities under Principle 4 in accordance with Section 6.7 of the *Biodiversity Conservation Regulations 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 TBDC profile for the Large-eared Pied Bat states:

Any impacts to breeding individuals or their habitat could be considered potentially serious and irreversible.

The TBDC profile for the Large Bent-winged Bat states:

Any impacts on breeding habitat could be considered potentially serious and irreversible (noting that this does not discount other impacts, such as the direct loss of breeding individuals).

BCS considers that the operational impacts of the project i.e., turbine strike, has the potential to represent a SAII impact to these two species via the direct loss of breeding individuals. An SAII assessment has not been undertaken for either species.

The assessment criteria for species in the BAM under subsection 9.1, are designed to estimate the impact the proposal will have on the viability of the entity at the local, IBRA subregional/regional and state scales. In this context BCS is seeking surety that the operational wind farm will have the capacity to adequately avoid and minimise impacts relating to blade strike of microbats for the life of the development.

BCS recommend that an SAII assessment is undertaken for both of the species described above in relation to SAII Principle 4. If there is an absence of available data or matters are uncertain the precautionary principle should be applied, a worst-case scenario assumed, and a maximum quantum of impact presented.

Recommendation

27.1 Undertake an SAII assessment for the Large-eared Pied Bat and Large Bent-winged Bat.

Assessment of prescribed and indirect impacts associated with the operation of the project will require review

28. Clarification regarding microbat survey effort is required

Twenty-five songmeters were deployed for a total of 613 songmeter nights across the project area. Four songmeters were located within the Leadville cluster, thirteen in the Mount Hope cluster (although only 10 are included in the analysis in Appendix J) and eight in the Girragulang Road cluster (only seven included in the analysis in Appendix J).

It is noted that the Leadville and Mount Hope turbine clusters contain clifflines and other features that has been identified as containing higher value habitat for microbats. It is therefore difficult to understand why the Mount Hope cluster was surveyed using songmeters at only four locations. The presence of the cave-roosting Large-eared Pied Bat recorded on multiple songmeters at Mount Hope and Leadville and Large Bent-winged Bat at multiple songmeters at Mount Hope indicates the presence of roosting habitat within close proximity to these areas.

Clarification of songmeter locations and justification of the number and placement of these within the Mount Hope turbine cluster is required.

Recommendations

28.1 Explanation is required as to why fewer songmeters were analysed than were reported as deployed.

28.2 Justification of the number and placement of songmeters within the Mount Hope turbine cluster is required.

29. Flight path data and BUS surveys are not clearly presented

Flight path data is an important component of the bird utilisation studies (BUS) as it has the potential to inform whether there are any high-risk areas for locating turbines. A total of 148 BUS were conducted across 37 fixed point locations. While the number of surveys points in each of the turbine clusters appears reasonable, the BDAR contains no map showing where these fixed points were located. The detailed survey maps depict avian survey sites but do not indicate which are the 37 fixed BUS sites. BCS is therefore unable to determine whether these surveys adequately sampled the proposed turbine arrays.

Flight path data is presented in Figure 49 of the BDAR; however, the scale of the map makes it difficult to interpret the information provided. BCS recommends the data be presented at a scale (possibly by cluster) where flight paths can be clearly seen. It would also be advantageous to depict the location of the bird utilisation survey locations on these maps.

Recommendations

29.1 Flight path data be presented at a scale where flight paths can be clearly seen.

29.2 The location of the bird utilisation survey locations should be provided on these maps and differentiated from diurnal bird surveys so the spatial adequacy of BUS surveys can be reviewed.

30. The Kernel density analysis maps depicting bird activity patterns require revision

The Kernel density analysis maps of activity patterns for four threatened species across eastern Australia (as well as within 100 km of the project) are shown in Figures 50 to 57. This data is

presented to illustrate migratory flight paths. While this data has the potential to provide information about usage of the wind farm location by these species, the coarseness of the data (presented seasonally) is of limited value in this regard. It fails to demonstrate whether or not migratory pathways exist in the region. The data, as presented, suggests that there is probably insufficient data in the vicinity of the study area to clearly show any useful trends.

If these maps are to be used it is also critical that they be correct. Many maps presented in the BDAR are incorrectly labelled. For instance, Figure 51 is a mislabelled duplication of Figure 50, while the remaining figures are labelled as representing two different species, at the incorrect scale or are clearly for a species other than that suggested.

There are also doubts around the validity of many of the maps presented. Figure 57, for example, supposedly represents White-throated Needletail records within 100 km of the project with records in all seasons of the year. The White-throated Needletail is migratory with the entire population being absent from Australia from April to September.

It is noted that Figure 57 is a duplicate of Figure 53 which is labelled as both White-throated Needletail and White-browed Woodswallow. This is further confused with Figure 56 labelled as both Rainbow Bee-eater and White-throated Needletail.

Recommendations

30.1 If the Kernel density analysis maps are to be used they should be relevant, presenting meaningful data that will assist in the analysis of migratory pathways.

30.2 Maps be labelled correctly and represent the species intended.

31. The baseline collision risk assessment may not accurately reflect the consequence of blade strike

Tables 42 and 43 provide the basis for the collision risk assessments of birds and bats. The collision risks metrics provided are:

- *Unlikely – a <50% probability*
- *Likely – a 50% chance a collision; and*
- *Almost certain – a >50% chance of a collision*

BCS considers that the metric of “Likely” is irrelevant to the assessment as it is improbable that a risk assessment can be established in a one percental grade. As such, the dual metrics of “Unlikely” and “Almost Certain” are far too coarse to provide an informed risk assessment for the project.

BCS recommends that definitions of likelihood be amended to better reflect the chances of occurrence. A more appropriate distribution of the metrics may be:

- Almost certain 95% -100% Expected to occur
- Likely 65% - 95% Will probably occur
- Improbable 35% - 65% Might occur at some time
- Unlikely 5 - 35% Could occur at some time but is improbable
- Rare <5% May only occur in exceptional circumstances.

In addition, BCS considers the consequence ratings do not consider the consequence for naturally rare resident species, such as the Black Falcon, where the loss of a small number of individuals may have a relatively high consequence for the local or regional population. No data is presented for local or regional population of the species presented in Table 45.

BCS acknowledges that information regarding regional population size of most species is not available, however this should not preclude the use of the precautionary principle in the absence of data or when matters are uncertain.

For example, the BDAR states that the risk rating for Black Falcon (listed as Vulnerable under the BC Act) is negligible based on an unlikely (<50%) likelihood assessment and a low consequence (repeated loss of small numbers of individuals but no reduction in local or regional population viability). It is noted that three Black Falcons were recorded flying more than 80 m above the ground, placing them within the blade strike zone. Black Falcons have been recorded as having been struck at wind farms in NSW. Black Falcons are regarded as rare residents in the Dubbo – Wellington area and usually breed in riparian areas, although birds will forage well away from rivers. This would almost certainly also be the case in the Coolah area. Consequently, BCS considers that the consequence, and therefore the collision risk assessment, for this species is underestimated.

BCS recommends that the outcomes of the collision risk assessment be revised. If there is uncertainty or data is limited regarding the status of avifauna species within the North West region advice should be sought from a suitably qualified species expert or the precautionary principle should be applied, and a worst-case scenario assumed.

Recommendations

31.1 Definitions of likelihood and metrics applied to the collision risk assessment be amended to better reflect the chances of occurrence.

31.2 If there is an absence of data or impacts are uncertain for specific species apply the precautionary principle and assume a worst-case scenario and/or seek advice from a suitably qualified species expert.

32. Information is required on potential barrier impacts

Section 7.1.2 of the BDAR states that:

Throughout the study area, there are numerous turbine-free zones to allow for movement of species of concern. There is unlikely to be a barrier effect from the proposed layout.

No further information has been provided in regard to the potential barrier effects cause by the project. In addition, the conclusion made in Section 7.1.2 of the BDAR does not appear to be supported by evidence and the BDAR does not consider that groups/rows of turbines are likely to cause barrier effects to aerial species.

An assessment of the potential barrier effects of the turbines to species moving across the landscape should be added to the BDAR. This information should feed into calculations of individual turbine risk ratings and predicted strike rates.

Recommendation

32.1 Further assessment of turbine barrier effects on fauna is required.

33. Prescribed impacts for wind turbine strikes should be offset

Section 8.4 of the BDAR identifies that wind turbine strikes on protected and threatened species will be a residual impact of the proposed project.

Whilst the assessment of prescribed impacts does not result in the generation of biodiversity credits, the consent authority has the discretion to increase the number of biodiversity credits to be retired due to environmental, social and economic impacts of the proposed development, including for prescribed impacts. If mitigation measures or adaptive management do not adequately address the potential impacts and unavoidable residual prescribed impacts will occur i.e., bird and bat strikes, this should be offset via additional biodiversity credits (above 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* (BC Regulation).

A bird and bat adaptive management plan (BBAMP) is to be prepared to help mitigate prescribed impacts. BCS recommends that the proponent should consult with us when preparing the BBAMP for the project. BCS considers that the BBAMP should include:

- A proposed monitoring methodology
- Offset quanta for each threatened bird and bat collision, fatality or injury, calculated annually over the operational life of the windfarm. The proposed credit quantum should be reviewed and fully justified. Credit quanta should be calculated according to the conservation status of individual species that may be struck and based upon extrapolations from carcass monitoring data, for example:
    - For a vulnerable species – a one-off retirement of 10 credits for each individual struck.
    - For an endangered species – a one-off retirement 15 credits for each individual struck.
    - For a critically endangered species – a one-off retirement of 20 credits for each individual struck.
- For protected (non-threatened) species, the impact to the protected species should be offset where:
    - There are no effective and scientifically validated mitigation measures available to reduce the likelihood of future strikes of a protected (non-threatened) species; and
    - Continued turbine strike impacts are likely to have consequences for the local persistence of populations
- A trigger, action, response plan (TARP) with specific and measurable triggers. Triggers for corrective actions should be based on strike rate extrapolations when assessed annually.
- Trials of alternative deterrent technologies
- Mitigation implementation protocols (e.g. shutting down turbines during migration events)

Section 8.7 of the BDAR provides some detail of the BBAMP framework provided, however the detail has been limited to several bullet points.

The BBAMP is an important tool for monitoring, mitigating and offsetting residual prescribed impacts resulting from turbine strikes. As such, a more comprehensive draft BBAMP framework should be included with the prescribed impact assessment and attached to the BDAR. The draft BBAMP should be prepared in consultation with BCS. BCS would be happy to provide guidance regarding acceptable methods for monitoring, mitigation methods and for offsetting strikes based on experience with other similar development types within the North West region.

Recommendation

33.1 Provide a more detailed BBAMP framework giving reference to the specific points identified in this response and in consultation with BCS.

34. Prescribed impacts on connectivity should be offset

Section 8.4 of the BDAR identifies that residual prescribed impacts to connectivity will occur due to transmission line route creating a 70m wide easement cleared of vegetation. This is identified in Table 31 to result in residual impacts for the Squirrel Glider.

Similar to prescribed impacts created by turbine strike, if mitigation measures cannot adequately address potential impacts and unavoidable residual prescribed impacts expected to occur this should be offset via additional biodiversity credits (above 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 BC Regulation.

BCS recommends more detail be provided regarding the residual prescribed impacts to connectivity expected to result for the Squirrel Glider and any other species and ecosystem credit candidate species within this area which will be impacted by disruption to connectivity.

The proponent should also propose an offsetting method and quantum which is commensurate to the residual impacts expected to occur. BCS would be happy to provide guidance regarding acceptable methods for offsetting connectivity impacts based on experience with other similar development types within the North West region.

Recommendations

34.1 Provide further detail regarding the assessment of residual prescribed impacts to connectivity.

34.2 Provide an offsetting method and quantum which is justifiably commensurate to the residual prescribed impacts expected to occur.

35. Indirect impacts for rotor swept areas should be offset

Table 41 of the BDAR states that the rotor swept area of each turbine will extend in a radius of 250m from the 148 proposed turbines.

Indirect impacts are addressed in Table 58 of the BDAR. The assessment of indirect impacts concludes that there will be little substantial change to water, noise, weed species, pest animal, lighting or air quality related impacts on land adjacent to the subject land. The indirect impact of the turbines on adjacent native vegetation and its fauna has not been addressed.

Retained vegetation adjacent to the rotor swept areas and surrounding buffer may be subject to indirect impacts, for example discouraging birds from nesting or roosting near turbines. Where indirect impacts cannot be appropriately mitigated through the implementation of onsite measures, BCS recommends that a credit requirement is calculated to offset these indirect impacts to habitat.

It will be necessary for the proponent to determine the type and extent of indirect impacts, as well as the area of native vegetation affected by those impacts. Spinning turbine blades are likely to have an indirect impact on birds and bats by removing the availability of some habitat components, such as air space above areas of native vegetation used for foraging and movement, including for migration.

To enable the development of an appropriate offset for the rotor swept area in accordance with Section 8.6 of the BAM 2020, a circle should be drawn around each turbine. The radius of this circle should be no smaller than the length of one turbine blade in addition to a buffer from the rotor swept area subject to indirect impacts. The selected radius is to be described and justified in the BDAR.

The area of native vegetation that lies within this 'indirect impact' area will need to be calculated. Given that indirect impacts will result in only a partial loss of biodiversity from these areas, the credit requirement generated should reflect this.

This can be achieved in two ways.

a. A partial loss percentage could be applied to the area of vegetation present in the 'indirect impact area'. For example, the partial loss could be between 5% and 20%, or it may be less or more, but usually not more than 50%. This percentage would again depend on the nature of the indirect impacts identified, the impact mitigation proposed, the intensity of the development and the proximity and susceptibility of the retained vegetation. The partial loss percentage will need to be fully justified in the BDAR. Once the partial loss percentage has been determined and appropriately justified it can then be pro-rated, for the purposes of the credit calculation, across the total indirect impact area by splitting the area up into separate management zones. If this option is taken an accredited assessor should split the indirect impact area into a total-loss zone (defined by the indirect impact percentage) and a zero loss zone. For instance, if a wind turbine buffer is 5ha in size and the associated indirect impacts is determined to be 50% partial loss, the management zones would include a 2.5ha zone of total-loss and a 2.5ha zone of zero loss. Each management zone should be appropriately labelled in the calculator i.e. 'indirect impact management zone', or similar, with the future site values for each zone adjusted accordingly.

b. The total area of vegetation affected by indirect impacts within the 'indirect impact area' can be included as the 'indirect impact management zone' in the calculator, with the 'future site value scores' adjusted to reflect a partial loss resulting from the indirect impacts anticipated.

This suggested calculation method should only be applied in this context, given the inherent difficulty in associating the indirect impacts associated with wind turbines to specific compositional, functional or structural attributes of vegetation zones. This method should not be considered an endorsed method for partial loss calculations associated with other development types.

The use of either approach will generate an ecosystem credit requirement for the indirect impacts of the construction and operation of the wind farm on biodiversity, via the marginalisation of habitat within rotor swept areas.

All steps undertaken to determine the offset requirement for indirect impacts in accordance with the above must be documented within the BDAR and reflected where necessary in the credit calculator.

Recommendation:

35.1 Ecosystem credits be calculated for the indirect impacts of turbine operation on native vegetation and threatened species habitat.

Like-for-like credit reports should be appended to the BDAR – this assists compliance with approval conditions

36. Like-for-like credit reports should be appended to the BDAR

Appendix O of the BDAR contains credit summary reports generated from the BAM-C. A credit summary report does not contain the detail necessary to determine the credit trading options available for the project.

It is recommended that like-for-like credit reports are appended to the BDAR. A like-for-like credit report allows all relevant parties including the proponent, BCS and the consent authority to trace the like-for-like credit trading options available to satisfy the credit obligation for the project.

Recommendation

36.1 The accredited assessor should generate and attach a biodiversity credit report (like-for-like) from the BAM-C to the BDAR.

Information provided for the convenience of the accredited assessor

37. All site investigations and associated credit obligations be completed prior to project determination

Section 3.7.1 of the BDAR states that:

Floristic data for areas without survey access (assumed areas) were combined in the credit calculations for those vegetation zones that did contain floristic data. Where no data was available for a zone, all floristic plots have been assumed at benchmark, subject to further investigation.

BCS recommend that all further investigations required to be conducted are undertaken prior to the credit obligation for the project being captured within consent conditions if approval is granted. If access cannot be obtained prior to consent being granted and the final impact resulting from the project has yet to be determined, a worse-case scenario must be assumed, and a maximum credit obligation calculated accordingly.

Recommendation:

37.1 Further investigation be conducted, prior to the credit obligation for the project being captured within consent conditions. If access cannot be obtained prior to consent being granted, a worse-case scenario must be assumed, and a maximum credit obligation calculated accordingly.

38. Information regarding bilateral assessment requirements has been provided for the accredited assessor's convenience

Table 70 of the BDAR contains a table which details the consistency of the referral notice requirements issued by DCCEEW.

The assessment of biodiversity impacts and offsetting is being undertaken under the EPBC Act Assessment Bilateral Policy. As a consequence of the assessment being undertaken in this manner additional information will be required to inform DCCEEW that all relevant MNES have been addressed within the bilateral assessment. The North West BCS Branch has prepared a guidance document to assist with undertaking bilateral assessments according to the BAM; this guidance document has been provided in **Attachment D**.

BCS recommend this guidance document be reviewed and a similar consistency table be provided in relation to the guidance document to maximise efficiency of review by DCCEEW.

Recommendation

38.1 Review the supporting guidance document in Attachment D and provide a consistency table to facilitate review of bilateral assessment requirements.

BCS North West Branch - Woodland Mapping Guidance

BCS North West Branch – Woodland Mapping Guideline

Introduction

The NSW Threatened Species Scientific Committee's final determinations for woodland endangered ecological communities (EECs) must be considered when preparing vegetation maps for impact assessments. These determinations describe the communities in several condition states, so vegetation mapping must ensure that all such condition states are mapped appropriately.

The Biodiversity Conservation and Science Directorate (BCS) has prepared these guidelines to assist proponents and their consultant ecologists with identifying, describing and mapping these EECs and other non-threatened woodland types.

Underpinning Considerations from Hnatiuk *et al.* (2009) (see Tables 6 and 7 below)

1. Open Forest has crowns touching or slightly separated – up to 0.25 crown widths apart.
2. Woodland has crowns clearly separated – up to one crown width apart.
3. Open Woodland has crowns well separated – up to 20 crown widths apart.
4. Isolated trees are approximately 100 metres or more apart.

Table 6: Visual estimation of crown cover class

Code	Criteria assessed in field	Described as	Crown separation ratio	Crown cover %	Foliage cover %
D	Crowns touching to overlapping	Closed or dense	<0	>80%	>70%
M	Crowns touching or slightly separated	Mid-dense	0–0.25	50–80%	30–70%
S	Crowns clearly separated	Sparse or open	0.25–1	20–50%	10–30%
V	Crowns well separated	Very sparse	1–20	0.25–20%	0.2–10%
I	Isolated plants: for trees about 100 metres apart, shrubs about 20 m apart	Isolated plants	>20	<0.25%	<0.20%
L	Isolated clumps of 2 to many plants about 200 metres apart	Isolated clumps	>20	<0.25%	<0.20%
E	Emergent	Emergents	>3	<5% of total crown cover	<3% of total foliage cover

Table 7: Converting crown separation ratio to crown cover

	Overlap		Touching		Crowns separate																			
Crown separation ratio	-.01	-.05	-.02	0	.05	0.1	0.15	0.2	0.25	0.3	0.4	0.5	0.6	0.75	1.0	1.25	1.5	2.0	3.0	4.0	8.0	10	15	20	30
Percentage crown cover (%)	100	89	84	81	73	67	60	56	52	48	41	34	31	26	20	16	13	9	5	3	1	0.6	0.3	0.2	0.1

Decision Logic for Box Gum Woodland CEEC based on NSW Scientific Committee Final Determination (N.B. This EEC can be a woodland, open woodland or derived native grassland)

1. Tree canopies up to 50 metres apart with exotic or native grassland or bare earth between them – map all as Box Gum Woodland (this could be up to 100 metres apart given Box Gum Woodland can be an open woodland but 50 metres was chosen to be pragmatic given this state can also have a mosaic of exotic/native species or even bare earth in between trees).
2. Tree canopies between 50 metres and 100 metres apart – map trees and any areas of native grassland as Box Gum Woodland but exclude areas of bare earth and exotic grassland areas.
3. Tree canopies more than 100 metres apart with patches of native and exotic grassland between them – map the areas of native grassland in between as Box Gum Grassland but exclude areas of bare earth and exotic grassland areas.

Process for Mapping Woodland Vegetation Zones

When applying the Biodiversity Assessment Method (BAM) under section 6.7 of the *Biodiversity Conservation act 2016* (BC Act) stratify the various condition states of each woodland plant community type (PCT) into separate vegetation zones based on tree crown separation. Vegetation zones within each woodland PCT should be separated into:

a) woodland - where crowns are clearly separated (crown separation ratio 0.25:1);
b) open woodland - where crowns are well separated (crown separation ratio 1:20); and
c) native grassland - where crowns are greater than 100 metres apart (>20 crown separation ratio).

Mapping polygon(s) for the woodland vegetation zone should be straightforward, corresponding with areas of slightly separated crowns. Conversely, establishing boundaries between open woodland and native grassland vegetation zones needs to include a buffer of native grassland from the outer tree crowns to account for the sparseness of the open woodland canopy stratum.

Therefore, determine the boundary between open woodland and native grassland vegetation zones by applying the following steps:

Step 1: place a polygon around all tree crowns within the open woodland area based on the crown separation ratios mentioned above (i.e. 1:20 but less than 100 metres apart) (refer to Figure 1);

Figure 1: Preliminary polygon encompassing open woodland tree crowns (indicative only).

Step 2: calculate the mean spacing between tree crowns within the polygon (e.g. 30 metres);

Step 3: create a buffer around the outer open woodland tree crowns with a width equivalent to the mean tree crown spacing (e.g. 30 metres) (Figure 2); and

Figure 2: Buffer around the open woodland tree crowns with width equivalent to mean tree crown spacing (indicative only).

Step 4: create the final open woodland polygon by combining the open woodland tree crown polygon and the buffer, excluding any areas of woodland vegetation, planted native vegetation, riparian vegetation or non-native grassland vegetation (Figure 3).

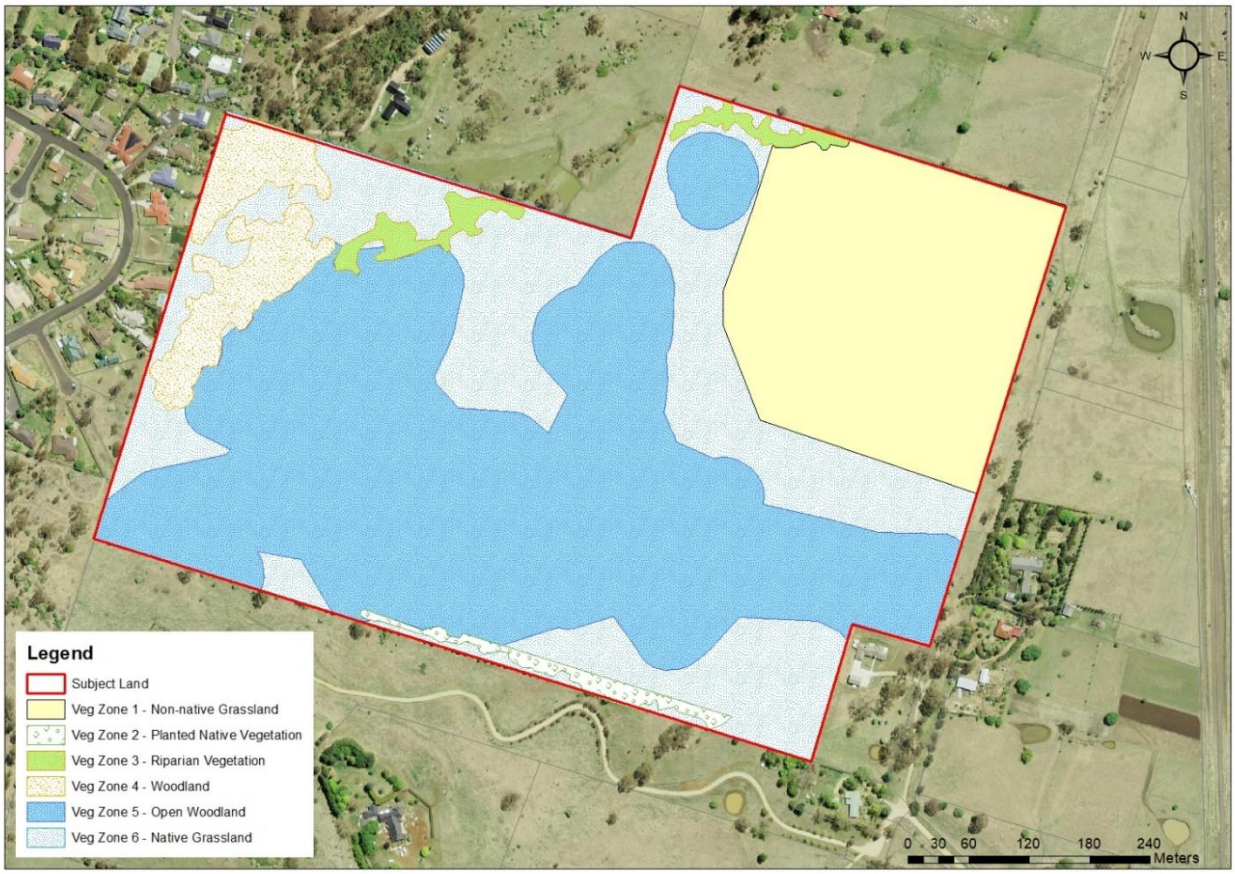

Figure 3: Indicative vegetation zone map of the subject land.

Attachment D

Bilateral Assessment Information and Data Requirements

Assessment of EPBC Act-listed threatened species and communities for projects
Suggested information for inclusion in the BDAR

1. Background & Description of Action

The Environmental Impact Statement (EIS)/ Biodiversity Development Assessment Report (BDAR) should include:

1. Descriptions and maps of the operational and construction footprints of the project with regards to Matters of National Environmental Significance (MNES).
2. Descriptions and maps of staging and timing of the action that may impact on MNES.
3. Maps of the subject land boundary showing the final proposal and disturbance footprint with regards to MNES.

Submit GIS shapefiles of all maps that relate to MNES.

2. Landscape Context of the MNES

Ensure that the 'Landscape Context' of BAM 2017 (Section 4) or 'Establishing the site context' of BAM 2020 (Section 3) have been fully met in the BDAR in relation to MNES.

3. EPBC Act Listed Threatened Species & Communities

The EIS should include the following:

1. Demonstration that field-based survey effort meets BCD survey guidelines and, where available, Commonwealth survey guideline.
2. Demonstration of access and use of supporting databases (e.g. NSW BioNet Vegetation Classification, NSW BioNet Threatened Biodiversity Data Collection, NSW BioNet Atlas, Commonwealth Species Profile and Threats Database search results)
3. Demonstration of access and use of published peer-reviewed literature
4. Demonstration of access and use of local data (if relevant)
5. Demonstration of appropriate mapping of all EPBC Act-listed threatened species and communities in accordance with the relevant Commonwealth listing advice.
6. Demonstration of consideration of important populations and critical habitat as defined in Approved Listing Advice, Approved Conservation Advice and Recovery Action Plans.
7. A list of all EPBC Act listed threatened species and communities that occur on the subject land, or in the vicinity (including species that are 'ecosystem credits' in BAM)
8. A discussion, with data and analysis where any species and communities identified by the Department of Climate Change, Energy, the Environment and Water (DCCEEW) referral documents have been ruled out as occurring on or near the subject site.

4. Avoidance, Minimisation, Mitigation & Management

The BDAR should include:

1. The demonstration of all feasible alternatives and efforts to avoid and minimise impacts on EPBC Act listed threatened species and communities (including direct, indirect and prescribed impacts) including an analysis of alternative:

a. designs and engineering solutions
b. modes or technologies
c. routes and locations of facilities
d. sites within the subject site
e. the identification of any other site constraints in determining the location and design of the proposal (such as bushfire protection requirements, flood planning levels, servicing constraints, etc).

2. A discussion and justification of all feasible impact avoidance, minimisation, and management all feasible alternatives and efforts to avoid and manage impacts (including adaptive management) Provide feasible measures to mitigate and/or manage impacts on EPBC Act listed threatened species and communities (including direct, indirect and prescribed impacts) including:
    a. techniques, timing, frequency and responsibility
    b. identify measures for which there is risk of failure
    c. evaluate the risk and consequence of any residual impacts
    d. any adaptive management strategy proposed to monitor and respond to impacts.

5. Impact Assessment

The EIS / BDAR should include the following:

1. Identification of the residual adverse impacts likely to occur to each EPBC Act listed threatened species and/or community after the proposed avoidance and mitigation measures are taken into account.
2. Justification and evidence for the predicted level of impact, with reference to the Commonwealth's Significant Impact Guideline and DPIE's 'Guidance to Assist a Decision-Maker to Determine a Serious and Irreversible Impact (SAII)'
3. Provide a summary table with the following information:

Name of EPBC Act listed entity	Nature & consequence of impact (direct & indirect)	Duration of impact (e.g. construction, operation, life of project)	Quantum of impact	Consequence of impact (local, state & national scales)	Impact requires offsetting? (significant or not)

4. Provide data and justification where any EPBC Act-listed threatened species or communities to be considered in the BDAR are considered to be at low risk of impact during the assessment.
5. For projects that DCCEEW considers that MNES have been significantly impacted by the 2019-2020 bushfires additional assessment is required. Those MNES will be identified in DCCEEW's 'Decision on referral'. The proponent must discuss in the EIS whether any additional bushfire impacts to those MNES were significant, and also whether any other local MNES were significantly impacted by those fires.

6. Offsets

The EIS / BDAR should include the following:

1. The identification of any MNES that haven't been offset using the BAM
2. Details of how impacts requiring offset corelate to the MNES impacts
3. Details of the Plant Community Types that require offsetting and the number and type of ecosystem credits required for impacts to MNES
4. Details of threatened species requiring offset and the number of species credits required for impacts to MNES

5. A demonstration of the correct uses the BAM (and BAM calculator) to identify the number and class of biodiversity credits that need to be offset to achieve a standard of 'no net loss' of biodiversity
6. Any details of ecological rehabilitation and/or biodiversity conservation actions proposed for offsetting
7. The identification of any other offsetting approach proposed, such as land-based offsets, retiring credits by payment into the Biodiversity Conservation Fund and/or through supplementary measures

8. Provide a summary table with the following information:

Threatened Species / Community listed under EPBC Act	PCTs associated with the ecosystem credit species / ecological community (if applicable)	Area of Impact (ha)	Credits Required	Offsetting Approach	Reference (EIS/BDAR)
TOTAL					

7. Other considerations

The EIS / BDAR should include the following:

1. Consideration of all relevant Commonwealth guidelines and policy statements that are appliable to the action and listed threatened species and/or communities, including but not limited to:
    a. International environmental obligations
    b. Recovery Plans
    c. Approved Conservation Advice
    d. Threat Abatement Plans
2. An assessment for each EPBC Act listed threatened species and/or community, that has been adequately informed by applicable Commonwealth guidelines and/or policy statements. For example, the interaction between the proposed action and important populations or critical habitat identified in policy documents and/or the interaction between the proposed action and threatening processes or recommended conservation actions outlined in Commonwealth policies and plans.