Our ref: DOC20/697329
Your ref: SSI-9371

Alexander Scott
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Dear Alex

Exhibition of the Inland Rail North Star to NSW/Queensland Border Environmental Impact Statement

Thank you for your email dated 25 August 2020 to the Biodiversity, Conservation and Science Directorate (BCS) inviting comments on the Environmental Impact Statement (EIS) for the Inland Rail North Star to NSW/Queensland Border project.

The proposed project consists of a railway alignment of 30 kilometres, comprising 25 kilometres of new track in the non-operational Boggabilla rail corridor and five kilometres of greenfield corridor to the NSW/Queensland border. Fourteen kilometres of the rail alignment crosses the Macintyre River floodplain. Impacts associated with 11 borrow pits have been assessed as part of the proposed project. The total footprint covers 769 hectares which includes 522 hectares of native vegetation. Three entities with the potential to be subject to serious and irreversible impacts occur or have habitat present in the footprint.

BCS has identified extensive issues with the Biodiversity Development Assessment Report (BDAR) and the data that underpins the calculation of the biodiversity offset credits. BCS has liaised with ARTC during our review of the EIS and the BDAR, and propose to continue this interaction following the completion of the exhibition period to ensure that all matters are satisfactorily addressed in a timely manner. ARTC have indicated they are committed to amending the BDAR so that it correctly reflects the impacts to biodiversity and the subsequent biodiversity credits that are required to offset these impacts.

In order to be able to compare the updated information in the BAM-C following incorporation of the feedback in this response with the original information reviewed, BCS suggest that the original BAM-C case is retained, a new version is saved, and that new version is updated. BCS can assist the accredited assessors with this task if required.

The assessment that has been undertaken to determine impacts to Matters of National Environmental Significance (MNES) listed under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* is complex and the outcomes lack clarity. It is proposed that BCS and the Department of Agriculture, Water and Energy (DAWE) will liaise with ARTC to clarify the assessment that was undertaken, whether the outcomes are acceptable and how residual impacts to MNES should be offset.

It should be noted that BCS have undertaken our review using 2013 aerial imagery. Changes to vegetation including clearing and landuse change may have occurred since this date, making our observations outdated.

A high-level review of the flooding and hydrology component of the EIS has been completed. Prior to detailed feedback being provided on some of the key elements of the modelling, BCS recommends that liaison with ARTC occurs in order to understand the justification behind some of the main decision points. BCS is committed to undertaking an iterative review approach following these discussions to ensure all matters are appropriately addressed.

BCS's biodiversity and flooding recommendations are provided in **Attachment A,** detailed biodiversity comments are provided in **Attachment B**, and detailed flooding comments are provided in **Attachment C**. If you require any further information regarding this matter, please contact Renee Shepherd, Principal Project Officer, via renee.shepherd@environment.nsw.gov.au or (02) 6883 5355.

Yours sincerely

Samantha Wynn
Acting Director North West
Biodiversity, Conservation and Science Directorate

2 October 2020

Attachment A – BCS's Recommendations

Attachment B – BCS's Detailed Biodiversity Comments

Attachment C – BCS's Detailed Flooding Comments

BCS's recommendations

Inland Rail North Star to NSW/Queensland Border – Environmental Impact Statement

AIAM	Adverse Impacts Assessment Methodology
BAM	Biodiversity Assessment Method
BAM-C	Biodiversity Assessment Method Calculator
BC Act	*Biodiversity Conservation Act 2016*
BC Regulation	Biodiversity Conservation Regulation 2017
BDAR	Biodiversity Development Assessment Report
DAWE	Commonwealth Department of Agriculture, Water and Energy
EEC	Endangered Ecological Community
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
HBT	Hollow bearing tree
HTE	High threat exotic
MNES	Matters of National Environmental Significance
PCT	Plant Community Type
SAII	Serious and Irreversible Impacts
TEC	Threatened Ecological Community
TBDC	Threatened Biodiversity Data Collection
VI score	Vegetation Integrity Score
BRFMP	Floodplain Management Plan for the Border Rivers Valley Floodplain 2020
AEP	Annual Exceedance Probability

Recommendations - biodiversity

1.1 Include a description of the habitat features and PCTs present in the project footprint used to create species polygons for each species credit species.

1.2 Provide further justification for the koala species polygon including information on the presence or absence of koala records and feed trees as listed in the Koala Habitat Protection SEPP in the vicinity of the project footprint.

1.3 Review the inconsistent areas of impact attributed to the koala and confirm the correct area of impact. Provide additional justification if necessary.

1.4 Confirm the area that has been assigned to the squirrel glider species polygon is correct, as the area stated in the BDAR does not conform to the spatial data. Ensure the subsequent credit obligation is also correct. If necessary, provide further explanation regarding how the species polygon was determined.

1.5 Review why the area of impact for the masked owl in the BDAR does not align with the area of impact in the spatial data.

1.6 Review whether all vegetation zones included in the species polygon for the masked owl contain the necessary habitat elements for breeding, and revise the polygon, area of impact, and credit obligation accordingly if necessary.

2.1 Update section 6.1.4.1 of the BDAR to ensure that all components of section 10.2.2 of the BAM are satisfactorily addressed for the Brigalow TEC.

2.2 Further detail is required on the avoidance measures that have been implemented and the measures proposed to contribute to the recovery of the pale imperial hairstreak (section 6.1.4.2 of the BDAR) and the braid fern (section 6.1.4.3 of the BDAR).

2.3 A targeted survey should be undertaken for the pale imperial hairstreak to more accurately determine the impact of the proposed project on this SAII species.

2.4 Avoidance of PCT35 and therefore potential pale imperial hairstreak habitat should be a key consideration in determining which borrow pits proceed.

2.5 Clarify why 11.24 hectares rather than 17.04 hectares of potential habitat has been identified for the braid fern when considering SAII for this species.

2.6 A targeted survey should be undertaken for the braid fern to more accurately determine the impact of the project on this SAII species.

3.1 Confirm whether all access tracks for borrow pits and the rail alignment, and all construction compounds have been included in the footprint for the proposal, and that their impact has been captured in the total area of impact and a subsequent credit obligation has been determined.

3.2 Confirm that the spatial data reflects the correct rail alignment width, and that the rail alignment footprint incorporates the relevant buffers around culverts.

4.1 The BDAR should describe how non-native vegetation has been determined in the project footprint.

5.1 Clarify what the “TBSA Guidelines” are and confirm whether the *NSW Guide to Surveying Threatened Plants* (OEH 2016) was used to inform threatened flora surveys.

5.2 Justify the use of meandering transects as the preferred survey threatened flora survey methodology, and provide spatial data of the meandering transect locations to ensure adequate coverage of the project footprint occurred.

6.1 Clearly articulate the impact occurring in each segment of the staged construction of the project. This must include the name and location of each segment; area of impact; each PCT impacted, its area and ecosystem credit obligation; and species credit species, their area of impact and credit obligation.

7.1 More detailed discussion is required in section 5.3 to describe the actions that have been undertaken to avoid impacts to biodiversity in both the planning and construction phases of the project. Chapter 8 of the BAM and Chapter 1 of the BAM Operational Manual Stage 2 should be used as guidance.

8.1 Information relating to the certification of the BDAR as being BAM compliant should be consolidated in one place in the BDAR.

9.1 If applicable, the BDAR must describe the circumstances in which variation rules will be applied to meet the biodiversity credit obligation, including evidence of the reasonable steps that have been taken to obtain like-for-like credits.

10.1 Separate tables should be included in the BDAR which clearly summarise the ecosystem and species credits for the entire project, rather than delineating the impacts into IBRA subregions or individual borrow pits.

11.1 The proposed edits to the BDAR listed in section 11 of BCS’s review should be addressed.

12.1 If species have been removed based on the absence of listed habitat constraints the assessor must;

a) Update the BDAR to adequately demonstrate that the habitat constraints are not present on site.

b) Tick the habitat constraint box in the calculator on the habitat suitability tab for that species.

If species have been removed based on the absence of habitat constraints not listed in the TBDC the assessor must provide adequate justification in the BDAR. As a minimum, the justification must include;

a) the specific habitat constraint(s) or microhabitat missing on the subject land; **and**

b) a description of the field technique used to assess the presence of the constraint or microhabitat (e.g. the survey effort and technique used to assess hollow-bearing trees) and any other data or information used to make the decision

If species have been removed because the site is outside of listed geographic limitations the assessor must;

a) Update the BDAR to adequately demonstrate that the site is outside of the listed geographic limitations.

b) Tick the geographic limitations box in the calculator on the habitat suitability tab for that species.

If species have been removed because they are considered to be vagrant the BDAR must adequately demonstrate why the species has been determined to be vagrant.

12.2 Where species did not appear on the predicted list but have been added to the BAM-C, an explanation as to why the species have been added must be included in the BDAR.

13.1 Any species that does not have habitat constraints listed in the TBDC should be retained in the BAM-C as a species for further assessment.

If species have been removed based on the absence of listed habitat constraints the assessor must;

a) Update the BDAR to adequately demonstrate that the habitat constraints are not present on site.

b) Tick the habitat constraint box in the calculator on the habitat suitability tab for that species.

If species have been removed based on the absence of habitat constraints not listed in the TBDC the assessor must provide adequate justification in the BDAR. As a minimum, the justification must include;

c) the specific habitat constraint(s) or microhabitat missing on the subject land; **and**

d) a description of the field technique used to assess the presence of the constraint or microhabitat (e.g. the survey effort and technique used to assess hollow-bearing trees) and any other data or information used to make the decision

If species have been removed because the site is outside of listed geographic limitations the assessor must;

a) Update the BDAR to adequately demonstrate that the site is outside of the listed geographic limitations.

b) Tick the geographic limitations box in the BAM-C on the habitat suitability tab for that species.

If species have been removed because 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 the assessor must;

a) Update the BDAR to adequately demonstrate that the habitat constraints or known microhabitats are degraded to the point that the species would no longer be present on the subject site.

b) Tick the habitat degraded box in the BAM-C on the habitat suitability tab for that species.

14.1 Ensure that the correct data set is entered in the BAM-C and that it reflects the field data sheets and data provided in the BDAR.

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

16.1 Where no numbers of hollow bearing trees have been recorded in the field data sheet, clarification is required on where the number in the BAM-C has come from.

17.1 All litter function scores need to be reviewed to ensure they have been calculated correctly. Any that are incorrect need to be updated in the BAM-C.

18.1 Function condition score data must be entered in the BAM-C for the identified plots.

19.1 The vegetation zone the plots CB628LS2, CB628LS3 and CB628LS4 are consistent with must be confirmed, and the minimum number of plots for the other vegetation zone must be appropriately met.

20.1 Justify why plots have been duplicated, including why those plots were chosen for duplication, and why duplication was used rather than benchmark. Tables 4.6 and 4.7 could be updated to state which vegetation zones required duplicated plots.

21.1 Explain why there are multiple sets of data for the same Plot ID.

22.1 The location of all plots should be reviewed to ensure that they conform to BAM. Where relevant, justification should be included in the BDAR to explain the selection of transect locations.

23.1 Information entered in the BAM for plots Z5P1 and Z5P2 should be reviewed, and the validity of using plot BP1LowP1 should be reviewed.

24.1 Review vegetation mapping to ensure that it correctly reflects the plot data collected.

25.1 BCS will undertake a review of the vegetation mapping and allocation of vegetation zones against aerial imagery to be provided by ARTC.

26.1 Inclusion of discarded railway sleepers as fallen logs in Plot CB244LS1 is at the accredited assessor's discretion, but it is not mandatory.

27.1 It is proposed that BCS and DAWE meet with the proponent to discuss the assessment that was undertaken for MNES, how this relates to BAM, whether the outcomes are acceptable and how residual impacts should be offset. Matters that need to be addressed in future discussions include (but are not limited to):

a. Explanation of what PCTs and vegetation zones constitute each TEC and what the total area is.

b. Confirmation on whether MNES not listed under the BC Act have been the subject of targeted surveys, and if so, what the outcome is.

c. Explanation of how the "total unmitigated potential disturbance area" of 700 hectares was calculated in Table 7.13.

d. Confirmation of which MNES are considered to be significantly impacted by the proposal.

e. Describe how the implementation of additional mitigation measures can reduce the area of impact to MNES, as applied in the SIAM.

f. Discuss the differences in impact areas calculated through the BAM and the AIAM.

g. Describe which MNES require offsetting, what the proposed offset strategy is and the timing of protection.

Recommendations – flooding and hydrology

28.1 Further analysis or justification should be undertaken to ratify the 1% design flood magnitude especially in relation to the current design flood of 1976. This will include a revision of the Flood Frequency Analysis including the assumptions and data used to undertake this analysis. The findings of this study differ compare to previous studies and this needs to be fully understood. The sensitivity analysis of the 1976 flood should include the impact on velocities and flow distribution.

29.1 Additional justification supporting the flood impact objectives is required.

30.1 Further assessment should be provided on the potential impacts to downstream flood-dependant ecosystems across a range of floods, especially frequent flood events.

31.1 The SES should be approached to determine which roads in the impact area are critical for access, and if additional submergence times identified in the EIS will compound issues on already flooded roads.

32.1 Additional narrative is required on how the afflux will impact on the North Star Sporting Club.

33.1 Additional evidence of the cumulative impact of the proposal compared to undeveloped floodplain scenarios is required.

34.1 Additional discussions and evidence regarding erosive velocities are required to justify the adopted approach. If there are signs of current erosion in areas identified as exceeding the threshold then accepting no increase in existing velocities may not be acceptable and an alternative approach proposed.

34.2 An alternate approach to mitigation measures for high velocities should be proposed if engineering solutions or landholder agreement is not feasible.

35.1 Review the list of general comments and update the EIS accordingly.

BCS's detailed comments

Inland Rail North Star to NSW/Queensland Border – Environmental Impact Statement

Biodiversity

1. Information used to determine species credit species polygons must be clearly described

Section 6.4.1.34 of the Biodiversity Assessment Method (BAM) requires that the Biodiversity Development Assessment Report (BDAR) includes a description of the species credit species and the habitat features or habitat constraints associated with the species on the project footprint. The BAM Operational Manual – Stage 1 (OEH 2018b) goes on to require that the description of the species polygon must include the number of individuals recorded and the buffers applied to define the boundaries of the polygon. Tables 4.14, 4.15 and 4.16 provide an indication of the vegetation zones associated with each species credit species, and habitat constraints that are listed in the Threatened Biodiversity Data Collection (TBDC). Similarly, Tables 4.11 and 4.13 list vegetation zones that have been excluded as habitat. Section 4.2.6 also states that any species that was not subject to a targeted survey effort in spring 2019 and had suitable habitat present was considered to occur.

However, this information is presented in numerous locations in the BDAR and it is unclear which "suitable habitat features" are located in which vegetation zones, and whether the presence of these habitat features varies across the project footprint.

The justification for the creation of the polygon for each species credit species should include:

- Whether the species was recorded or assumed present, and if presence was assumed why this was the case (for example targeted fauna surveys did not occur during the nominated survey months)
- Which plant community types (PCTs) and vegetation zones have been included and why (this may refer to PCT associations contained in the TBDC, published literature or other survey results)
- Where key habitat features are required, evidence of the presence within the polygon/s (referencing photos or field data sheet information), or alternatively confirmation that presence of these features has been assumed if detailed habitat surveys have not been conducted.

Not all species polygons have been interrogated as part of this review, however three species have been used as examples below to outline the additional information that is required to adequately justify the creation of species polygons.

Koala *(Phascolarctos cinereus)*

Table 4.16 states that 0.72 hectares of breeding habitat occurs in the railway alignment, with no potential breeding habitat occurring in the borrow pits. The habitat constraint listed is "important habitat" which is not described, and Table 4.14 states that the only vegetation zone associated with the species polygon is PCT36 (high condition). This small area of vegetation is immediately adjacent to the Macintyre River at the northern extent of the project (Map F.3ap in Appendix F in the BDAR).

While koalas are currently listed as a dual credit species in the TBDC, they should be treated as a species credit species. Potential koala habitat is any vegetation community that contains one or more koala feed/use trees. Reference should be made to the list of koala feed/use trees in the State Environmental Planning Policy (Koala Habitat Protection) 2019 (the SEPP) and *A review of koala tree use across New South Wales* (OEH 2018a). The presence or absence of koalas within potential koala habitat on the subject land must be determined through targeted survey and the level of survey effort must be justified in the BDAR.

The koala species polygon should be mapped to the extent of the PCT (containing one or more koala use/feed trees, as detailed above) in which presence was confirmed. Connectivity between PCTs with confirmed koala presence must be considered in the overall extent of the species polygon, with justification for decisions provided in the BDAR.

Nine PCTs were excluded as potential breeding habitat because no koalas were recorded in them during the targeted survey. No discussion was provided on the presence or absence of other koala records in the vicinity of the project footprint, nor was any discussion provided on the presence or absence of koala use trees listed in the SEPP.

Different figures are attributed to potential koala habitat throughout the BDAR:

- 0.72 hectares defined within the species credit species polygon under BAM (Table 4.16)
- A total of up to 17.12 hectares of potential habitat and 31 species credits (Table 6.7; noting that the 31 species credits relates to the 0.72-hectare polygon, not 17.12 hectares as implied)
- 285.47 hectares of disturbance that constitutes a significant adverse residual impact upon habitat for MNES (Table 7.15)
- 297.39 hectares of significant residual adverse impacted habitat disturbance area (Table 3.1 in Appendix J of the BDAR).

Given the project is a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the project is assessed under the bilateral agreement between the NSW and Commonwealth Governments. The BDAR must articulate these different areas of potential impact to the koala and clearly justify the area of impact identified using the BAM, and the subsequent species credit obligation.

Squirrel glider (*Petaurus norfolcensis*)

Section 4.2.4.3, section 5.2.1.17 and Figure 4.2 in the BDAR confirm that squirrel gliders were recorded in PCT36 along the Macintyre River, and PCT244 and PCT55 in the rail alignment.

Table 4.16 states that 11.38 hectares of breeding habitat occurs in the railway alignment, with no potential breeding habitat occurring in the borrow pits. No habitat constraints are listed, and three vegetation zones have been included in the species polygon – the high condition zones for PCT55, PCT244 and PCT36. However, Figures F.3an and F.3ao show only two separate polygons (PCT36 high and PCT55 high) as constituting the species polygon, with these areas totalling 0.73 hectares and 0.53 hectares respectively – considerably less than the 11.38 hectares previously stated. It is not clear why PCT244 has been omitted from the species polygon, particularly when section 4.2.4.3 states that it has been included. Furthermore, Table 6.2 states that there is 9.97 hectares of habitat being impacted in the alignment, requiring a total of 272 species credits. Other polygons of high condition PCT36, 55, and 244 occur within the project footprint, so it is not clear why they have been omitted from the species polygon.

Table 4.12 states that the squirrel glider is associated with PCT418, but Table 4.11 excludes low quality PCT244 and PCT418 due to a lack of suitable density of trees. It is not clear why medium condition vegetation zones for PCT244 and PCT418 have not been included in the species polygon. Clarification is required in the BDAR.

Masked owl (*Tyto novaehollandiae*)

Table 6.2 states there is 101.03 hectares of impact to the habitat of the masked owl, but spatial data provided by the proponent indicates there is only 38.9 hectares of impact in the rail alignment. It appears that the masked owl has been assumed to be present, with PCTs in which the species is predicted to occur listed in Table 4.12. Low condition vegetation zones were excluded from the species polygon and are listed in Table 4.11, with the reason for exclusion being the absence of large hollows for nesting. Using this reasoning, there may be other vegetation zones or vegetation patches that do not contain this habitat element that could be removed from the species polygon.

Recommendations

1.1 Include a description of the habitat features and PCTs present in the project footprint used to create species polygons for each species credit species.

1.2 Provide further justification for the koala species polygon including information on the presence or absence of koala records and feed trees as listed in the Koala Habitat Protection SEPP in the vicinity of the project footprint.

1.3 Review the inconsistent areas of impact attributed to the koala and confirm the correct area of impact. Provide additional justification if necessary.

1.4 Confirm the area that has been assigned to the squirrel glider species polygon is correct, as the area stated in the BDAR does not conform to the spatial data. Ensure the subsequent credit obligation is also correct. If necessary, provide further explanation regarding how the species polygon was determined.

1.5 Review why the area of impact for the masked owl in the BDAR does not align with the area of impact in the spatial data.

1.6 Review whether all vegetation zones included in the species polygon for the masked owl contain the necessary habitat elements for breeding, and revise the polygon, area of impact, and credit obligation accordingly if necessary.

2. Greater detail is required for the assessment of SAII entities

Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions threatened ecological community (TEC) is listed as an entity subject to serious and irreversible impacts (SAII), and 101.1 hectares of the component PCT, PCT35, is present in the project footprint. Section 6.1.4.1 discusses where PCT35 is present on site and provides some historical extent information. However, this section does not address all the components listed in section 10.2.2 of the BAM and the BDAR should be updated accordingly.

The pale imperial hairstreak (*Jalmenus eubulus*) is a critically endangered species, it is only found in Brigalow-dominated open forests, and 78.6 hectares of potential habitat is considered to occur in the project footprint. A targeted survey has not been conducted for this species, so the species has been assumed to be present. This species meets three of the four principles for SAII, and given the very limited number of records for this species in NSW, their proximity to the project footprint, and the large area of potential habitat proposed to be impacted, it is strongly recommended that a targeted survey is undertaken to more accurately determine the potential impact to this species.

The habitat for this species occurs across six borrow pits. Avoidance of PCT35 and therefore potential habitat for this SAII species should be one of the highest priorities when considering which borrow pits should proceed. The discussion in section 6.1.4.2 of the BDAR on this species with regards to avoidance measures that have been implemented and the measures proposed to contribute to the recovery of the species lack detail. Further information is required for these aspects.

The potential impact identified for the pale imperial hairstreak is concerning. BCS proposes to liaise with the proponent on this matter and provide further advice on a targeted survey for this species.

Like the pale imperial hairstreak, the presence of braid fern (*Platyzoma microphyllum*) has been assumed where potential habitat occurs because a targeted survey has not been completed for this species. Braid fern is associated with PCT247 and 11.24 hectares of potential habitat has been identified. It is not clear why the full 17.04 hectares of habitat identified in Table 6.2 has not been considered habitat for the purposes of SAII. Again, it is recommended that a targeted survey is completed for braid fern to more accurately identify the impact of the proposed project on the species.

Recommendations

2.1 Update section 6.1.4.1 of the BDAR to ensure that all components of section 10.2.2 of the BAM are satisfactorily addressed for the Brigalow TEC.

2.2 Further detail is required on the avoidance measures that have been implemented and the measures proposed to contribute to the recovery of the pale imperial hairstreak (section 6.1.4.2 of the BDAR) and the braid fern (section 6.1.4.3 of the BDAR).

2.3 A targeted survey should be undertaken for the pale imperial hairstreak to more accurately determine the impact of the proposed project on this SAII species.

2.4 Avoidance of PCT35 and therefore potential pale imperial hairstreak habitat should be a key consideration in determining which borrow pits proceed.

2.5 Clarify why 11.24 hectares rather than 17.04 hectares of potential habitat has been identified for the braid fern when considering SAII for this species.

2.6 A targeted survey should be undertaken for the braid fern to more accurately determine the impact of the project on this SAII species.

3. Confirmation is required that all impacts from the proposal have been included in the footprint

Section 1.1.2.4 states that impacts to borrow pits and access tracks required for the borrow pits have been reported individually for each borrow pit area. However, no access tracks have been identified in the footprint in the spatial data or in Figures 3.5a-3.5p. Similarly, it is not clear whether the construction compounds are included in the footprint.

The spatial data provided to BCS shows that the rail alignment is typically 90 metres wide, however the BDAR repeatedly refers to an alignment that is 40 metres wide. The rail alignment does not include buffers around culverts in the manner that has been undertaken for the Narrabri to North Star (N2NS) project. Buffers around culverts for N2NS were approximately 140 metres in total width. It may be that the wider alignment in NS2B incorporates the culvert buffers for this project. Confirmation is required that the spatial data provided correctly identifies the area under investigation and all necessary construction buffers.

Recommendations

3.1 Confirm whether all access tracks for borrow pits and the rail alignment, and all construction compounds have been included in the footprint for the proposal, and that their impact has been captured in the total area of impact and a subsequent credit obligation has been determined.

3.2 Confirm that the spatial data reflects the correct rail alignment width, and that the rail alignment footprint incorporates the relevant buffers around culverts.

4. Inadequate justification for the presence of non-native vegetation has been provided

Section 3.2.1 states that the BAM requires identification of areas of non-native vegetation which do not require further assessment, and section 3.4.3.1 further states that rapid vegetation assessments conducted in the proposal area identified these areas of non-native vegetation. Access to the rapid vegetation assessment information was not available during the review of the BDAR.

Figures 3.5a-3.5p depict the areas of non-native vegetation in the project footprint and for many polygons the non-native vegetation aligns with cultivated paddocks or operational borrow pits. However, the methodology used to determine these areas of non-native vegetation is not clearly described in the BDAR. The BDAR should outline the methodology used to determine non-native vegetation, which may include (but not be limited to) the results from rapid assessments, photos of cultivated paddocks or aerial photography.

Recommendation

4.1 The BDAR should describe how non-native vegetation has been determined in the project footprint.

5. Further information is required on the targeted threatened flora surveys

Meandering transects were used as the method for targeted threatened flora surveys as described in section 3.4.4.1. It is requested that the spatial information showing the location of the meandering transects be provided to demonstrate that the transects appropriately cover the project footprint.

The BAM Operational Manual Stage 1 states that surveys should be conducted in accordance with the taxa-specific guidelines that are available. At the time the surveys were completed, the *NSW Guide to Surveying Threatened Plants* (OEH 2016) was the most current guideline (noting that this has been superseded by a 2020 update). This guideline is not discussed in the BDAR, and confirmation should be provided as to whether it was used. The preferred survey method described in the guideline is parallel field traverses, and it would be beneficial for a justification to be provided regarding why meandering transects were chosen instead. Section 3.4.6 refers to the "TBSA Guidelines" for the meandering transect methodology, but it is not clear what these guidelines are.

The BDAR states that given the existing drought conditions during the survey period, "*the results of flora surveys are not considered sufficient to determine species-credit species to be absent*" and therefore all flora species credit species are assumed to be present. This precautionary approach is supported, and it conforms to the guidance provided in the *NSW Guide to Surveying Threatened Plants* (OEH 2016).

Recommendations

5.1 Clarify what the "TBSA Guidelines" are and confirm whether the *NSW Guide to Surveying Threatened Plants* (OEH 2016) was used to inform threatened flora surveys.

5.2 Justify the use of meandering transects as the preferred survey threatened flora survey methodology, and provide spatial data of the meandering transect locations to ensure adequate coverage of the project footprint occurred.

6. The proposed segmentation (staging) of the proposal requires further information

The BDAR states that there will be a segmented (or staged) approach to the construction of the project, and that this segmented approach will provide flexibility in the retirement of associated biodiversity credits. Table 3 lists the 12 proposed segments – the rail alignment and 11 borrow pits

– along with some corresponding information. However, insufficient detail has been provided in that table. It is requested that the following information is included in the BDAR:

- name and location of each segment
- area of impact, including area of impact to native vegetation
- each PCT 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.

Recommendation

6.1 Clearly articulate the impact occurring in each segment of the staged construction of the project. This must include the name and location of each segment; area of impact; each PCT impacted, its area and ecosystem credit obligation; and species credit species, their area of impact and credit obligation.

7. The demonstration of measures taken to avoid impacts to biodiversity is inadequate

Chapter 8 of the BAM outlines the requirement to demonstrate that reasonable measures have been undertaken to avoid or minimise impacts of the proposed development on biodiversity. Chapter 1 of the BAM Operational Manual Stage 2 (OEH 2019) also provides guidance on avoidance of impacts. Section 5.3.1 of the BDAR refers to Chapter 3 of the EIS to provide details on the alternative options investigated for the NS2B route. Chapter 3 indicates that ecological criteria were considered in the multi-criteria assessment for route options, but no details are provided.

Section 5.3.1 of the BDAR states that temporary infrastructure will be located in non-native vegetation or highly disturbed vegetation where possible, but no commitments or detailed discussion on the location of infrastructure has been provided. This section goes on to state that the proposal footprint was restricted to avoid Matters of National Environmental Significance (MNES) and threatened species as far as practical, but again, no detail or examples are provided.

A key component of avoidance that has not been discussed is the selection of borrow pits. The proposal assesses 11 potential borrow pit sites. The borrow pits are typically located on rocky outcrops with in-tact native vegetation present, as the sites are not suitable for farming. It is acknowledged that key considerations for the selection of the borrow pits is proximity to the rail alignment, and the suitability of the material. However, little to no consideration has been given to the ecological impacts. Section 4.1.1.2 states that the borrow pit sites were selected to "*minimise impacts to existing agricultural land-use and distance to the rail alignment"* and the presence of existing borrow pits was also considered.

This section does state that biodiversity impacts will be considered in the final selection of borrow pits to be used. Ecological considerations should have a high priority, as six of the borrow pits contain PCT35 – Brigalow – belah open forest/woodland. This PCT conforms to the Brigalow TEC as listed under both the *Biodiversity Conservation Act 2016* (BC Act) and EPBC Act, and it is also considered to be the subject of SAII as described in the *Biodiversity Conservation Regulation 2017*. In addition, PCT35 is habitat for the threatened species the pale imperial hairstreak, which is also the subject of SAII. The avoidance of these SAII should be one of the priority criteria when selecting borrow pits in the construction phase.

Recommendation

7.1 More detailed discussion is required in section 5.3 to describe the actions that have been undertaken to avoid impacts to biodiversity in both the planning and construction phases of

the project. Chapter 8 of the BAM and Chapter 1 of the BAM Operational Manual Stage 2 should be used as guidance.

8. The certification of the BDAR could be clarified

Section 6.15 of the BC Act requires an accredited assessor to certify that the BDAR has been prepared according to the BAM at a specified date and that date is within 14 days of the date the report is submitted. The BDAR contains some information on the preparation of the BDAR in the Executive Summary, and further information on page 19. Consideration should be given to consolidating this information into the one location.

Recommendation

8.1 Information relating to the certification of the BDAR as being BAM compliant should be consolidated in one place in the BDAR.

9. The BDAR must identify the use of variation rules if they are to be enacted

Section 6.12 of the BC Act requires that a BDAR include information on the number and class of biodiversity credits to be retired. The BDAR must also identify the credits to which the variation rules could be applied and where the proponent intends to enact them. The BDAR does not discuss the need to enact variation rules, nor does it include a Biodiversity Assessment Method Calculator Credit Report (Variation).

The "*Ancillary rules: Reasonable steps to seek like-for-like biodiversity credits for the purpose of applying the variation rules*" outline the minimum requirements for proponents to show they have taken reasonable steps to obtain like-for-like credits before the variation rules can be applied. Evidence of these reasonable steps must be provided to the consent authority for approval prior to the variation rules being enacted. If variation rules are proposed to be applied after the consent has been granted, a project modification may be required.

Recommendation

9.1 If applicable, the BDAR must describe the circumstances in which variation rules will be applied to meet the biodiversity credit obligation, including evidence of the reasonable steps that have been taken to obtain like-for-like credits.

10. Include separate tables that state the ecosystem credits and species credits

The BDAR does not contain summary tables that clearly state the ecosystem credit and species credit obligation for the project. Two separate tables should be prepared that include:

1. For ecosystem credits - the PCTs present, the area of impact, and the resulting ecosystem credit obligation. The table should resemble this:

PCT	Total area to be impacted (ha)	Ecosystem credits required
PCT 27 Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	4.31	42

2. For species credits – the species impacted, the area of impact, and the resulting species credit obligation. The table should resemble this:

Species name	Scientific name	Total area to be impacted (ha)	Ecosystem credits required
Belson's panic	*Homopholis belsonii*	383.78	9866

Inclusion of these tables provides a valuable reference point and will form the basis of consent conditions if the project is approved. The total area of impact and credits should include both the rail alignment and the borrow pits in the one figure.

Recommendation

10.1 Separate tables should be included in the BDAR which clearly summarise the ecosystem and species credits for the entire project, rather than delineating the impacts into IBRA subregions or individual borrow pits.

11. Minor edits are required throughout the BDAR

Many inconsistencies or inaccuracies occur throughout the BDAR that require review and amendment. Many of these have already been discussed with the proponent or are discussed in detail in this submission. Additional matters to be reviewed and addressed include:

1. The area of impact in Table 3 for borrow pit 9 should be 54.8 hectares (not 554.8 hectares), and the total impact area for the project should be 768.65 hectares (not 1268.65 hectares).

2. Table 2.1 (page 13) states that there is no Category 1-exempt land in the subject land as defined by the *Local Land Services Act 2013*. The BDAR should clarify that a categorisation process was not conducted to determine if there is Category 1-exempt land present.

3. The biodiversity offset requirements for the Inland Rail Narrabri to North Star project listed in Table 3.6 are incorrect and should be updated.

4. Section 3.4.3.2 states that separate vegetation zones were required for vegetation that had a vegetation integrity (VI) score of <15 for CEECs and EECs; <17 for PCTs that provide habitat for threatened species or a vulnerable ecological community; or <20 for a PCT that is not a TEC or associated with threatened species habitat. When reviewing the VI scores and vegetation zones in Table 6.1 the zoning does not strictly adhere to this delineation. Either the zones need to be amended or section 3.4.3.2 should state that the VI score thresholds were *considered* when determining vegetation zones.

5. Inconsistencies exist with the dates that the BAM plot surveys were undertaken. Section 3.4.1 states 18-24 June 2019, and section 3.4.4 states 20-21 June 2019.

6. Section 4.2.2 states that Table 4.5 lists 14 PCTs across 27 vegetation types. Table 4.5 lists 30 distinct vegetation zones.

7. In Table 6.2, borrow pits 1 and 2 have species credits listed for Belson's panic, but there is no area of impact listed.

Recommendation

11.1 The proposed edits to the BDAR listed in section 11 of BCS's review should be addressed.

Biodiversity matters already discussed with the proponent and accredited assessors

The following matters have been discussed with the proponent and the accredited assessors and it is understood these items are currently under review. BCS have included these comments to provide additional guidance and for the completeness of our assessment.

12. Removal of ecosystem credit species from the predicted list must be consistent with the assessment requirements of the BAM

A number of species have been removed from the predicted list (ecosystem credits) generated from the BAM calculator (BAM-C). The removal of these species is not consistent with the assessment requirements set out in steps 2 and 3 of chapter 6 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;
    ii. the specific habitat constraint(s) or microhabitat missing from the vegetation zone; **and**
    iii. 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; **or**
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.

The following species do not have habitat constraints or geographic limitations listed in the TBDC and are not considered vagrant and therefore if the assessor proposes to exclude these species adequate justification must be provided in the BDAR as per (b) above;

- Varied sittella (*Daphoenositta chrysoptera*)
- Black-striped wallaby (*Macropus dorsalis*)
- Black-chinned honeyeater (eastern subspecies) (*Melithreptus gularis gularis*)
- Large bent-winged bat (*Miniopterus orianae oceanensis*)
- Blue-billed duck (*Oxyura australis*)
- Koala (*Phascolarctos cinereus*)
- Grey-headed flying-fox (foraging) (*Pteropus poliocephalus*)
- Brown treecreeper (eastern subspecies) (*Climacteris picumnus victoriae*)
- Little lorikeet (*Glossopsitta pusilla*)
- Swift parrot (foraging) (*Lathamus discolour*)
- Pied honeyeater (*Certhionyx variegatus*)
- Little pied bat (*Chalinolobus picatus*)
- Speckled warbler (*Chthonicola sagittata*)

An example of where the justification for removal of a species is not adequate is the koala. Table 4.9 states that the koala has been removed from a number of vegetation zones as *"the species require trees for food and shelter and the low-quality PCTs contain only highly scattered individual or no trees therefore do not provide habitat for the species".* Koalas will move between highly scattered trees, therefore any vegetation zones containing trees should not be removed for this species.

Where habitat constraints or geographic limitations are listed in the TBDC or NSW profile (respectively) and the species has been removed for these reasons the BDAR must adequately demonstrate that the habitat constraints are not present on site or that the area is outside of the geographic limitations of the species. Additionally, the appropriate box must be ticked in the calculator in the habitat suitability tab.

Two species, freckled duck (*Stictonetta naevosa*) and grey falcon (*Falco hypoleucos*), have been removed from the predicted list for all associated vegetation types because they are considered vagrant. BCS note the vagrant box has been ticked in the BAM-C for the removal of these two species, however there is no justification in the BDAR. As per section 6.4.1.14 of the BAM "*the assessor must record in the BAR the reasons for determining that the species is unlikely to occur on the subject land".*

BCS notes that the northern free-tailed bat (*Ozimops lumsdenae*) was recorded during surveys but is not included in the predicted ecosystem species list in Table 4.8. It is also noted that this species has been added to the BAM-C as an ecosystem species for a number of the vegetation zones. BCS agrees with this approach, however any addition of species to the BAM-C should be explained in the BDAR.

Recommendations

12.1 If species have been removed based on the absence of listed habitat constraints the assessor must;

a) Update the BDAR to adequately demonstrate that the habitat constraints are not present on site.

b) Tick the habitat constraint box in the calculator on the habitat suitability tab for that species.

If species have been removed based on the absence of habitat constraints not listed in the TBDC the assessor must provide adequate justification in the BDAR. As a minimum, the justification must include;

a) the specific habitat constraint(s) or microhabitat missing on the subject land; **and**

b) 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

If species have been removed because the site is outside of listed geographic limitations the assessor must;

a) Update the BDAR to adequately demonstrate that the site is outside of the listed geographic limitations.

b) Tick the geographic limitations box in the calculator on the habitat suitability tab for that species.

If species have been removed because they are considered to be vagrant the BDAR must adequately demonstrate why the species has been determined to be vagrant.

12.2 Where species did not appear on the predicted list but have been added to the BAM-C, an explanation as to why the species have been added must be included in the BDAR.

13 Removal of species credit species from the candidate list must be consistent with the assessment requirements of the BAM

A number of 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 chapter 6 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;

   iv. the specific habitat constraint(s) or microhabitat missing on the subject land; **and**

   v. 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 following species do not have habitat constraints or geographic limitations listed in the TBDC and are not considered vagrant and therefore if the assessor proposes to exclude these species adequate justification must be provided in the BDAR (see point *b* above);

- Spiny peppercress (*Lepidium aschersonii*)
- Squatter pigeon (southern subspecies) (*Geophaps scripta scripta*)

The following species have habitat constraints listed in the TBDC and therefore should only be removed from the candidate list if the listed constraints are not present on the subject site or the habitat constraints listed in the TBDC or known microhabitats that the species requires to persist on or use are degraded to the point where the species will no longer be present;

- Black-tailed godwit (*Limosa limosa*)
- Eastern cave bat (*Vespadelus troughtoni*)
- Large bent-winged bat (*Miniopterus orianae oceanensis*)
- Large-eared pied bat (*Chalinobus dwyeri*)
- Masked owl (*Tyto novaehollandiae*)
- Pale imperial hairstreak (*Jalmenus eubulus*)
- Sloane's Froglet (*Crinia sloanei*)

Table 4.11 of the BDAR lists a number of species that have been excluded based on habitat assumptions. It is not clear whether this table is referring to the exclusion of species from the candidate list or the exclusion of vegetation areas from species polygons for those species that have been detected on site or assumed present (there are a number of species, including barking owl (*Ninox connivens*) and black-breasted buzzard (*Hamirostra melanosternon*), in this table that did not generate species credits). If it is the exclusion of species from the candidate list, species credit species cannot be excluded from selected vegetation zones at this stage of the assessment. If there are any areas in the project footprint that may contain suitable habitat for the species it must be retained as a species for further assessment.

Black-tailed godwit

Table 4-11 states the reason for exclusion is '*Habitat Constraints – The species is only known to breed in Europe and Asia'.* This reasoning for exclusion is not adequate; the species credit component for this species is mapped as an important area and it is not based on where the species breeds. BCS agree that this species can be removed as the project are does not fall within the mapped important area for the species, however the BDAR must justify this exclusion correctly.

Eastern cave bat

This species has been excluded in the BAM-C, however there is no justification provided in the BDAR for its removal and it is included in Table 4.12 as a candidate species credit species for further assessment.

There are a number of other species that have been removed from the candidate list in the BAM-C, but no box has been ticked for the reason for removal. The appropriate box must be ticked in the BAM-C in the habitat suitability tab.

Recommendation

13.1 Any species that does not have habitat constraints listed in the TBDC should be retained in the BAM-C as a species for further assessment.

If species have been removed based on the absence of listed habitat constraints the assessor must;

a) Update the BDAR to adequately demonstrate that the habitat constraints are not present on site.

b) Tick the habitat constraint box in the calculator on the habitat suitability tab for that species.

If species have been removed based on the absence of habitat constraints not listed in the TBDC the assessor must provide adequate justification in the BDAR. As a minimum, the justification must include;

a) the specific habitat constraint(s) or microhabitat missing on the subject land; **and**

b) 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

If species have been removed because the site is outside of listed geographic limitations the assessor must;

a) Update the BDAR to adequately demonstrate that the site is outside of the listed geographic limitations.

b) Tick the geographic limitations box in the BAM-C on the habitat suitability tab for that species.

If species have been removed because 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 the assessor must;

a) Update the BDAR to adequately demonstrate that the habitat constraints or known microhabitats are degraded to the point that the species would no longer be present on the subject site.

b) Tick the habitat degraded box in the BAM-C on the habitat suitability tab for that species.

14 Inconsistencies exist between the BOAMs plot data (excel spreadsheet), the field data sheets and data in the BAM-C

There are inconsistencies between the plot data provided in BOAMs (excel spreadsheet), the field data sheets and the data that has been entered in the BAM-C, as discussed with the proponent and the accredited assessors on 10 September 2020. The data provided in the BDAR and field data sheets must be consistent with the data entered into the BAM-C as any errors in the BAM-C can have an impact on the final credit liability for the project. BCS provided the proponent with a spreadsheet highlighting these inconsistencies on 13 September 2020. BCS understands that this information is being investigated and corrected by the proponent and their accredited assessors.

Recommendation

14.1 Ensure that the correct data set is entered in the BAM-C and that it reflects the field data sheets and data provided in the BDAR.

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

From reviewing the plot data provided in BOAMs (excel spreadsheet) and the field data sheets it has been identified that there are some vegetation plots that have not been included in the BAM-C. These plots have been identified in the spreadsheet provided to the proponent and the accredited assessors on 13 September 2020. Minimum plot numbers have been met for all vegetation zones, however 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, are affected by drought conditions, or for any other reason, this should be clearly justified in the BDAR.

Recommendation

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

16 Inconsistent approach to recording the presence of hollow bearing trees

There is an inconsistent approach to how hollow bearing trees (HBTs) have been recorded and entered in the BAM-C. Some of the data sheets (eg Plot ID CB36MS1) have recorded the presence of HBT's by writing "yes" in the field data sheets in the HBT column in each of the size classes in which they occurred, however there is no number to indicate how many of the trees in the size class are hollow bearing. It is unclear where the numbers for some plots entered in the BAM-C have come from as relevant information does not exist in the field data sheets. The number of HBT's for each plot must be entered in the BAM-C (page 27, BAM Operational Manual Stage 1).

Recommendation

16.1 Where no numbers of hollow bearing trees have been recorded in the field data sheet, clarification is required on where the number in the BAM-C has come from.

17 Litter scores have been incorrectly calculated

There are some plots where the litter function score has been calculated incorrectly. Most of the errors appear to be in plots that have been completed in the borrow pit areas. BCS have identified a sample of plots where this score is incorrect, and this was provided to the proponent and the accredited assessors on 13 September 2020.

The average of the litter cover from the five sub-plots (BCS understands only four were taken in some plots) must be calculated to generate the average percentage litter cover for the entire plot, which is entered into the BAM-C (page 27, BAM Operational Manual Stage 1).

Recommendation

17.1 All litter function scores need to be reviewed to ensure they have been calculated correctly. Any that are incorrect need to be updated in the BAM-C.

18 Function scores have not been entered in the BAM-C for some plots

Some plots have no function condition score data entered in the BAM-C apart from the High Threat Exotic (HTE) values. These plots have been identified in the spreadsheet provided to the proponent and the accredited assessors on 13 September 2020 BCS.

Recommendation

18.1 Function condition score data must be entered in the BAM-C for the identified plots.

19 Some plots have been used for two different vegetation zones across two PCTs

There are three plots (plot IDs CB628LS2, CB628LS3 and CB628LS4) that have been entered in the BAM-C for two vegetation zones across two different PCTs. The vegetation zones are 628_CB_Low in assessment 14394 and 247_CB_Low in assessment 14394. The same plots cannot be used for two different vegetation zones particularly across two PCT's. Confirmation must be provided on which vegetation zone these plots are consistent with, and the minimum number of plots for the other vegetation zone must be appropriately met.

Recommendation

19.1 The vegetation zone the plots CB628LS2, CB628LS3 and CB628LS4 are consistent with must be confirmed, and the minimum number of plots for the other vegetation zone must be appropriately met.

20 Adequate justification must be provided for duplicating plots

There are some plots that have been duplicated potentially to make up the minimum plot numbers. While this approach is acceptable in some circumstances, justification must be provided in the BDAR as to why this method has been used. Plots that have been duplicated have been identified in the spreadsheet provided to the proponent and the accredited assessors on 13 September 2020. A specific example is provided below.

Example – assessment 14244, vegetation zone 35_NB_Low. Plot 2 has been duplicated to give plot 3 values, however there appears to be an additional plot (with the same plot ID, see table below) that has been collected and not used. The plot that has not been used appears to have values that are closer to PCT35's benchmark then the plot that has been duplicated.

Plot Name	Composition Data						Structure Data						BCS Comments
NB35LS1	1	5	4	9	0	1	0.2	30.2	0.4	1.3	0	0.1	Entered in BAM-C as Plot 2 and duplicated to create Plot 3 values
NB35LS1	1	8	5	12	0	3	25	7.6	4.3	22.5	0	0.4	Not entered in BAM-C, no field data sheet provided.

Where plots have been duplicated to make up minimum plot numbers justification must be provided in the BDAR as to why this was the most appropriate method for the zone. Where enough plots exist for a vegetation zone, but plots have been duplicated instead of using all collected plots, adequate justification must be provided as to why the discarded plots were not representative of the site and why duplicating plots was more appropriate. Additionally, adequate justification must be provided for the selection of the plot to be duplicated.

Recommendation

20.1 Justify why plots have been duplicated, including why those plots were chosen for duplication, and why duplication was used rather than benchmark. Tables 4.6 and 4.7 could be updated to state which vegetation zones required duplicated plots.

21 Plot names have been duplicated but data is different

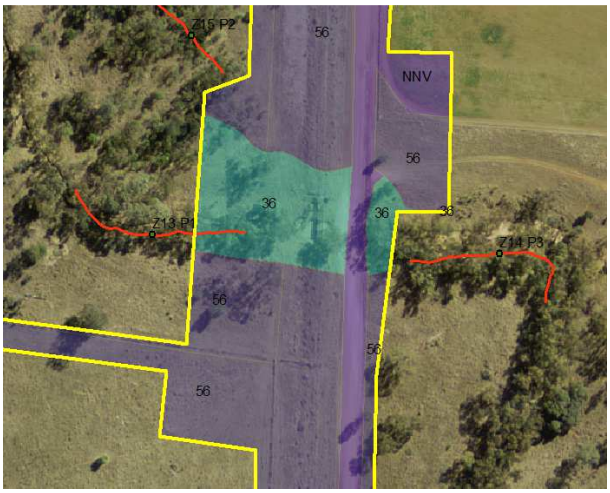
As per the example above there are some instances where the same plot name has been used but the data is different and in most instances only one of the two have been entered into the BAM-C. Additional examples where this has occurred are Plot IDs CB244LS1, CB244MS1, CB244MS2 and CB56LS3. In addition to the comments above an explanation is required to clarify why multiple sets of data exist for the same plot ID. BCS has reviewed the spatial data provided for plot locations and it is not always clear where the additional plots with the same Plot ID are located.

Recommendation

21.1 Explain why there are multiple sets of data for the same Plot ID.

22 Placement and shape of transects is not consistent with the BAM

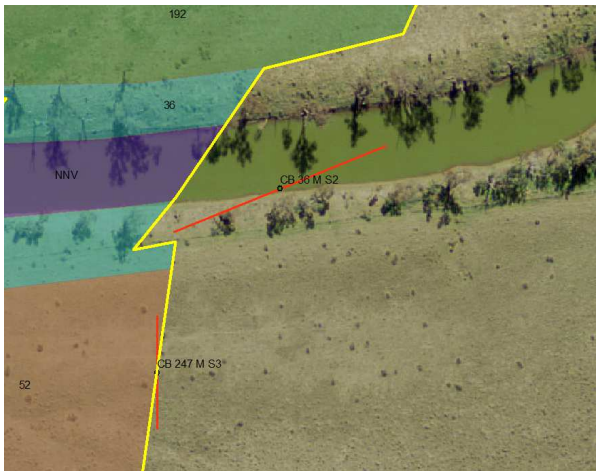
There are some plots where the transect does not follow a straight line. As per section 5.3.4.4 of the BAM, plots/transects must be established to provide a representative assessment of the vegetation integrity of the vegetation zone, accounting for the level of variation in the broad condition state of the vegetation zone. In the examples below the transect does not follow a straight line but instead appears to follow the denser woody vegetation present on site. This is not an acceptable approach to establishing a vegetation integrity survey plot.



Example 1: Plots Z13 P1 and Z14 P3

Example 2: Plot Z14 P1

There are some plots that have not been appropriately placed to provide a representative assessment of the vegetation integrity of the vegetation zone. As per section 5.3.4.6 of the BAM plots should not be located in or near ecotones, vehicle tracks and their edges, or other disturbed areas that are readily distinguishable from the broad condition state of the vegetation zone. Examples are provided below where transects appear to cross into rivers and across roads.



Example 1: Plot CB36MS2

Example 2: Plot NB35LS1

Recommendation

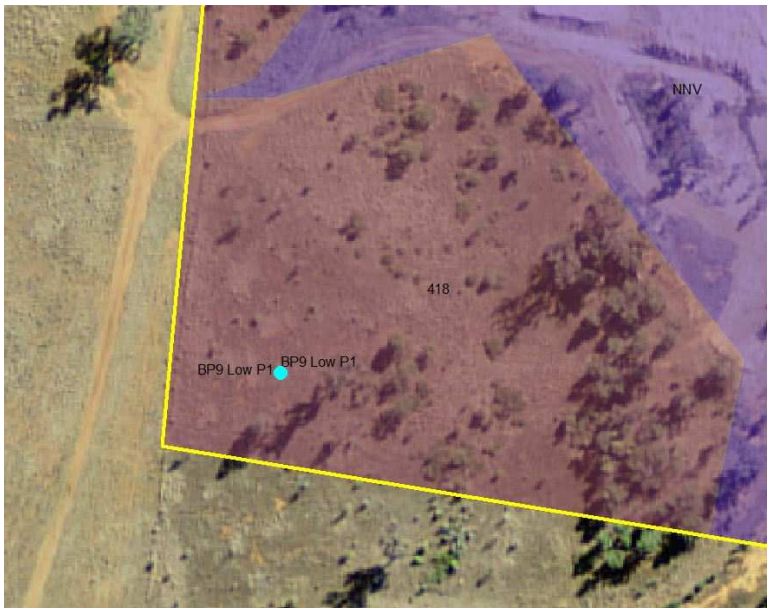
22.1 The location of all plots should be reviewed to ensure that they conform to BAM. Where relevant, justification should be included in the BDAR to explain the selection of transect locations.

23 Poor alignment of field data information with the BAM-C may be affecting VI scores

There are some vegetation zones that have much lower vegetation integrity (VI) scores than what would be expected. BCS have identified some issues that may be affecting the VI scores for these vegetation zones.

Vegetation zone 55_NB_high has two plots completed (Z5P1 and Z5P2) and entered in the BAM-C, however the field data sheet for plot Z5P2 cannot be found. The data entered in the BAM-C for plot Z5P1 does not appear to match the information on the field data sheet, for example the BAM-C states there is no shrub layer or ground layer, but the field data sheet contains multiple ground layer species and three shrub species. No tree species have been included on the field data sheet, but one has been entered in BAM-C, and the aerial imagery of the site shows trees to be present. Entering incorrect data in the BAM-C can have an impact on the final credit obligation.

The plot data that has been entered in the BAM-C for vegetation zone BP_418_Low appears to align with the data collected at Plot ID BP1LowP1. The location of this plot has been reviewed against aerial imagery and there appears to be a greater density of trees to the east of this plot location. Placing the plot further to the east would create a different VI score for this zone (see image below). It is acknowledged that the age of the aerial imagery used to complete this review may not accurately reflect what is currently on site.



Example 1: Plot ID BP1LowP1

Additionally, it is noted that two vegetation zones (55_NB_High and BP25_35_High) have VI scores of 26 and 30.6 respectively. While the naming convention of vegetation zones does not impact on the credit obligation it should accurately reflect the vegetation condition and a VI score of 26 or 30.6 would not be considered high condition vegetation.

Recommendation

23.1 Information entered in the BAM for plots Z5P1 and Z5P2 should be reviewed, and the validity of using plot BP1LowP1 should be reviewed.

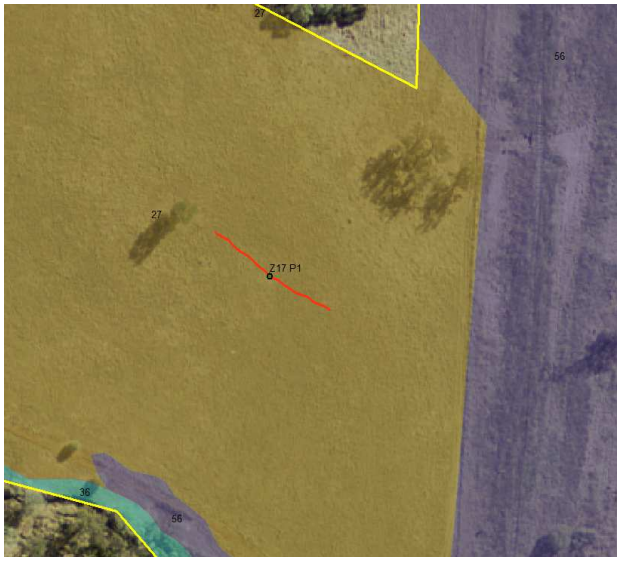
24 Vegetation mapping is inconsistent with PCT identification in plots

The spatial layers provided to BCS have been reviewed against the BDAR and a number of areas have been identified where the PCT identified from the plot data is inconsistent with the PCT that has been mapped.

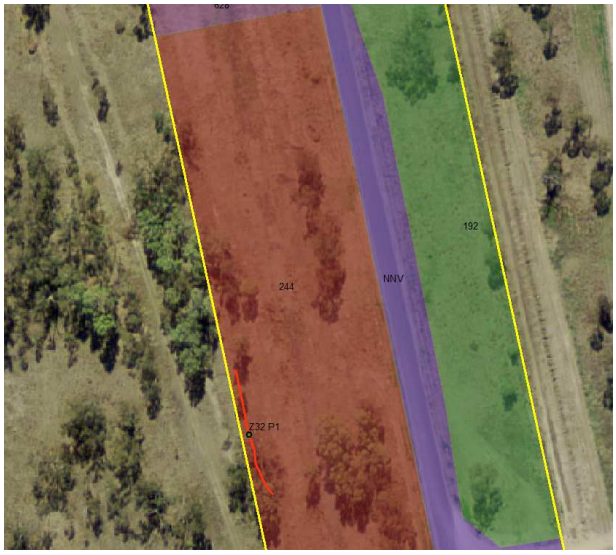
Example 1 – Plot ID Z17P1 has been identified as PCT56 and entered in the calculator for vegetation zone 56_NO_Low, however the PCT mapping shows the plot is located in an area mapped as PCT 27 Low.

Example 2 - Plot ID Z32P1 has been identified as PCT628 and entered in the BAM-C for vegetation zone 628_CB_Medium, however the PCT mapping shows that the plot is located in an area mapped as PCT 244 Medium.

All data must be reviewed, and the mapping must accurately represent the vegetation on site.



Example 1: Plot ID Z17P1



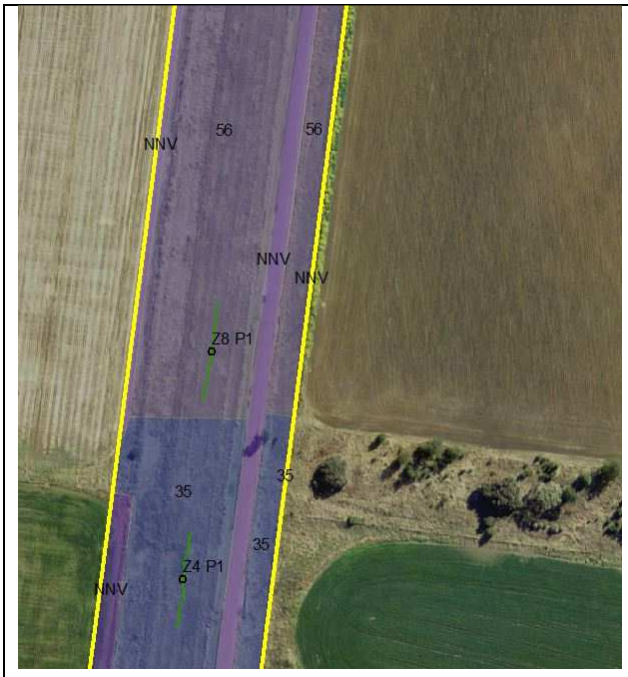
Example 2: Plot ID Z32P1

Recommendation

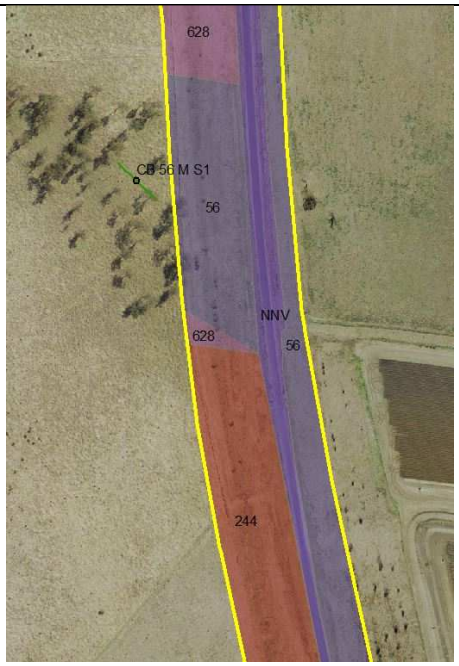
24.1 Review vegetation mapping to ensure that it correctly reflects the plot data collected.

25 Delineation of vegetation zones in the mapping does not align with aerial imagery

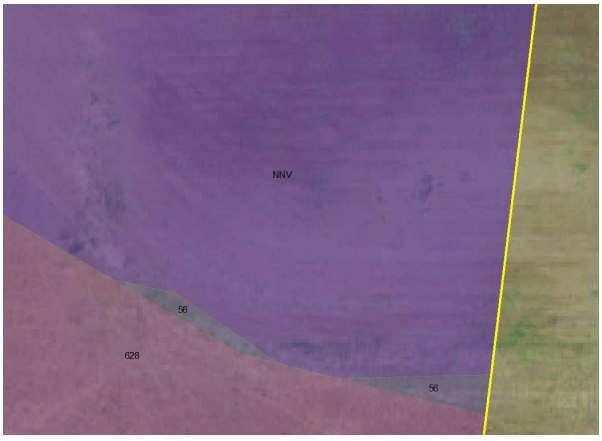
A review of the NS2B PCT spatial layer against ADS40 aerial imagery indicates that the delineation of vegetation zones does not always align with the on-ground vegetation condition. BCS would like to review the vegetation mapping against ARTC's aerial imagery to enable a more accurate assessment. This imagery has been requested by BCS but unfortunately could not be provided during the EIS exhibition period. Below are examples where BCS questions the delineation of vegetation zones, and these sites would form part of a detailed mapping review.



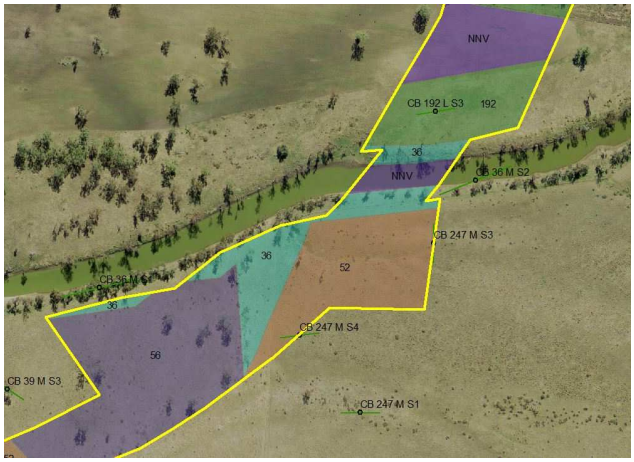
Example 1: The delineation between PCT35 and PCT56 requires review.



Example 2: It is not clear why the sliver of PCT628 exists between PCT244 and PCT56.



Example 3: It is not clear why the slivers of PCT56 occur between PCT628 and NNV.



Example 4: It is not clear how the boundaries of PCT56, PCT36 and PCT52 have been allocated.

Recommendation

25.1 BCS will undertake a review of the vegetation mapping and allocation of vegetation zones against aerial imagery to be provided by ARTC.

26 Including discarded railway timber as fallen logs is not required

Plot CB244LS1 has recorded 20 metres of fallen logs however there is a note on the field datasheet indicating that these logs are discarded railway timber. Inclusion of the discarded timber

as fallen logs is at the accredited assessor's discretion and it should reflect whether the timber is providing habitat.

Recommendation

26.1 Inclusion of discarded railway sleepers as fallen logs in Plot CB244LS1 is at the accredited assessor's discretion, but it is not mandatory.

Matters of National Environmental Significance

27 The assessment of Matters of National Environmental Significance (MNES) is complex and the outcomes are unclear

Identification of TECs

Appendix C provides some description regarding the key diagnostic characteristics of the TECs and whether the vegetation within the project footprint aligns with these thresholds. However, the table in the appendix does not provide the area of each TEC that is considered present. Similarly, Table 7.1 in the BDAR provides a very brief summary of the analogous PCTs that relate to the TECs that are predicted to occur, but the information is different to that in Appendix C, and again no area is stated for each TEC.

Section 3.4.5 of the BDAR states that given the drought conditions that were experienced during the field surveys, it has been assumed that all of PCT 52 meets the criteria for the Natural grasslands TEC until a further detailed assessment can be completed in non-drought conditions. This conservative approach is supported. However, it is not clear why the high condition vegetation zones for PCT 35 are considered to be part of this TEC, as described in the table in Appendix C (page 2).

The assessment for the Poplar box grassy woodland TEC in Appendix C states that condition thresholds have not yet been assessed. It is not clear whether both PCT56 and PCT244 conform to the TEC, and which condition classes meet the TEC criteria.

The assessment of the Semi-evergreen vine thicket TEC in Appendix C should refer to PCT 147 rather than PCT417 (page 10).

Survey techniques and effort

Section 3.4.6 of the BDAR states that Commonwealth Threatened Species Survey and Assessment Guidelines were considered when undertaking surveys. The species surveyed in October 2019 are listed in Table 3.11 in the BDAR, but this does not include all the MNES that have the potential to occur on the project footprint. There is no discussion provided on whether targeted surveys have been completed for all potential MNES, particularly those species that are not listed under the BC Act.

Predictive modelling

Section 7 of the BDAR states that two stages in the modelling process were undertaken:

- Predictive habitat and TEC modelling
- Adverse Impacts Assessment Methodology (AIAM) – used following initial assessment of impacts from the proposal, to identify where the proposal will have a likely significant residual adverse impact "*upon EPBC Act listed species that are not BC Act listed species"* (section 7.1 of the BDAR). This is not strictly correct as the model was applied to all EPBC Act species and TECs, not just species not listed under the BC Act.

Predictive habitat modelling delineates core, essential, general or unlikely habitat. Section 7.1.1.2 of the BDAR states that a highly conservative methodology was employed, and where doubt existed habitat was included rather than excluded. This raises concern that potential habitat is likely over-estimated, and therefore the impact of the proposal on habitat in the "context area" (12,783 hectares as stated in Table 7.13) will be under-estimated. This also means that the magnitude of disturbance (described in Table 7.2 with results in Table 7.13) may be under-estimated. No discussion was presented regarding how the predictive habitat modelling compares to the BAM in terms of breeding or foraging habitat delineation.

Appendix I also discusses the predictive habitat modelling methodology. It states that six flora species (Table 2.1), 17 fauna species (Table 2.2) and six TECs (Table 2.3) are identified as occurring or potentially occurring in the subject land. Tables 2.1, 2.2 and 2.3 do not include two entities identified by DAWE as potentially being impacted by the controlled action or identified in database searches undertaken by the proponent including adorned delma (*Delma torquata*) and winged peppercress (*Lepidium monoplocoides*). There is no explanation as to why these species are considered not to occur in the project area.

Section 7.2.2 states that the squatter pigeon (*Geophaps scripta* scripta) was considered unlikely to occur as the study area is outside of the current known distribution of the species. No specific information was provided.

Significant Impact Assessment Methodology (SIAM)

Section 7.1.2 of the BDAR states that an initial significant impact assessment was undertaken based on the magnitude of impacts and the sensitivity of entities. Table 7.5 displays the sensitivity assessment matrix.

Table 7.12 indicates that all species and TECs listed in Tables 2.1-2.3 in Appendix I were considered to have high sensitivity, except for the white-throated needletail (*Hirundapus caudacutus*) because of its aerial nature.

Table 7.13 presents an estimation of the potential magnitude of disturbance for each entity. It is unclear what is meant by the "total unmitigated potential disturbance area" in the subject land, given this area is 700 hectares. This area does not equate to the project footprint (1,269 ha) or even the native vegetation extent (522 ha). Further explanation regarding this area is required.

Following the calculation of significance for the initial mitigation scenario (as per Table 5.2 – locating the proposal in the existing rail corridor, rail corridor 40 metres in width, fauna fencing, etc) further mitigation measures (as included in Table 5.3 – development of biodiversity management plan, fauna passage measures, weed and pest management, etc) were applied and the significance was reassessed (Table 7.14). Each entity with a residual significance of moderate or greater in Table 7.14 was considered to be significantly impacted under the SIAM assessment, and was then further assessed under the AIAM process. The BDAR does not explain how the application of additional mitigation measures can reduce the area of impact to MNES.

Adverse Impact Assessment Methodology (AIAM)

No five-part test of significance was undertaken to assess the impacts to MNES, but all elements of the Commonwealth significant impact guidelines were incorporated into the AIAM.

AIAM uses five factors to assess potential impacts that may result in a significant residual adverse impact – habitat suitability, habitat resilience, species resilience, landscape attributes and disturbance nature. Table 2.8 in Appendix J assigns a habitat resilience rating to each PCT based on the information in Table 2.9 of the appendix (that is, a natural regeneration period of 0-5 years indicates high habitat resilience, and a natural regeneration period of 31 years or more indicates a low habitat resilience). It is not clear why PCTs 55, 56, 98,147,192, 244, 418 and 628 are

considered to have a high habitat resilience rating given it takes 100+ years for these PCTs to mature. Further explanation is required.

Table 7.15 in the BDAR presents the area of disturbance that constitutes a significant adverse residual impact upon habitat for MNES. It is not clear why Table 7.15 does not align with Table 3.1 in Appendix J (as described further below) which appears to display the same information. Furthermore, the impacted areas for some entities are different in Table 3.1 Appendix J compared to Table 3.2 Appendix J. It is the areas of impact listed in Table 3.2 Appendix J that are re-produced in section 10 of the BDAR highlighting the entities with the greatest potential impacts.

Entity	Significant residual impact as per Table 7.15 BDAR (ha)	Significant residual impact as per Table 3.1 Appendix J (ha)
Weeping myall woodlands	Not listed	0.03
Tylophora linearis	47.37	44.23
Grey-headed flying fox (*Pteropus poliocephalus*)	263.93	271.37
Belson's panic (*Homopholis belsonii*)	346.62	203.51
Koala (*Phascolarctos cinereus*)	285.47	297.39
Painted honeyeater (*Grantiella picta*)	292.73	295.18
Slender Darling pea (*Swainsona murrayana*)	280.76	211.77
White-throated needletail (*Hirundapus caudacutus*)	Not listed	453.32

*Table 3.2 goes on to state that it is considered to be an aerial forager and will not be subject to impacts from the project.

Furthermore, Table 6.7 in the BDAR describes the impact area for each MNES (which does not align with species listed in Table 7.15 of the BDAR or Table 3.1 Appendix J) as determined under BAM, and the associated like-for-like offsets. The potential area of impact to MNES listed in this table does not match areas in the aforementioned tables (that is, Table 7.15 of the BDAR of Table 3.1 of Appendix J).

According to the Executive Summary of the BDAR, impact assessment under SIAM identified significant impacts on four terrestrial fauna species – curlew sandpiper (*Calidris ferruginea*), Dunmall's snake (*Furina dunmalli*), red goshawk (*Erythrotriorchis radiatus*), and spot-tailed quoll (*Dasyurus maculatus*). This conclusion is not discussed elsewhere in the BDAR and it is not clear why other entities are not listed here. Elsewhere in the BDAR it is stated that impacts with a significance level of high or major following AIAM were considered to constitute a significant residual impact. The lack of discussion regarding which MNES are considered to be significantly impacted must be addressed.

Comparison of BAM impacts with AIAM impacts

The area of significant residual impact (hectares) for each entity (that is, the area of significant impact that remains after mitigation measures have been implemented) does not align with the area of impact identified under BAM. It would be beneficial for the BDAR to discuss and contextual these differences. These differences can vary markedly – the BAM identifies 0.72 ha of impact to the koala (which requires review as per recommendation 1.3 of this review) but the AIAM identifies 297.39 ha residual significant impact. Conversely, the BAM identifies up to 230 hectares of impacts to Poplar box grassy woodland TEC, but the AIAM identifies 119 hectares of residual impact.

Offsets for MNES

Section 7.5.1 of the BDAR states that offsets will be required to compensate for the significant adverse residual impacts on MNES as a result of the proposal, and a majority of the TECs and threatened species may be offset under BAM. However, there is no further discussion quantifying these offsets, which is concerning given the residual impact calculated for the MNES does not align with the area of impact calculated by BAM. The SEARs for the proposal clearly state that each EPBC Act-listed entity likely to be significantly impacted must be identified and information must be provided on "*the proposed offset strategy, including discussion of the conservation benefit, how offsets will be secured, and timing of protection*". This is not addressed in the BDAR.

There are three species assessed that are not listed under the BC Act – curlew sandpiper, Dunmall's snake and white-throated needletail. The white-throated needletail is not considered in the significance assessment given it is an aerial species. No discussion has been included as to how impacts to the curlew sandpiper and Dunmall's snake should be offset.

Recommendation

27.1 It is proposed that BCS and DAWE meet with the proponent to discuss the assessment that was undertaken for MNES, how this relates to BAM, whether the outcomes are acceptable and how residual impacts should be offset. Matters that need to be addressed in future discussions include (but are not limited to):

a. Explanation of what PCTs and vegetation zones constitute each TEC and what the total area is.

b. Confirmation on whether MNES not listed under the BC Act have been the subject of targeted surveys, and if so, what the outcome is.

c. Explanation of how the "total unmitigated potential disturbance area" of 700 hectares was calculated in Table 7.13.

d. Confirmation of which MNES are considered to be significantly impacted by the proposal.

e. Describe how the implementation of additional mitigation measures can reduce the area of impact to MNES, as applied in the SIAM.

f. Discuss the differences in impact areas calculated through the BAM and the AIAM.

g. Describe which MNES require offsetting, what the proposed offset strategy is and the timing of protection.

References

OEH (2016) *NSW Guide to Surveying Threatened Plants*. Office of Environment and Heritage, Sydney.

OEH (2018a) *A review of koala tree use across New South Wales*. Office of Environment and Heritage, Sydney

OEH (2018b) *Biodiversity Assessment Method Operational Manual – Stage 1,* Office of Environment and Heritage, Sydney

OEH (2019) *Biodiversity Assessment Method Operational Manual – Stage 2*, Office of Environment and Heritage, Sydney

Flooding and Hydrology

It should be noted that this is a high-level review of the EIS, and BCS is committed to undertaking an iterative review approach to address the matters identified in this response. Following the outcomes of upcoming discussions with ARTC and the Planning and Assessment Group, BCS may undertake a more detailed review of certain components and provide relevant feedback.

28 The 1% AEP design flows are significantly different and lower than the 1976 flood (approx. 0.5% AEP)

The independent review has made comment on the difference between the 1% AEP design flow and the 1976 flood, and recommended joint probability analysis at the detailed design phase. The magnitude of the design flood is critical in the analysis and impact of the proposal on flood behaviour. Given the significant difference in flows, with the adopted design flows (1%) being lower than the *Floodplain Management Plan for the Border Rivers Valley Floodplain 2020* (BRFMP) which uses the 1976 flood, the consequences of inconsistencies in assessment and approval mechanisms should be resolved before detailed design. There also appears to be community concern regarding the flood impact and analysis which strengthens the need for a robust approach. The 1% design flood magnitude is also inconsistent with historical analysis of the flood frequency and the flood frequency analysis undertaken for the EIS. The assessment of the 1976 flow focused on afflux and did not include velocity or flow distribution which are also criteria used to assess the impact of flooding

Recommendation

28.1 Further analysis or justification should be undertaken to ratify the 1% design flood magnitude especially in relation to the current design flood of 1976. This will include a revision of the Flood Frequency Analysis including the assumptions and data used to undertake this analysis. The findings of this study differ compare to previous studies and this needs to be fully understood. The sensitivity analysis of the 1976 flood should include the impact on velocities and flow distribution.

29 The flood impact objectives require more explanation

The flood impact objectives have been tabled (Table 13.7 Flood Impact Objectives) however no justification regarding the development of these objectives was apparent. Further justification describing how the objectives were developed will assist in understanding the applicability of these objectives to the project.

Recommendation

29.1 Additional justification supporting the flood impact objectives is required.

30 Impacts to wetlands and flood-dependent ecosystems identified in the BRFMP should be assessed across a range of floods

Table 13.33 has identified Management Zone D areas in the vicinity of the proposal. Potential impacts to any wetlands and flood-dependent ecosystems identified in the BRFMP (e.g. Management Zone D) which include all those that may be impacted by changes in flow behaviour downstream of the proposal should be assessed over a range of floods. This is especially important for the small floods or low flows as these flows are crucial to maintaining the ongoing character of the ecosystems. The flooding characteristics at the full range of floods therefore need to be considered.

Recommendation

30.1 Further assessment should be provided on the potential impacts to downstream flood-dependant ecosystems across a range of floods, especially frequent flood events.

31 The significance of increased time of submergence on local roads is unclear

There appears to be some roads that have extensive time of submergence. Some roads may be more critical than others regarding the need for access, and additional flooding, including more frequent floods, need to be considered. The State Emergency Service (SES) should be consulted regarding this issue.

Recommendation

31.1 The SES should be approached to determine which roads in the impact area are critical for access, and if additional submergence times identified in the EIS will compound issues on already flooded roads.

32 Impact on the North Star Sporting Club is unclear

Under the 20% AEP peak water levels will increase by up to 80 mm. It is not clear from Section 13.8.3.2 how this will impact on the club, and whether it will be over the floor level of any buildings or critical infrastructure.

Recommendation

32.1 Additional narrative is required on how the afflux will impact on the North Star Sporting Club.

33 Hydraulic modelling should compare undeveloped, existing and developed floodplain conditions

To ensure the cumulative impact of the proposal is considered, the hydraulic modelling needs to compare the undeveloped floodplain scenario to existing and developed floodplain conditions. The flow distribution especially in the vicinity of Boggabilla and Goondiwindi for the undeveloped condition can therefore be compared to the fully developed conditions which includes the proposal. This is a criterion in the BRFMP and is important to fully assess the cumulative impact of any proposal which can impact on the flood behaviour. The 2011 flood also raised concern as to the adequacy of the Goondiwindi town levee and the impact to rural levees. If future modifications to the surrounding rural infrastructure are required then an understanding of any changes in flow distribution downstream of the rail alignment is required to inform these modifications.

Recommendation

33.1 Additional evidence of the cumulative impact of the proposal compared to undeveloped floodplain scenarios is required.

34 Potential high velocities are being encountered

The EIS notes in Section 13.8.2.10 that the allowable velocities exceed the limits defined in Table 13.35, however existing velocities have not been increased. If the areas where existing velocities exceed the allowable limits and the watercourses show signs of instability, then the existing velocities are already exceeding safe limits for erosion and mitigating measures will be required. These existing velocities, therefore, cannot be used as the acceptable limits.

It is also noted that for areas outside the BRMP, the *Guide to Road Design* (Austroads 2013) (AGRD) standards are used. Given there is significant divergence between the allowable velocities (BRFMP and AGRD), and the soil types would not be expected to alter substantially between these areas, then using higher velocity criteria in these areas could be problematic.

If during detailed design, high velocities are encountered and scour protection is not possible with either engineering design solutions or agreement with the impacted landholder, alternate mitigation measures or approaches must be clearly articulated.

Recommendations

34.1 Additional discussions and evidence regarding erosive velocities are required to justify the adopted approach. If there are signs of current erosion in areas identified as exceeding the threshold then accepting no increase in existing velocities may not be acceptable and an alternative approach proposed.

34.2 An alternate approach to mitigation measures for high velocities should be proposed if engineering solutions or landholder agreement is not feasible.

35 General comments

The following general comments are provided for consideration:

a. Section 13.4.3.3 – confirm whether the original DEM was 10mx10m or 5mx5m.

b. Section 8.1.8 - there appears to be poor correlation of the FFA curve with stream gauging results. Also, the analysis uses GEV while Boggabilla and Goondiwindi uses LPIII.

c. Table 8.9 – justify why the Tuflow factored flows are not matched with the FFA.

d. The design provides flood immunity for a 1% AEP flood at formation level. The worse-case scenario will be when the railway line overtops, which is track level. Some narrative should be provided as to when this is envisaged to occur.

e. Figure A22 – clarify whether a reduction in flood levels will occur downstream of the removed railway line, and if so why this would happen.

Recommendation

35.1 Review the list of general comments and update the EIS accordingly.