

COPPABELLA
Wind Farm

Response to biodiversity and heritage submissions

COPPABELLA WIND FARM MODIFICATION APPLICATION



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ACRONYMS AND ABBREVIATIONS

BC Act	<i>Biodiversity Conservation Act 2016 (NSW)</i>
Cwth	Commonwealth
DECCW	Refer to OEH
DPE	(NSW) Department of Planning and Environment
EEC	Endangered ecological community – as defined under relevant law applying to the proposal
EIA	Environmental impact assessment
EPBC Act	<i>Environmental Protection and Biodiversity Conservation Act 1999 (Cwth)</i>
EP&A Act	<i>Environmental Planning and Assessment Act 1979 (NSW)</i>
FBA	NSW Framework for Biodiversity Assessment
ha	hectares
km	kilometres
m	Metres
MAEAR	Modification Application Environmental Assessment Report
NSW	New South Wales
OEH	(NSW) Office of Environment and Heritage, formerly Department of Environment, Climate Change and Water
sp/spp	Species/multiple species
TSC Act	<i>Threatened Species Conservation Act 1995 (NSW)</i>

1 BACKGROUND

The Coppabella Wind Farm (CWF) Modification Application was submitted in September 2017 (MAEAR, NGH Environmental 2017). It followed the granting of development consent in March 2016, acquisition of the project from Epuron by Goldwind, further investigative and environmental studies and review of feasible project options and their viability. With respect to biodiversity and heritage impacts, the key modifications related to an expanded construction footprint and taller wind turbines. The expanded footprint for roads, hardstands and cable routes, based on realistic civil designs in the context of steep terrain and larger turbines, has increased the area of clearing required for the project

The NSW Office of Environment and Heritage (OEH) provided submissions in response to the CWF Modification Application. In their initial submission, OEH requested a site visit to inspect and discuss vegetation mapping on the site. A site visit was conducted on the 15 January 2018 attended by staff from Goldwind Australia, NGH Environmental and OEH. A second letter was issued by OEH to Department of Planning and Environment (DPE) on 25 January 2018 documenting the outcomes of the site visit.

After DPE's consideration of the matters raised by OEH, DPE directed Goldwind (DPE via email 31 January 2018, Appendix A) to provide the following additional information to supplement the biodiversity and Aboriginal heritage assessments in the Coppabella Wind Farm Environmental Assessment for Modification One. These matters (1-8, below) form the scope of this response to OEH biodiversity and heritage submissions.

Table 1-1 Scope of response to DPE request and OEH biodiversity and heritage submissions

Matter:	This document:
1. Framework for Biodiversity Assessment (FBA)	Section 2 and 10
a. update the biodiversity assessment to meet the requirements of the FBA, as agreed by representatives of NGH Environmental, Goldwind and OEH at the site visit on 15 January 2018.	
2. Vegetation mapping	Section 3.1
a. update vegetation mapping in accordance with OEH's advice; and	
b. consider and address OEH's comments regarding the potential relocation of infrastructure away from areas of Box Gum Woodland EEC in moderate to good condition.	
3. Threatened species surveys	Section 4.1
a. provide clarification regarding additional surveys undertaken and threatened species considered (as per comments dated 28 November 2017); and	
b. consider and address OEH's comments regarding the Golden Sun Moth (as per comments dated 28 November 2017).	Section 4.2
4. Hollow bearing trees	Section 5.1
a. confirm which, and to what extent, species would be impacted by the removal of hollow-bearing trees; and	
b. consider and address OEH's comments regarding the potential relocation of infrastructure away from areas with large numbers of hollow bearing trees.	Section 5.2
5. Offsets	Section 6
a. recalculate offset requirements based on updated vegetation mapping in accordance with OEH's advice.	
6. Bird and bat strike	Section 7

Matter:	This document:
a. clarify the incremental change to the impacts to birds and bats from the increased rotor swept area (RSA) of the proposed modified turbines.	
7. Aboriginal cultural heritage	Section 8
a. confirm the extent of the additional Aboriginal cultural heritage assessment that was undertaken for the modified development footprint, including the location of additional survey transects.	
8. Whitefield's Road	Section 9
a. confirm that the project as modified would not result in any impacts additional to those of the project as approved along Whitefield's Road, including impacts to vegetation, hollow bearing trees and aboriginal heritage items.	

The information provided below and in the appended documentation addresses these requirements.

2 APPROACH - FRAMEWORK FOR BIODIVERSITY ASSESSMENT

In their 23 October 2017 submission OEH state:

3. The modification does not fully comply with the NSW Framework for Biodiversity Assessment (FBA)

OEH had the understanding, that the FBA would apply for this modification. Although some components roughly follow the FBA, important components have been omitted. Considering the substantial increase of impacts with this modification, the FBA should be followed, which is likely to result in an increase of survey effort.

Components that OEH considers are omitted are (compared to the reporting requirements for a FBA project are listed in Appendix 7 of the FBA):

- a) A full threatened species assessment; identifying the ecosystem and species credit species which are aligned with each plant community type (PCT), i.e. the candidate species list. This should then include an assessment as to whether surveys are required based on habitat features, and a justification for inclusions and exclusions. Species polygons also need to be provided for species that cannot withstand a loss (chapter 6 of FBA). The EA only briefly assesses the impacts to the regent honeyeater, superb parrot and golden sun moth.*
- b) It is not sufficient for the EA to state that the proponent is minimising and avoiding impacts of a project (as per table 8-3 in the EA), when the impacts of the proposal are increasing 4-fold for native vegetation and 3-fold for Box Gum Woodland endangered ecological community (EEC). As a second example, there will be an increase in the number of hollow-bearing trees to be impacted on, particularly around certain turbines. However, those higher risk turbines have not been moved or removed to minimise impacts.*
The EA needs to convincingly demonstrate the efforts to avoid and minimise impacts on biodiversity values in accordance with Section 8.3 of the FBA. The EA should also include a statement of onsite measures proposed to avoid and minimise direct and indirect impacts of the project.
- c) All impacts to EEC vegetation must be offset in line with section 9.4.1.1, even if they are below a site score of <17. This means:*
 - o the 95 ha of 'Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion – Low condition' will need to be offset.*

- o The 141.83 ha of 'Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion – Moderate to good (low diversity)' will need to be offset.
 - o Additionally, if the 14.63 ha of 'Long-leaved Box Dry Grass Forest Derived grassland' is predicted to provide habitat for threatened species, it will also need to be offset.
- d) The EA must also respond to section 9.2 of the FBA, which are 'impacts on biodiversity that require further consideration'. These are impacts that are considered to be complicated or severe. A decision will be made by the consent authority on whether it is appropriate for these impacts to occur.

The FBA has been followed to address the expanded construction footprint for the modified development. The required reporting format of the FBA (a Biodiversity Assessment Report, BDAR) has not been produced. In a meeting of 6/7/17, OEH deferred to DPE on whether full FBA reporting (a BDAR) was required. DPE accepted NGH Environmental's proposed approach to provide a chapter assessment, in line with other impact areas being considered in the Modification Application (email from DPE 18 July 2017) clarifying additional impacts must be assessed in accordance with the FBA and an offset strategy would be required.

NGH Environmental acknowledge that not all information required by the FBA is documented in the MAEAR (NGH Environmental 2017). Additional detail is now provided in the sections below to illustrate that the FBA methodology has been followed, albeit without the preparation of a full BDAR.

• Full threatened species assessment.	The justification for inclusion or exclusion of candidate species generated by the BioBanking Credit Calculator (Proposal ID 144/2017/4423MP) is provided in Section 4 of this document.
• Efforts to avoid and minimise impacts on biodiversity.	Measures employed to avoid and minimise impacts on native vegetation and significant features such as hollow-bearing trees were provided in Appendix A.4 of the MAEAR. Additional measures employed to avoid and minimise impacts on hollow-bearing trees (as per DEP request Item 4) are documented in Section 5 of this document.
• All impacts to EEC vegetation must be offset.	This is addressed in Section 6 of this document.
• Impacts on biodiversity that require further consideration.	An assessment according to FBA <i>Section 9.2 Impacts on biodiversity that require further consideration</i> is included in Section 10 of this document.

3 UPDATED VEGETATION MAPPING AND AVOIDANCE OF IDENTIFIED AREAS

3.1 VEGETATION MAPPING CHANGES AND AVOIDANCE MEASURES

Table 3-1 below is taken from the OEH letter to DPE (OEH ref. DOC17/646767-1) dated 25 January 2018. A column has been added which details the actions taken to respond to each of the issues raised by OEH. These actions followed the on-site review with OEH on 15 January 2018 and have included: re-classification of some mapped areas, movement of infrastructure to avoid woodland vegetation and, in some cases, confirmation of the original mapping.

Where discrepancies were identified, and revision required, survey timing was regarded as likely to have been the primary reason for the discrepancies. In previous surveys, exotic species may have been more prevalent, obscuring or dominating the native groundcover component which was more apparent during the recent summer site visit with OEH. The revised vegetation mapping is presented in Appendix B.

In their letter, OEH also note that the vegetation mapping errors are likely to extend beyond the areas inspected and this has been taken into consideration when addressing the mapping discrepancies. In the absence of any additional field data, a conservative approach has been taken, reclassifying entire polygons in which inspection points are located. This is considered appropriate as the polygons were originally mapped as homogenous areas during the previous field investigations.

OEH noted that where reference to 'Box Gum Woodland derived native grassland – low condition' is made that it is followed by '(exotic)'. This is consistent with comments made by OEH during the site visit that where exotic species dominated the low condition derived grassland vegetation, the area should be simply mapped as exotic. The approach taken by NGH Environmental is consistent with the definition of low condition native vegetation provided on Page 60 of the FBA states:

Vegetation in low condition:

- a) *woody native vegetation with native over-storey percent foliage cover less than 25% of the lower value of the over-storey percent foliage cover benchmark for that vegetation type, and where either:*
 - *less than 50% of ground cover vegetation is indigenous species, or*
 - *greater than 90% of ground cover vegetation is cleared*

OR
- b) *native grassland, wetland or herbfield where either:*
 - *less than 50% of ground cover vegetation is indigenous species, or*
 - *more than 90% of ground cover vegetation is cleared.*

Native vegetation that is not in low condition is in moderate to good condition.

As such, low condition native grassland can be exotic-dominated, retaining only a minor native component. This approach has been maintained by NGH Environmental throughout the assessment. Areas that have been mapped as exotic are considered entirely exotic, for the purpose of the assessment, with negligible native component such that they are no longer considered to comprise viable native vegetation.

The responses provided in Table 3.1 that recognise agreement on vegetation mapping and include additional avoidance for some previous impacts give confidence that the revised mapping is suitable for the purpose and reduces the project impact or improves the offset assessment process. The avoidance of impacts documented in Table 3-1 and further avoidance of hollow-bearing trees documented in Section 5.2 (such as the removal of Turbine 36) has resulted in a modified approval being sought for 75 wind turbines.

Table 3-1 Extract from the OEH submission on 25 January 2018 and actions taken in response

OEH's internal Reference	Easting and Northing GDA94	What the area is currently mapped as	Site inspection finding	OEH's recommended action	Action by NGH Environmental/Goldwind
Photo point FID 3	643560 6151889	Exotic	Confirmed exotic.	None required	n/a
Photo point FID4	643630 6152117	Exotic	Confirmed exotic.	None required	n/a
Photo point FID 7 to FID 10	644242 6154023 To 644470 6153861	Exotic	This area is the Box Gum Woodland derived native grassland. NGH agreed on site.	change mapping in this area to Box Gum Woodland derived native grassland EEC).	Area re-classified including approximately 95 meters west of FID 7 and 100 meters east of FID 10 based on NGH Environmental field observations (refer mapping in Appendix B).
Photo point FID 13	642206 6154029	This area is mostly mapped as exotic, with small sections of Box Gum woodland - Moderate to good (low) mapped where the trees are.	The trees are close enough to mean the whole area should be mapped as the Box Gum Woodland vegetation moderate to good. The groundcover is also native (not exotic). There is a substantial Yellow Box tree with hollows in this area that should be protected during construction and operation.	Update mapping of this area to Box Gum Woodland (EEC) - moderate to good condition. Move infrastructure into the more degraded areas.	Grassland areas in between trees within 100m of each other have been included as structural woodland. The exotic grassland has been re-classified as Box Gum Woodland derived native grassland from a waypoint taken in the field by NGH Environmental agreed by OEH during the site visit to be the transitional point. The re-classified area extends upslope to another waypoint taken by NGH Environmental as the transition to exotic grassland on the hill top. The treed vegetation on the hillslope west of FID 13 and up to FID 15 has been re-classified as Long-leaved Box Dry Forest due to the absence of Box Gum Woodland overstorey species in this area as observed during the site visit. The revised mapping is included as Appendix B. Infrastructure now moved to further avoid the substantial Yellow Box tree with hollows (refer Section 5.2 of this report).

OEH's internal Reference	Easting and Northing GDA94	What the area is currently mapped as	Site inspection finding	OEH's recommended action	Action by NGH Environmental/Goldwind
Photo point FID 15	641768 6154245	Exotic	Confirmed exotic.	None required	n/a
Photo point FID 16	641811 6154561	Box Gum woodland - Moderate to good (low) and mix of other.	Infrastructure placed in an area mapped Box Gum woodland - Moderate to good-when there are exotic cleared areas surrounding it.	Suggest avoiding impact to the Box Gum woodland - EEC and situating the infrastructure in a cleared area.	Stockpile site in this area removed from the modified layout.
Observation point FID 2	641712 6154573	Exotic	Over 50% native. This area is the Box Gum Woodland derived native grassland. NGH agreed on site.	Update mapping in this area to Box Gum Woodland derived native grassland (EEC) - Moderate to good condition	Area re-classified extending south to similar elevation as observed at FID 15 where grassland transitions to exotic and extending east to apparent transition to confirmed exotic grassland at FID 13. The revised mapping is included as Appendix B.
Observation point FID 3	641685 6154576	Box Gum Woodland derived native grassland - low (exotic)	Over 50% native. Box Gum Woodland derived native grassland - Moderate to good	Update mapping in this area to Box Gum Woodland derived native grassland (EEC) - Moderate to good condition	These areas have been re-classified. The entire polygon has been re-classified to the west where it adjoins other areas mapped as Box Gum Woodland derived native grassland - Moderate to good which is well beyond the areas inspected. To the south east the polygon has been re-classified up to the elevation as observed at FID 15 where grassland transitions to exotic dominated. The revised mapping is included as Appendix B. The vegetation has been maintained as Box Gum Woodland derived native grassland – Low condition as although
Observation point FID 4	641390 6154488	Box Gum Woodland derived native grassland - low (exotic)	Over 50% native. Box Gum Woodland derived native grassland - Moderate to good	Update mapping in this area to Box Gum Woodland derived native grassland (EEC) - Moderate to good.	

OEH's internal Reference	Easting and Northing GDA94	What the area is currently mapped as	Site inspection finding	OEH's recommended action	Action by NGH Environmental/Goldwind
Observation point FID 5	641271 6154734	Box Gum Woodland derived native grassland - low (exotic)	Over 50% native. Box Gum Woodland derived native grassland - Moderate to good	Update mapping in this area to Box Gum Woodland derived native grassland (EEC) - Moderate to good	exotic dominated, a native component was observed in this area during past surveys. The area is consistent with the definition of native vegetation in low condition specified in the FBA.
Observation point FID 6	642170 6155321	Exotic	Confirmed exotic.	None required	n/a
Observation point FID 7	640898 6155370	Box Gum woodland - Moderate to good (low)	Likely to meet a higher quality class-very good quality vegetation in this area with a very high number of tree hollows. Sighting of two Wedge-tail Eagles foraging in this area.	Avoid this area of important woodland- moving infrastructure to areas of degraded vegetation surrounding this patch.	Infrastructure moved to avoid the main woodland area containing high numbers of hollow-bearing trees (refer Section 5.2 of this report).
Photo FID 18	636829 6155380	Exotic	Confirmed exotic.	None required	n/a
Photo FID 19 & 20	638515 6154116	Exotic	Borderline exotic and native. Difficult to tell due to grazing pressure.	None required	n/a

OEH's internal Reference	Easting and Northing GDA94	What the area is currently mapped as	Site inspection finding	OEH's recommended action	Action by NGH Environmental/Goldwind
Whitefield's Road	644625 6147433	Box Gum Woodland moderate to good (low)	The site inspection confirmed this area is of very high-quality vegetation with an intact grassy understory and a canopy with high density of tree hollows	Agreed that this was probably one of the highest ecological areas of the whole site. Avoid any disturbance to roadside vegetation.	Road has been redesigned to avoid mature roadside vegetation where possible including hollow-bearing trees. Only four hollow-bearing trees will be impacted. Due to the required turn radius for large vehicles it is not possible to avoid all hollow-bearing trees.
Red point FID 0	644889 6150055	Box Gum Woodland Derived native grassland moderate to good (low)	This area is good quality habitat surrounded by seemingly degraded pasture to the south. Yet the road goes through the quality habitat area.	Move road to south to avoid impacts on this area.	A site visit conducted by Goldwind and NGH Environmental on 28 February 2018, confirmed that no trees will require removal in this area. Some minor trimming of lower branches would be required only. One hollow-bearing tree previously identified as being impacted no longer exists (burnt out). The ground cover vegetation in this area is also more degraded than within the more intact vegetation to the north due to the close proximity to cleared areas and exotic pastures.

3.2 UPDATED IMPACT CALCULATIONS

The MAEAR (NGH Environmental 2017) was undertaken to address new or increased biodiversity impacts arising from the modified project. Specifically, it addressed:

“... changes to development footprint arising from the detailed engineering design and larger turbine model including impacts extending outside the consented ‘Development Corridor’.”

Development of the detailed engineering design has continued since the submission of the MAEAR. This process and the updated vegetation mapping and additional avoidance measures discussed in Section 3.1 have affected the estimated impact area required for the project. The changes also affect the proportion of Threatened Ecological Communities (TECs) now impacted by the development.

Table 3-2 presents impacts based on the:

- Consented layout, as approved March 2016.
- Updated submissions layout, as presented in this report.

Note: permanent and temporary monitoring masts will be required to be installed however, the locations have not yet been finalised. Where possible, these will be sited to avoid impacts. In either case, the vegetation impacts due to the masts will be captured within the projects impact footprint, with no net increase in and amount of clearing required for the project. The masts will be subject to all relevant project environmental management commitments.

Table 3-2 Updated impacts on vegetation and TECs

Vegetation Type / Condition	Consented layout and components			Modified layout and increase		
	Consented Layout (ha)	Coppabella transmission component (ha)	Total that should have been approved (ha)	Modification Layout total with 5m buffer (ha) (approx.)	Increase (ha) ¹	Percent increase
Box Gum Woodland	11.2	18.1	29.3	31.8	2.5	
Low	0.7	17.5	18.2	0.3	-17.9	
Moderate-good (high diversity)	0.3	0.3	0.6	0.3	-0.3	
Moderate-good (low diversity)	10.1	0.3	10.4	31.1	20.7	
Box Gum Woodland Derived Grassland	56.1	0.0	56.1	225.3	169.2	
Low	2.7	0.0	2.7	77.2	74.5	
Moderate-good (high diversity)	0.0	0.0	0.0	2.1	2.1	
Moderate-good (low diversity)	53.4	0.0	53.4	146	92.6	
Long-leaved Box Dry Grass Forest	0.9	0.0	0.9	6.7	5.8	
Moderate-good (high diversity)	0.3	0.0	0.3	0.4	0.1	
Moderate-good (low diversity)	0.6	0.0	0.6	6.3	5.7	
Long-leaved Box Dry Grass Forest Derived Grassland	0.0	0.0	0.0	12.2	12.2	
Moderate-good (low diversity)	0.0	0.0	0.0	12.2	12.2	
Riparian	0.1	0.0	0.1	0.3	0.2	
Moderate-good (low diversity)	0.1	0.0	0.1	0.3	0.2	
Exotic dominated pasture	14.7	0.0	14.7	59.3	44.6	303%
Total native vegetation	68.3	18.1	86.4	276.3	189.9	220%
Total TEC	67.3	18.1	85.4	179.9	94.5	111%
Grand Total	83	18.1	101.1	335.6	234.9	232%
Note 1 - The increase, considering the 18.1 ha that was originally required to construct the Coppabella precinct independently.						

4 CANDIDATE SPECIES AND THREATENED SPECIES SURVEYS

4.1 SURVEYS UNDERTAKEN FOR PREDICTED AND CANDIDATE SPECIES

4.1.1 Previous responses / correspondence

The OEH submission from 23 October 2017 states:

A full threatened species assessment; identifying the ecosystem and species credit species which are aligned with each plant community type (PCT), i.e. the candidate species list. This should then include an assessment as to whether surveys are required based on habitat features, and a justification for inclusions and exclusions. Species polygons also need to be provided for species that cannot withstand a loss (chapter 6 of FBA). The EA only briefly assesses the impacts to the regent honeyeater, superb parrot and golden sun moth.

In a response to these comments from the proponent dated 28 November 2017, Goldwind state:

NGH has identified additional species from updated searches as well as by use of the FBA calculations. EAR Table 8.1 lists additional species returned and considered. The EAR explains the additional surveys undertaken to inform the assessment.

Candidate species were evaluated for impact based on all information now held for the site. Candidates are evident in the FBA credit calculations that can be provided to OEH but were not reported in the FBA format. For the assessment of the modified project they included:

– Survey time matrix

Common name	Scientific name
Austral Pillwort	<i>Pilularia novae-hollandiae</i>
Booroolong Frog	<i>Litoria booroolongensis</i>
Brush-tailed Phascogale	<i>Phascogale tapoatafa</i>
Crimson Spider Orchid	<i>Caladenia concolor</i>
Dwarf Bush-pea	<i>Pultenaea humilis</i>
Eastern Pygmy-possum	<i>Cercartetus nanus</i>
Golden Sun Moth	<i>Synemon plana</i>
Koala	<i>Phascolarctos cinereus</i>
Pink-tailed Legless Lizard	<i>Aprasia parapulchella</i>
Regent Honeyeater	<i>Anthochaera phrygia</i>
Rosenberg's Goanna	<i>Varanus rosenbergi</i>
Silky Swainson-pea	<i>Swainsona sericea</i>
Small Purple-pea	<i>Swainsona recta</i>
Small Scurf-pea	<i>Cullen parvum</i>
Squirrel Glider	<i>Petaurus norfolcensis</i>
Striped Legless Lizard	<i>Delma impar</i>
Woolly Ragwort	<i>Senecio garlandii</i>
Yass Daisy	<i>Ammobium craspedioides</i>

In comparison, those listed for last Major project assessment accompanying the Yass Valley Wind Farm application in 2015 included:

Survey time matrix

Common name	Scientific name
Brush-tailed Phascogale	Phascogale tapoatafa
Dwarf Bush-pea	Pultenaea humilis
Eastern Pygmy-possum	Cercartetus nanus
Golden Sun Moth	Synemon plana
Koala	Phascolarctos cinereus
Pink-tailed Legless Lizard	Aprasia parapulchella
Regent Honeyeater	Anthochaera phrygia
Rosenberg's Goanna	Varanus rosenbergi
Silky Swainson-pea	Swainsona sericea
Sloane's Froglet	Crinia sloanei
Small Purple-pea	Swainsona recta
Small Scurf-pea	Cullen parvum
Squirrel Glider	Petaurus norfolcensis
Striped Legless Lizard	Delma impar
Yass Daisy	Ammobium craspedioides

There are few differences: The Austral Pillwort, Crimson Spider Orchid, Woolly Ragwort. No potential habitat for the semi aquatic Austral Pillwort occurs in the impact areas. Austral Pillwort and Woolly Ragwort can be surveyed for at any time of year and have not been recorded onsite in any surveys since 2009, including surveys that targeted better quality vegetation. The Modification Application states no Crimson Spider Orchid habitat occurs in the impact areas.

4.1.2 Additional information

In addition to the information provided above, survey methodologies, survey effort and conditions (where available) are detailed for each of the candidate species identified by the FBA in Table 4-1 below along with the original assessment of habitat contained in the biodiversity assessment (NGH Environmental 2009). The conclusion regarding the presence of the species on the site is also detailed as entered into the BCC for the offset calculations (refer Section 6 below). The survey effort documented in Table 4-1 below (where GIS data is available), is mapped in Appendix C of this report.

As discussed in the 28 November 2017 Goldwind response, no suitable habitat for Austral Pillwort is present within the development footprint and as such, no targeted survey has been undertaken. Habitat for the Crimson Spider Orchid is not typical for the species however, suitably timed surveys have been undertaken that would have detected the species if present.

Additional targeted surveys have continued since the submission of the MAEAR (NGH Environmental 2017). These included:

- Targeting spring and summer flowering threatened flora species, targeting areas within the modified project footprint that were outside of the consented development envelope (refer to Appendix D). Adjacent areas that were within the previously consented areas were also surveyed for comprehensiveness.
- Additional targeted surveys were also completed for the Koala in February 2018 (Appendix D).
- Additional Superb Parrot Survey undertaken in November 2017 (refer Appendix D) after the Modification Application was lodged to fulfil an EPBC condition of consent.
- A specialist assessment for the Regent Honey-Eater (March 2018, Appendix D)
- Additional hollow bearing tree surveys within the construction footprint which now cover 100% of the updated submissions layout, as presented in this report (Section 5 and Appendix D). These are particularly relevant to the assessment of Superb Parrot impacts.

Table 4-1 Surveys completed for candidate species credit species identified during the FBA assessment

Common name	Habitat assessment (NGH 2009)	Specific survey conducted	Survey Effort	Survey Conditions	Occurring on site?
Austral Pillwort <i>Pilularia novae-hollandiae</i>	Habitat: Absent Occurrence: None, no wetlands on the site	No survey specifically targeting this species, but numerous flora surveys conducted across the site from 2008 and the species and its preferred habitat have not been identified. 23 May 2017 Latest surveys for habitat in the modification footprint.	NA.	NA.	No. General surveys have not detected the species or preferred habitat. the site is approximately 200km beyond the known distribution of this species.
Booroolong Frog <i>Litoria booroolongensis</i>	Habitat: Absent Occurrence: None	16-19 September or 6-7 November 2008. <i>Frog census and aquatic habitat assessments</i> at riparian corridors, drainage lines and farm dams to identify the diversity of frog species present and the condition and quality of these habitats. Frogs identified by call. 23 May 2017 Latest surveys for habitat in the modification footprint.	7 frog surveys (30-90 mins). Total = 6 person hours.	September survey undertaken early Spring after good rainfall a month earlier. Max day time temperature range 11.1 – 24.5°C; Min overnight temperature range -1 – 8.5°C. Cloud cover generally moderate.	No. Best habitat along Jugiong Creek which will only be traversed by an overhead powerline. Verbal advice from OEH during the site visit on 15 Jan 2018 was that if direct impacts are avoided in this area then additional survey not required.
Brush-tailed Phascogale <i>Phascogale tapoatafa</i>	Habitat: Present, although marginal due to fragmentation Occurrence: Unlikely	16-19 September 2008 <i>Tree Elliot traps (B)</i> at site 7a on the western facing slope in woodland. Traps were placed on mature hollow-bearing trees around the northern edge of the woodland 18 January 2018 Latest surveys for habitat in the modification footprint.	1 transect of 10 traps over 3 nights. Traps were placed 2-3m above the ground on trunks of mature trees. Total = 30 trap nights	September survey undertaken early Spring after good rainfall a month earlier. Max day time temperature range 11.1 – 24.5°C; Min overnight temperature range -1 – 8.5°C.	No. Trapping conducted in optimal habitat and species not detected. Other habitat across the site is marginal.

Common name	Habitat assessment (NGH 2009)	Specific survey conducted	Survey Effort	Survey Conditions	Occurring on site?
Crimson Spider Orchid <i>Caladenia concolor</i>	Habitat: Marginal Occurrence: Low due to heavy grazing pressure over most of the sites. Survey was conducted during the flowering period and the Burrinjuck Spider Orchid was not detected, though it is unlikely to flower reliably every year, or could flower later than the survey period (16-22 Sept 2008)	<i>General vegetation validation and Plot surveys completed across most of the current proposal footprint as follows:</i> 16-22 September 2008. The development envelope including representative sections of the grid connection transmission routes were surveyed for flora values. 8 November 2008. Additional surveys in areas identified as having potential threatened species habitat were carried out in a follow-up visit. <i>Targeted survey work as follows:</i> 15 October 2009 Targeted survey at dry forest remnant in far south of Cluster 7. 30 October – 01 November 2017 Targeted surveys within the high diversity Box Gum Woodland derived grassland between Turbines 19 and 29 and the high diversity Long-leaved Box forest and adjacent Box Gum Woodland east of Turbine 79.	September 2008 survey 14 x Quadrats (20 x 20 m = 0.4 ha); 30 x Random Meanders; (30 mins up to 1 ha); 13 x Spot Inspections Total = 70 person hours October 2009 survey North-south transects, spaced 5-10m searches by 2 botanists over 1.5 hrs. October 2017 Evenly spaced transects (as much as the terrain allowed) spaced approximately 10 – 20m apart depending on visibility were conducted by one botanist over 4.5 hrs.	October 2009 survey targeted to coincide with flowering time of orchid (spring). October 2017 survey within the survey period specified in the TSDC.	No, habitat marginal and not detected during general or targeted flora surveys.
Dwarf Bush-pea <i>Pultenaea humilis</i>	Not considered in original BA.	30 October – 01 November 2017 Targeted surveys within the high diversity Box Gum Woodland derived grassland between Turbines 19 and 29 and the high diversity Long-leaved Box forest and adjacent Box Gum Woodland east of Turbine 79. In addition to the areas targeted supporting high diversity ground cover, areas of woodland and forest	Evenly spaced 10-20m transects and random meanders. Total = 4.5 person hours.	Survey within the survey period specified in the TSDC.	No. Targeted surveys did not detect this species.

Common name	Habitat assessment (NGH 2009)	Specific survey conducted	Survey Effort	Survey Conditions	Occurring on site?
		with a relatively intact overstorey supporting a lower diversity native dominated ground cover were also targeted for this species. This includes the area on and below the ridge in the vicinity of Turbine 4 and immediately south of Turbine 77.			
Eastern Pygmy-possum <i>Cercartetus nanus</i>	Habitat: Absent, woodland doesn't have shrubs Occurrence: None	No specific surveys conducted. Vegetation validation surveys confirm that the shrub layer required for this species is absent throughout the site including the additional modification areas. 18 January 2018 Latest surveys for habitat in the modification footprint.	NA	NA	No. No suitable foraging habitat present.
Golden Sun Moth <i>Synemon plana</i>	Habitat: Present: Occurrence: Unlikely, site is beyond the known distribution of the species	December 2013 Coppabella and Marilba development envelopes targeted. Survey identified Golden Sun Moth to occur broadly across the Marilba precinct but it was not detected at Coppabella (refer to full report in Appendix D). Surveys in line with <i>Survey Guidelines for Golden Sun Moth</i> (ACT Conservation, Planning and Research 2010). 18 December 2014 - 16 January 2015 Follow up targeted surveys at Coppabella precinct only, failed to	December 2013 Golden Sun Moth surveys were conducted over a 5-day period (20, 25 and 26 November 2013 and 2 and 3 December 2013) at 100 proposed turbine sites (43 within the Coppabella precinct). All sites were surveyed using either a random meander or point count method. 18 December 2014 - 16 January 2015 4 separate days of survey during December 2014 to January 2015 in suitable	Weather conditions during the survey were variable ranging from cool to hot and occasionally with strong wind. Maximum temperatures ranged from 18°C on 25 November to over 30°C on 2 and 3 December. Rain was not recorded during or immediately prior to surveys. Despite some sub-optimal conditions, moths were observed free flying, in large numbers at some locations. Weather mostly suitable within accepted GSM survey conditions, except	No. Targeted surveys did not detect this species.

Common name	Habitat assessment (NGH 2009)	Specific survey conducted	Survey Effort	Survey Conditions	Occurring on site?
		detect the species (refer to full report in Appendix D). Surveys in line with <i>Significant Impact Guidelines for Golden Sun Moth</i> (DEWHA 2009).	habitat involving random traverses through and around 31 turbine sites. Opportunistic searches also conducted within powerline connection routes when walking between turbines. Combined Total Effort: 76 surveys at proposed turbine sites on site; 55 offsite surveys.	for 2 afternoons when wind increased and surveys were not undertaken. Days were warm to hot, cloudless skies and calm. No rain.	
Koala <i>Phascolarctos cinereus</i>	Habitat: Present Occurrence: Possible	General surveys as part of assessment process (2007 – 2017) Habitat assessment and vegetation surveys across the entire development footprint mapping vegetation types, condition, and habitat features. 7 – 9 February 2018 Spot Assessment Technique (SAT) surveys based on a 500m grid within areas of better quality habitat (approach determined in consultation with OEH).	General surveys as part of assessment process (2007 – 2017) 37 habitat assessments and 6 habitat inspections plus opportunistic observations of entire project development area. 7 – 9 February 2018 13 spot inspections; plus broad vegetation mapping. 17 SAT plots (locations determined in consultation with OEH) with 53 person hours of active searching.	Weather throughout the survey period was hot, humid and sunny with a slight breeze. Temperatures between 13.6 and 36.2 degrees and no rainfall.	No. Targeted surveys did not detect this species.
Pink-tailed Worm Lizard <i>Aprasia parapulchella</i>	Habitat: Present, however rocky habitat is severely grazed	Refer to Striped Legless Lizard (SLL) below for surveys undertaken. All surveys completed for the SLL were completed for the Pink-tailed Worm Lizard, except for those undertaken during 18 December 2014 - 16 January 2015			No. Targeted surveys did not detect this species.

Common name	Habitat assessment (NGH 2009)	Specific survey conducted	Survey Effort	Survey Conditions	Occurring on site?
	Occurrence: Possible				
Regent Honeyeater <i>Anthochaera phrygia</i>	Habitat: foraging (feed trees) habitat present Occurrence: Possible	2008 BA assessment 25 bird census surveys involving spot surveys and transects (20-90 mins). Plus 32 habitat assessments. 2012 SER report 5 Habitat assessments; 6 Habitat Inspections; 4 Bird census. No specific targeted survey undertaken. Targeted survey for habitat undertaken by BLA 8 March 2018 .	2008 BA assessment 17.5 person hours documented for 2008 assessment. 2012 SER report No person hours provided for 2012 SER report. 2018 BLA habitat assessment One day on site by an independent senior ecologist assessing habitat suitability.	Not available.	Not recorded during any survey however, assumed to occur as no specific targeted survey undertaken.
Rosenberg's Goanna <i>Varanus rosenbergi</i>	Habitat: Absent Occurrence: Unlikely	General surveys as part of assessment process 2008-2012 No specific surveys undertaken however, habitat assessment across numerous surveys from 2008 indicate that termite mounds, necessary for breeding are absent. Predicted by calculator due to the presence of rocky outcrops. 18 January 2018 Latest surveys for habitat confirmed that suitable habitat is not present in the updated submissions layout.	NA	NA	No. Suitable breeding habitat (termite mounds) not present.
Silky Swainson-pea <i>Swainsona sericea</i>	Habitat: Marginal Occurrence: Very low due to heavy	<i>General vegetation validation and Plot surveys completed across most of the current proposal footprint as follows:</i>	September 2008 survey 14 x Quadrats (20 x 20 m = 0.4 ha);	Survey within the survey period specified in the TSDC.	No. Targeted surveys did not detect this species.

Common name	Habitat assessment (NGH 2009)	Specific survey conducted	Survey Effort	Survey Conditions	Occurring on site?
	grazing pressure over most of the site.	16-22 September 2008. The development envelope including representative sections of the grid connection transmission routes were surveyed for flora values. 8 November 2008. Additional surveys in areas identified as having potential threatened species habitat were carried out in a follow-up visit. <i>Targeted survey work as follows:</i> 15 October 2009 Targeted random meander survey (Cropper 1993) specifically to identify Yass Daisy but also identify potential for <i>Swainsona recta</i> within grassland south-west of Cluster 7. 30 October – 01 November 2017 Targeted surveys within the high diversity Box Gum Woodland derived grassland between Turbines 19 and 29 and the high diversity Long-leaved Box forest and adjacent Box Gum Woodland east of Turbine 79 (refer to full report in Appendix D).	30 x Random Meanders; (30 mins up to 1 ha); 13 x Spot Inspections Total = 70 person hours 15 Oct 2009 survey: Entire area searched by 2 botanists over 3 hrs 30 October – 01 November 2017 Evenly spaced 10-20m transects and random meanders. 4.5 person hours.		
Small Purple-pea <i>Swainsona recta</i>	Not considered in original BA	As for the Silky Swainson-pea above.			No. Targeted surveys did not detect this species.
Small Scurf-pea <i>Cullen parvum</i>	Habitat: Marginal Occurrence: Very low	16 January 2018 Targeted surveys across the entire modification footprint in high diversity	16 January 2018 Evenly spaced 10-20m transects and random meanders. 2.5 person hours.	Survey within the survey period specified in the TSDC.	No. Targeted surveys did not detect this species.

Common name	Habitat assessment (NGH 2009)	Specific survey conducted	Survey Effort	Survey Conditions	Occurring on site?
		Box Gum Woodland derived grassland between Turbines 19 and 29, the high diversity Long-leaved Box forest and adjacent Box Gum Woodland east of Turbine 79 and a small area of high diversity Box Gum Woodland derived grassland north of Turbine 77.			
Squirrel Glider <i>Petaurus norfolcensis</i>	Habitat: Present Occurrence: Possible	16-19 September 2008 <i>Tree Elliot traps (B)</i> at site 7a on the western facing slope in woodland. Traps were placed on mature hollow-bearing trees around the northern edge of the woodland 13-16 October 2009 <i>Cage traps</i> using an aluminium extension ladder to nail trap to tree at site 4A and 7 where hollow-bearing trees located. 18 January 2018 Latest surveys for habitat confirmed that suitable habitat is not present in the updated submissions layout.	1 transect of 10 traps over 3 nights. Traps were placed 2-3m above the ground on trunks of mature trees. Total = 30 trap nights 14 cage traps over 3 nights. Traps were placed trunks 3-5m off the ground at 50-100m apart. Total = 42 trap nights	16-19 September 2008 Undertaken early Spring after good rainfall a month earlier. Daytime conditions generally fine, warm and sunny (max temp 24.5°C), with moderate to fresh winds. Bright moon, full moon on 15 September. 13-16 October 2009 Weather varied from overcast days to cool, windy days (max temp 16.1°C and min temp of 3.8°C). Up to 6.8mm rainfall recorded on the first day of survey.	No. Targeted surveys did not detect this species.
Striped Legless Lizard <i>Delma impar</i>	Habitat: Present Occurrence: Possible	16-19 September 2008; 6-7 November 2008; 9-11 March 2009 <i>Rock rolling and habitat searches</i> focusing on ridges and slopes with outcropping rock as well as woodland with leaf litter, hollow logs and tussock forming grasses. Searches completed	16-19 September 2008; 6-7 November 2008; 9-11 March 2009 25 surveys (20-90 mins) Total = 17.5 person hours 15-18 October 2012 3 searches	September 2008 Survey undertaken early Spring after good rainfall a month earlier. Daytime conditions generally fine, warm and sunny (max temp 24.5°C), with moderate to fresh winds.	No. Targeted surveys did not detect this species.

Common name	Habitat assessment (NGH 2009)	Specific survey conducted	Survey Effort	Survey Conditions	Occurring on site?
		across most of the current footprint where habitat appropriate. 15-18 October 2012 <i>Targeted rock rolling and habitat searches</i> within additional areas added to the existing footprint not assessed within the BA. Searches undertaken opportunistically in better quality habitat within scattered loose, medium sized rocks in grassland or Box-Gum Woodland. 18 December 2014 - 16 January 2015 <i>Targeted rock rolling</i> at 31 turbine sites Surveys in line with <i>Threatened Biodiversity Survey and Assessment Guidelines</i> (DEC 2004). 18 January 2018 Latest surveys for habitat confirmed that suitable habitat is not present in the updated submissions layout.	18 December 2014 - 16 January 2015 4 separate days of survey during December 2014 to January 2015. Over 1500 rocks rolled (approximately 50 at each site). Combined Total Effort: 22.25 hours, >2600 rocks rolled.	Bright moon, full moon on 15 September. 18 December 2014 - 16 January 2015 Days were warm to hot, cloudless skies and calm. No rain.	
Woolly Ragwort <i>Senecio garlandii</i>	Occurs on sheltered slopes of rocky outcrops Habitat: Present Occurrence: Very low	<i>General vegetation validation and Plot surveys completed across most of the current proposal footprint as follows:</i> 16-22 September 2008. The development envelope including representative sections of the grid connection transmission routes were surveyed for flora values (broad vegetation assessment, quadrats,	September 2008 survey 14 x Quadrats (20 x 20 m = 0.4 ha); 30 x Random Meanders; (30 mins up to 1 ha); 13 x Spot Inspections Total = 70 person hours 30 October – 01 November 2017	Survey within the survey period specified in the TSDC.	No. Targeted surveys did not detect this species.

Common name	Habitat assessment (NGH 2009)	Specific survey conducted	Survey Effort	Survey Conditions	Occurring on site?
		random meanders and spot inspections, vegetation mapping). 8 November 2008. Additional surveys in areas identified as having potential threatened species habitat were carried out in a follow-up visit. <i>Targeted survey work as follows:</i> 30 October – 01 November 2017 Targeted surveys within the high diversity Box Gum Woodland derived grassland between Turbines 19 and 29 and the high diversity Long-leaved Box forest and adjacent Box Gum Woodland east of Turbine 79 (refer to full report in Appendix D). 16 January 2018 Targeted surveys across the entire modification footprint in high diversity Box Gum Woodland derived grassland between Turbines 19 and 29, the high diversity Long-leaved Box forest and adjacent Box Gum Woodland east of Turbine 79 and a small area of high diversity Box Gum Woodland derived grassland north of Turbine 77.	Evenly spaced 10-20m transects and random meanders. 4.5 person hours. 16 January 2018 Evenly spaced 10-20m transects and random meanders. 2.5 person hours		
Yass Daisy <i>Ammobium craspedioides</i>	Known to occur within the property boundaries, outside of the	<i>General vegetation validation and Plot surveys completed across most of the current proposal footprint as follows:</i> 16-22 September 2008.	September 2008 survey 14 x Quadrats (20 x 20 m = 0.4 ha); 30 x Random Meanders; (30 mins up to 1 ha); 13 x Spot Inspections	Survey within the survey period specified in the TSDC.	No. Targeted surveys did not detect this species.

Common name	Habitat assessment (NGH 2009)	Specific survey conducted	Survey Effort	Survey Conditions	Occurring on site?
	construction footprint	The development envelope including representative sections of the grid connection transmission routes were surveyed for flora values (broad vegetation assessment, quadrats, random meanders and spot inspections, vegetation mapping). 8 November 2008. Additional surveys in areas identified as having potential threatened species habitat were carried out in a follow-up visit. October 2012 General flora searches of additional areas added to the development footprint not previously assessed within the BA (broad vegetation assessment, random meanders and spot inspections, vegetation mapping). <i>Targeted survey work as follows:</i> 30 October – 01 November 2017 Targeted surveys within the high diversity Box Gum Woodland derived grassland between Turbines 19 and 29 and the high diversity Long-leaved Box forest and adjacent Box Gum Woodland east of Turbine 79 (refer to full report in Appendix D).	Total = 70 person hours October 2012 survey 14 random meanders, 11 inspection points Total = 21 person hours 30 October – 01 November 2017 Evenly spaced 10-20m transects and random meanders. 4.5 person hours.		

4.2 COMMENTS RELATING TO THE GOLDEN SUN MOTH

In their submission dated 23 October 2017, OEH state:

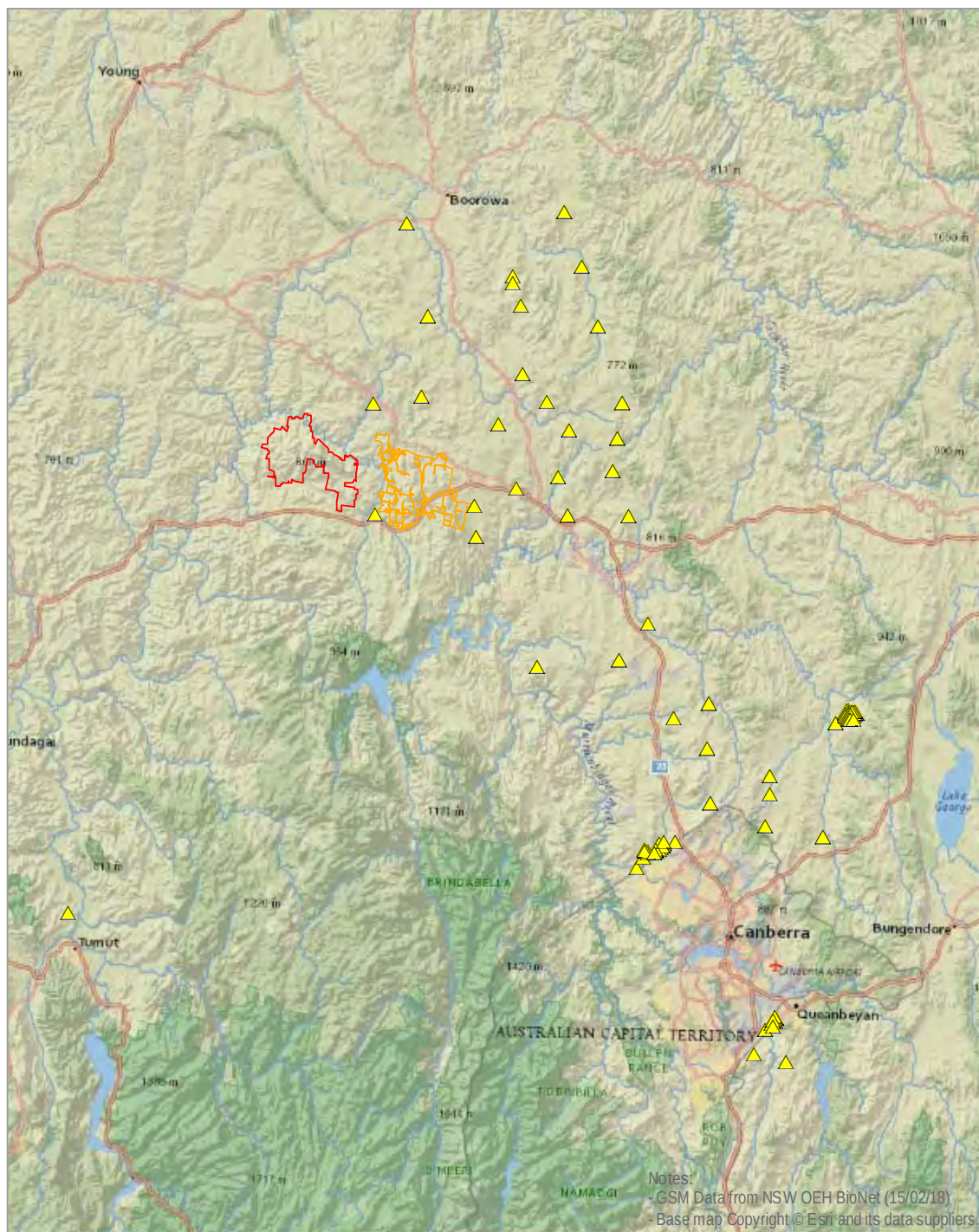
Regarding the Golden Sun Moth (GSM), the EA states “These surveys identified Golden Sun Moth to occur broadly across the Marilba precinct, east and west, with a small number of sightings at the Conroy’s Gap Extension Precinct”. The species is known to occur in the region. The Coppabella vegetation plot data also confirms the presence of Wallaby Grass, which is GSM habitat. Given the large increase in impacts to native vegetation in the Coppabella precinct, OEH considers surveys for the GSM should be re-done in this precinct, as part of this modification. Alternatively, the species can be assumed to be present as per the FBA method and the species can be offset using species credits.

It is acknowledged that the modified layout (and subsequent updated submission layout) produces a large increase in the impacts to native vegetation however, the distribution of impacts has for all intents and purposes remained consistent. For example, no turbine location has been moved more than allowable micro-siting allowances. No new turbines have been added; four have been removed. As such, the survey sites that were targeted for the GSM in the December 2013 surveys and the December 2014 and early January 2015 surveys are highly relevant to the updated submission layout.

Golden Sun Moth was found to occur broadly across the Marilba precinct during the December 2013 surveys yet during the same survey program, there were no observations made within the Coppabella precinct (original report included in Appendix D). The large number of observations at the Marilba precinct would suggest that if the GSM was present at the Coppabella precinct, it would have been evident. This agrees with local records that also show a distinct lack of records west of Marilba. To address the *Survey Guidelines for Golden Sun Moth* (ACT Conservation, Planning and Research 2010) and *Significant Impact Guidelines for Golden Sun Moth* (DEWHA 2009), repeated surveys are required. To address these and clarify the presence or absence of the GSM at Coppabella, the December 2014 and early January 2015 surveys were conducted (original report included in Appendix D). These surveys also failed to detect the GSM in the Coppabella precinct despite ideal survey conditions and the species being known to be flying in the region at the time.

All valid locality records of the GSM from the OEH BioNet Atlas are mapped on Figure 4-1 showing the known distribution of the species relative to the proposal site boundary (Coppabella precinct) and the former Marilba precinct. The proposal site occurs just to the west of the known western distribution of the GSM in the region whereas the Marilba precinct is within this distribution. The further supports the results of the surveys where GSM was found at Marilba but not Coppabella. Additionally, it is noted that males will not fly long distances (no greater than 100m) (OEH 2018). Populations separated by distances of greater than 200 m can be considered effectively isolated and populations which have gone extinct, or vacant patches of suitable habitat, are highly unlikely to be recolonised (OEH 2018). On this basis, it would not be expected that individuals currently located at Marilba would move westward to occupy areas at Coppabella.

The level of survey already conducted and the location of the proposal site (outside of the current known distribution of the GSM with no records further west in the region), provides a confident basis for considering the species unlikely to occur within the proposal site. Additional survey or assuming the presence of the species is not considered to be justified.



- Coppabella precinct
- Former Marilba precinct
- ▲ GSM record (BioNet)

0 5 10 20 Kilometres

Ref: 16-440
 Author: DM 15/02/18



Figure 4-1 All GSM records within NSW relative to the proposal

4.3 ADDITIONAL HABITAT ANALYSIS FOR THE REGENT HONEYEATER

The original biodiversity assessment for the proposal and the offset calculations that accompanied the modification application took a conservative approach in assuming that all Box-Gum Woodland was potential habitat for the Regent Honeyeater. Additional investigations have now been undertaken to look at the characteristics and importance of the habitat within the proposal area to define a more accurate 'species polygon', as required by the FBA.

As required by Section 6.5.1.15 of the FBA; *where a species is assumed to be present on the development site, the assessor must use an expert report to determine the location and area of the species polygon to include the fauna habitat...*

BLA was engaged to undertake an assessment of suitability of habitat at the site and the potentially impacted areas as habitat for Regent Honeyeater. BLA has extensive experience in ecological assessments and avian species. The BLA investigation incorporated literature review, review of existing NGH mapping, discussion of site features with NGH and site inspection by BLA.

The BLA review found:

- Key breeding habitat for Regent Honeyeater is distant from the Coppabella Wind Farm project area.
- Some potential suitable foraging habitat is present within the project area (refer Appendix E). Foraging habitat is restricted to trees. To determine the area of habitat, trees were buffered (with overlap dissolved) by a 10m radius (20m diameter). This diameter was determined on account of maximum crown width based on measurements from aerial imagery and is likely to be a conservative measure of the extent of the crown of all trees.
- Only a relatively small area of Regent Honeyeater habitat would be impacted (13.64 ha, mapped in Appendix E) compared to that likely to occur in the locality.
- No Regent Honeyeater were observed during the site inspection consistent with NGH survey results and limited records for the region.
- The low proportion of Regent Honeyeater habitat affected by the modified proposal would not affect connectivity and would not limit the use of the more widespread habitats in the locality by this species.

Following the BLA analysis, advice was received from OEH that BLA did not have sufficient direct experience with the Regent Honeyeater to be considered an 'expert' for the purposes of providing an 'Expert Report' in accordance with the FBA. NGH has engaged an OEH recommended Regent Honeyeater expert to provide an Expert Report. The results of this report will be used to:

- Determine if the Regent Honeyeater is likely to occur and utilise the habitats present and if so;
- Quantify the final amount of impact on potential Regent Honeyeater habitat and calculate required offsets according to the FBA.

5 HOLLOW-BEARING TREES

In their request (31 January 2018), DPE required confirmation of which, and to what extent, species would be impacted by the removal of hollow-bearing trees due to the modified layout. Additionally, they required

that OEH's comments regarding the potential relocation of infrastructure away from areas with large numbers of hollow bearing trees be considered.

5.1 EXTENT TO WHICH HOLLOW DEPENDANT SPECIES WOULD BE IMPACTED BY THE PROPOSAL

Based on the assessments completed to date, one hollow-dependant threatened species; Superb Parrot, is known to occur on the proposal site. Considering candidate species generated by the FBA assessment, surveys have verified that Brush-tailed Phascogale and Squirrel Glider have no potential to occur onsite or be impacted by loss of hollows due to the development.

The following additional hollow-dependant threatened fauna species were identified as 'possible occurrence' in the original Coppabella Biodiversity Assessment (NGH Environmental 2009) and have not been subject to additional targeted survey to demonstrate their presence or absence:

- Barking Owl
- Brown Treecreeper
- Microbats
 - Southern Myotis
 - Little Pied Bat
 - Yellow-bellied Sheath-tail Bat

The Gang-gang Cockatoo was identified as a possible vagrant.

None of these species are identified as candidate species credit species within the FBA calculations and as such, do not require specific survey or offsetting. All except the Little Pied Bat and Southern (Large-footed) Myotis are however, identified as ecosystem credit species and are assumed to occur in the habitats present and contribute to the ecosystem credit requirements detailed in Section 5 below. The extent to which each of these hollow dependant species would be impacted by the proposal is discussed for each species below.

5.1.1 Superb Parrot

Detailed survey of the modification construction footprint recorded 283 hollow-bearing trees (HBTs) that are likely to be impacted by the proposal. However, for reasons given below, it is unlikely that many of these trees would be utilised by the Superb Parrot.

A review of the scientific literature investigating the habitat preferences of and use of the landscape by the Superb Parrot was undertaken by NGH Environmental and is documented in full in the Coppabella Wind Farm EPBC Technical Report (NGH Environmental 2017). These habitat preferences were used to redefine 'important' habitat for the Superb Parrot across the proposal area. The key findings from the literature review for redefining important habitat were:

- Distribution and abundance is influenced by tree cover and species composition (Manning 2004).
- The Superb Parrot is associated with low to moderate elevations and in landscapes of limited relief (Manning *et al.* 2006 & 2007).
- Superb Parrots occur where vegetation is not completely cleared but is not too dense (Manning *et al.* 2006 & 2007). Manning *et al.* (2006) suggest optimum amount of tree cover where Superb Parrots occur is between 0 and 35% (0% represents a few isolated trees).

- When making local foraging movements, Superb Parrots usually move along wooded corridors, or make local movements within breeding territory, seldom crossing extensive open areas (Manning *et al.* 2006 & 2007).
- Optimum elevation for the Superb Parrot between 350 m and 550 m. Below 350 m abundance increased with elevation and above 550 m there is a reduction in abundance as elevation increases. A general reduction in abundance was also observed as terrain variability increases (Manning *et al.* 2007). (Only 11 turbines are at elevations below 550m and terrain is quite variable).
- Forests and woodland used for nesting include the following eucalypt species that occur on site include: River Red Gum *Eucalyptus camaldulensis* (limited to Jugiong Creek), Blakely's Red Gum *E. blakelyi*, Apple Box *E. bridgesiana*, White Box *E. albens* and Red Box *E. polyanthemos*.

Based on this, important habitat and the most likely habitat to be occupied by the Superb Parrot was defined where the following criteria were met:

- Box-Gum Woodland below 550 m elevation, and
- Box-Gum Woodland (and derived grassland) between 0 – 35% tree cover.

The resulting important habitat for the Superb parrot is mapped in Appendix E.

There is 789 ha of important habitat for Superb Parrot within the Coppabella Wind Farm project site of which 48.2 ha occurs within the construction footprint. 65 HBTs occur within important habitat in the construction footprint which provide potential nesting sites for the Superb Parrot.

It is a commitment of the proposal to offset HBTs independent of the requirements of the FBA. Additionally, minimisation of impacts on HBTs, with particular reference to Whitefield's Road upgrades (only 4 HBTs to be removed along Whitefield's Road), are requirements of the project.

Offsets are being targeted to areas within the proposal area or in areas in close proximity to the site and would likely include areas that meet the definition of important habitat above. The proposal site also occurs within the core nesting area for the Superb Parrot (Baker-Gabb 2011). As offsets are being sought locally, it is likely that the offset site would also be within this core nesting area which would provide a long-term conservation outcome for the Superb Parrot. The offset commitment requires finalisation of an offset plan in consultation with OEH.

5.1.2 Barking Owl

This species was not recorded during nocturnal call playback surveys targeting this species in 2008 although territorial pairs tend to respond strongly to recordings of Barking Owl calls from up to 6 km away (OEH 2018).

Where it is known to exist, the Barking Owl occupies large territories of up to 6,000 ha with approximately 2,000 ha being more common in NSW (OEH 2018). It inhabits woodland and open forest, including fragmented remnants and partly cleared farmland (OEH 2018) and as such, most all of the wooded areas within the proposal area could provide potential habitat. It requires large hollows for nesting with entrances of diameter 20 – 46 cm and 20 – 300 cm depth. (NPWS 2003). Living trees are preferred and nest sites are used repeatedly over years by a pair (OEH 2018).

93 living HBTs with hollows greater than 20cm have been identified within the construction footprint that provide potential nesting habitat for the Barking Owl. It is a commitment of the proposal to offset all HBTs supplementary to the requirements of the FBA.

5.1.3 *Brown Treecreeper*

The Brown Treecreeper was not recorded during the 2008 – 2009 surveys for the Original BA but has been recorded subsequently during Superb Parrot monitoring in 2014, 2016 and 2017 and was detected during surveys by BLA on 01 March 2018. The woodland and forest habitat across the proposal site would be suitable for this species. Fallen timber is an important habitat component for foraging and hollows in standing dead or live trees and tree stumps are essential for nesting (OEH 2018). Fallen timber is generally more abundant within the more continuous areas of woodland and forest and often absent from the areas that are more highly cleared. The Brown Treecreeper is generally sedentary and considered to be resident in many locations, although some birds may disperse locally after breeding (OEH 2018). As such, not all of the proposal site is likely to provide preferred habitat for the Brown Treecreeper. Detailed micro habitat mapping for this species has not been conducted as the impacts to this species were considered to be relatively low in the original BA assessment. It is therefore assumed that all 283 living and dead HBTs that could be removed by the proposal provide potential nesting sites for this species.

As stated above, it is a commitment of the proposal to offset all HBTs supplementary to the requirements of the FBA therefore ensuring offsets are provided for the nesting habitat impacted by the proposal for the Brown Treecreeper.

5.1.4 *Microbats*

The Southern Myotis, Little Pied Bat, Eastern False Pipistrelle and Yellow-bellied Sheath-tail Bat were not recorded within the proposal area during the targeted Anabat surveys for the original BA in 2008 however, suitable roosting and breeding habitat is present across the proposal site in the form of HBTs, there are records throughout the region, additional targeted surveys have not been conducted and as such, they are considered to have the potential to occur.

Southern Myotis

Southern Myotis forage over streams and pools catching insects and small fish and roost in groups of 10 – 15 close to water (OEH 2018). They are widespread along the coast, but inland they are only generally found along major rivers and streams (OEH 2018). Jugiong Creek is the only major drainage line that would be likely to provide habitat for this species within the proposal area. The modification footprint crosses Jugiong Creek along the proposed overhead power line route only. HBT mapping has not been conducted along the overhead power line route as it is highly likely that any HBTs identified during the works could be avoided. There is one tree that could be hollow-bearing along Jugiong Creek within the current modification footprint that could provide potential habitat for the Southern Myotis.

The Little Pied Bat and Yellow-bellied Sheath-tail Bat

The Little Pied Bat prefers open woodland and dry open forest and the Yellow-bellied Sheath-tail Bat forages in most habitats (OEH 2018). All of the woodland and forest habitat across the proposal site provides habitat for these species. These species will utilise a range of hollow sizes and all 283 HBTs to be impact by the proposal provide potential roosting and nesting habitat. These species are highly mobile and would also utilise the large areas of habitat within the proposal area outside of the modification footprint.

5.2 RELOCATION OF INFRASTRUCTURE AWAY FROM AREAS WITH LARGE NUMBERS OF HOLLOW-BEARING TREES

In addition to the requests of the OEH letter on 25 January 2018 to avoid specific areas of habitat in Table 3-1 above, the OEH submission on the 23 October 2017 also states:

There are some turbines with an excessive number of hollow-bearing trees around them – for example turbines 36 and 41. As stated in previous responses to the original proposal, the close proximity of turbines to hollow-bearing trees is expected to affect their use by aerial species and basically quarantine the habitat and/or increase the strike rate of the turbines. The turbines should be removed, or moved, to reduce the high level of impact on birds and bats that is likely to result.

Opportunities to avoid impacts to HBTs were incorporated into the design submitted with modification application (Appendix A.4 of the MAEAR, NGH Environmental 2017). The ability to avoid impacts was however, somewhat constrained by other considerations, such as trying to stay where possible, within the consented development envelope.

Post submission of the MAEAR, the proponent has undertaken the additional design measures detailed in Table 5-1 below to avoid and minimise the impacts of the modified project on HBTs. It is difficult to avoid impacts to HBTs at Turbine 41 through micro-siting given the steep topography surrounding the approved turbine location. Removal of this turbine is not preferred as this turbine is important to the viability of the project in terms of energy generation. The measures described in Table 5-1 below have achieved avoidance at Turbine 36 and a number of other locations (refer Figure 5-1 to Figure 5-4).

Table 5-1 Additional design measures resulting in reduced impacts to HBTs

Location	Action undertaken	Outcome
Turbine 36	Turbine removed to avoid HBTs.	Avoidance of 58 HBTs.
Substation site	Adjustment of road (3m) to more clearly avoid the HBT near the substation identified by OEH (refer Table 3-1).	Better avoidance of one substantial HBT.
Road between Turbines 17 - 19	Relocation of road to avoid HBTs in this area.	Avoidance of 33 HBTs.
Turbines 75, 76 and 77	Removal of Turbines 75, 76 and 77 in response to community feedback.	Avoidance of seven HBTs.
Whitefield's Road	Redesign of the road to avoid removal of HBTs where possible.	Avoidance of 45 HBTs.
Final Outcome		A total of 144 HBTs avoided by the revised design

In addition to the specific design measures to avoid HBTs, the following design measures have reduced impacts on vegetation and habitats in general:

- The stockpile sites to the north and north-west of the substation site has been removed.
- Updated access road design that reduces the road width around bends. This was a result of utilising the dimensions of a specific wind turbine blade that is proposed to be used onsite for the logistic calculations, rather than the generic blade dimensions used in the previous design.



Figure 5-1 HBTs to be avoided by removing Turbine 36



Figure 5-2 Substantial HBT avoided at the substation site and removal of stockpile site to the north

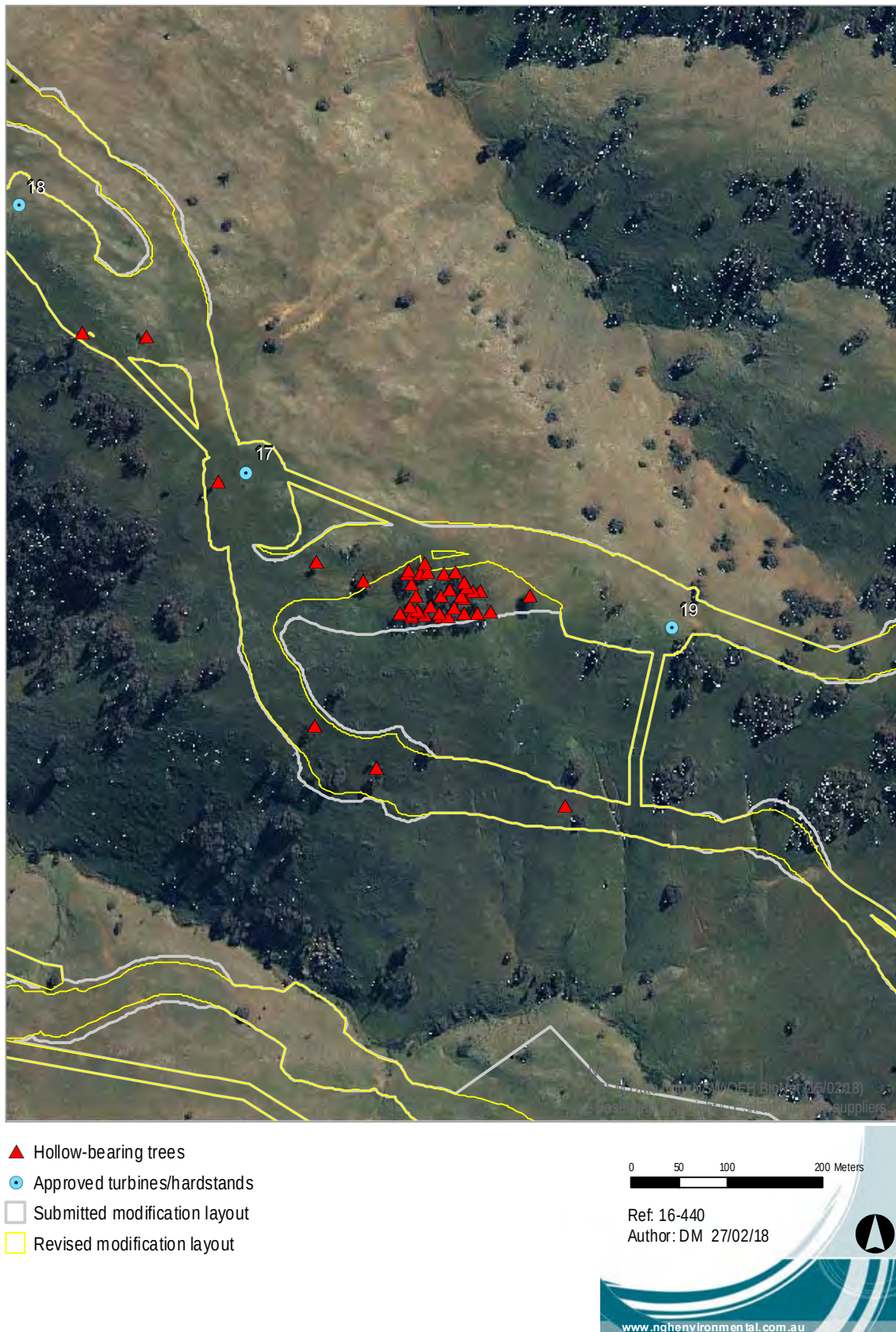


Figure 5-3 Avoidance of HBTs between Turbine 17 and 19



- ▲ Hollow-bearing trees
- Approved turbines/hardstands
- Submitted modification layout
- Revised modification layout

0 50 100 200 Meters

Ref. 16-440
Author: DM 27/02/18



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Figure 5-4 HBTs avoided by removing Turbines 75, 76 and 77

6 RECALCULATION OF OFFSETS REQUIRED BY THE MODIFICATION

In their 23 October 2017 submission OEH make the following comments regarding offsets:

As discussed above in the FBA section (point 3) [documented below], the offsets tabled in the EA are not accurate. OEH recommends the offsets be recalculated to include offsets for all the EEC and threatened species habitat area, regardless of whether some of the site scores are low.

3. All impacts to EEC vegetation must be offset in line with section 9.4.1.1, even if they are below a site score of <17. This means:
 - o the 95 ha of 'Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion – Low condition' will need to be offset.
 - o The 141.83 ha of 'Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion – Moderate to good (low diversity)' will need to be offset.
 - o Additionally, if the 14.63 ha of 'Long-leaved Box Dry Grass Forest Derived grassland' is predicted to provide habitat for threatened species, it will also need to be offset.

This advice from OEH is contrary to the outputs provided by the BioBanking Credit Calculator (BCC). As such, clarification was sought from the OEH BioBanking team as to the correct approach. Advice from John Siedel (Acting Team Leader – Ecosystem Assessment via email on 5 Feb 2018) directed NGH Environmental to the *NSW Biodiversity Offsets Policy for Major Projects: Practice note - Offset threshold for vegetation below a certain condition level* (refer Appendix F). This practice note makes a correction to the FBA and states that:

'... an offset is not required for an impact on native vegetation that has a site value score of less than 17, including native vegetation that is an endangered or critically endangered ecological community, and/or vegetation that is associated with threatened species habitat'.

This is consistent with the outputs of the BCC and this approach is applied below in determining the credit requirements of the modified project.

The key decision points made throughout the FBA process to determine the final credit requirement are documented below.

6.1 LANDSCAPE ASSESSMENT

A landscape assessment was undertaken in accordance with Chapter 4 of the FBA for linear developments. The following data was entered into the BCC:

- | | |
|-----------------------------|---|
| • IBRA region/sub-region | Murrumbidgee/Upper Slopes |
| • Mitchell Landscapes | Boorowa Volcanics, Young Hills and Slopes, Murrumbidgee – Tarcutta Channels and Floodplains |
| • Patch size | Entered as 1001 for each Mitchell Landscape |
| • Connectivity value class | Riparian buffer of a 4th or 5th order stream (Jugiong Creek) |
| • % Native vegetation cover | 26-30 before and 26-30 after development |
| • Area/Perimeter ratio | 64 before and 58 after development |

The resulting assessment circle score was 23.5.

6.2 VEGETATION ZONES AND PLOTS

Vegetation zones remain consistent with those presented in the MAEAR but incorporate the mapping changes requested by OEH in Section 3. Vegetation zones, area and plot requirements are documented in Table 6-1.

Table 6-1 Revised vegetation zones for the modified project

Vegetation community	PC type code	Plant community type name	Biometric condition	Zone area (ha) (approx.)	No. of plots required	Plots conducted
Box-Gum Woodland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate to good (high diversity)	0.33	1	BP2 (no longer in construction footprint but considered representative)
Box-Gum Woodland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate to good (low diversity)	31.44	4	BP1, BP3, YVP1, BP15 (just outside of construction footprint)
Box-Gum Woodland derived grassland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Low	77.15	3	BP5, YVP2, YVP3, YVP8
Box-Gum Woodland derived grassland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate to good (high diversity)	2.12	2	YVP4, YVP6
Box-Gum Woodland derived grassland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate to good (low diversity)	146.01	6	BP4, BP8, BP10 (just outside of construction footprint), YVP2A, YVP7, YVP9
Long-leaved Box Dry Grass Forest	MR598	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	Moderate to good (high diversity)	0.44	1	BP14 (no longer within construction footprint but considered representative)
Long-leaved Box Dry Grass Forest	MR598	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub	Moderate to good (low diversity)	6.26	3	BP9, YVP10, YVP11 (transect extends into adjacent Long-

Vegetation community	PC type code	Plant community type name	Biometric condition	Zone area (ha) (approx.)	No. of plots required	Plots conducted
		low open forest on hills in the southern part of the NSW South Western Slopes Bioregion				leaved Box Dry Grass Forest Derived Grassland)
Long-leaved Box Dry Grass Forest derived grassland	MR598	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	Moderate to good (low diversity)	12.24	3	YVP12, YVP13, YVP5
River Red Gum and riparian	MR616	Yellow Box - River Red Gum tall grassy riverine woodland of NSW South Western Slopes Bioregion and Riverina Bioregion	Moderate to good (low diversity)	0.27	1	BP13 (just outside of construction footprint)

6.3 HABITAT FEATURES

The following habitat features were entered for species credit species:

Impact	Common Name	Scientific Name	Feature
Yes	Golden Sun Moth	<i>Synemon plana</i>	Land within 40 m of grassland or grassy woodland containing dense cover of wallaby grasses (<i>Austrodanthonia</i> spp.)
Yes	Rosenberg's Goanna	<i>Varanus rosenbergi</i>	Land within 250 m of termite mounds or rock outcrops
Yes	Striped Legless Lizard	<i>Delma impar</i>	Land containing loose surface rock, cracking surface soils or tussock clumps
Yes	Small Purple-pea	<i>Swainsona recta</i>	Land containing a forb-rich grassy groundlayer
Yes	Booroolong Frog	<i>Litoria booroolongensis</i>	Land within 100 m of stream or creek banks
Yes	Pink-tailed Legless Lizard	<i>Aprasia parapulchella</i>	Land containing surface rocks (embedded or loose)
Yes	Dwarf Bush-pea	<i>Pultenaea humilis</i>	As per vegetation type (poorly known)
No	Sloane's Froglet	<i>Crinia sloanei</i>	Land within 50 m of identified breeding habitat
Yes	Austral Pillwort	<i>Pilularia novae-hollandiae</i>	Periodically waterlogged sites (including table drains and farm dams).

6.4 ECOSYSTEM CREDIT SPECIES

The following ecosystem credit species are predicted to occur by the BCC and contribute to the ecosystem credit requirements:

Predicted threatened species			
Common name	Scientific name *	TS offset multiplier	On site *
Barking Owl	<i>Ninox connivens</i>	3.0	Yes
Black-chinned Honeyeater (eastern subspecies)	<i>Melithreptus gularis</i> subsp. <i>gularis</i>	1.3	Yes
Brown Treecreeper (eastern subspecies)	<i>Climacteris picumnus</i> subsp. <i>victoriae</i>	2.0	Yes
Bush Stone-curlew	<i>Burhinus grallarius</i>	2.6	Yes
Diamond Firetail	<i>Stagonopleura guttata</i>	1.3	Yes
Eastern False Pipistrelle	<i>Falsistrellus tasmaniensis</i>	2.2	Yes
Flame Robin	<i>Petroica phoenicea</i>	1.3	Yes
Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>	2.0	Yes
Glossy Black-Cockatoo	<i>Calyptorhynchus lathami</i>	1.8	Yes
Grey-crowned Babbler (eastern subspecies)	<i>Pomatostomus temporalis</i> subsp. <i>temporalis</i>	1.3	Yes
Hooded Robin (south-eastern form)	<i>Melanodryas cucullata</i> subsp. <i>cucullata</i>	1.7	Yes
Little Eagle	<i>Hieraaetus morphnoides</i>	1.4	Yes
Little Lorikeet	<i>Glossopsitta pusilla</i>	1.8	Yes
Painted Honeyeater	<i>Grantiella picta</i>	1.3	Yes
Scarlet Robin	<i>Petroica boodang</i>	1.3	Yes
Speckled Warbler	<i>Chthonicola sagittata</i>	2.6	Yes
Spotted Harrier	<i>Circus assimilis</i>	1.4	Yes
Spotted-tailed Quoll	<i>Dasyurus maculatus</i>	2.6	Yes
Square-tailed Kite	<i>Lophoictinia isura</i>	1.4	Yes
Squirrel Glider population, Wagga Wagga Local Government Area	<i>Petaurus norfolcensis</i> - endangered population Wagga Wagga	2.2	Yes
Swift Parrot	<i>Lathamus discolor</i>	1.3	Yes
Turquoise Parrot	<i>Neophema pulchella</i>	1.8	Yes
Varied Sittella	<i>Daphoenositta chrysoptera</i>	1.3	Yes
Yellow-bellied Sheath-tail-bat	<i>Saccolaimus flaviventris</i>	2.2	Yes

6.5 SPECIES CREDIT SPECIES

The species credit species requiring survey, survey effort and conclusions regarding presence within the development site are documented in Section 4.

The Regent Honeyeater is the only species where surveys cannot be conclusive as to the presence or absence of the species and as such it has been assumed to occur. No other species credit species are considered likely to occur based on the results of the targeted surveys.

An expert report is being obtained according to the requirements of the FBA to determine the likelihood of this species to occur and, the area of habitat within the development site that would be impacted for the Regent Honeyeater if it is concluded that the species could occur. Following receipt of this report, the offset requirements for this species will be determined.

6.6 REVISED CREDIT REQUIREMENTS

The credit requirement of 1578 ecosystem and 3398 species credits provided in the MAEAR has been updated on the basis of:

- Updated vegetation mapping, as set out in Section 3 of this report
- Small changes to the layout, as a consequence of further detailed engineering design and avoidance measures set out in Sections 3.1 and 5.2 of this report

The results of the revised offset calculations are presented in Table 6-2 below. The credit profile is provided as Appendix G.

Table 6-2 Revised offset requirements for the project

Ecosystem credits

Vegetation community	PC type code	Plant community type name	Biometric condition	Management zone area (ha) (approx.)	Loss in site value score	Credits req for TS	Ecosystem credits required
Box-Gum Woodland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate to good (high diversity)	0.33	49.48	14	14
Box-Gum Woodland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate to good (low diversity)	31.44	32.29	946	946
Box-Gum Woodland derived grassland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Low	77.15	9.90	0	0
Box-Gum Woodland derived grassland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate to good (high diversity)	2.12	20.83	46	46
Box-Gum Woodland derived grassland	MR528	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate to good (low diversity)	146.01	14.58	2454	0
Long-leaved Box Dry Grass Forest	MR598	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	Moderate to good (high diversity)	0.44	32.81	13	13
Long-leaved Box Dry Grass Forest	MR598	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum	Moderate to good (low diversity)	6.26	66.15	347	347

Vegetation community	PC type code	Plant community type name	Biometric condition	Management zone area (ha) (approx.)	Loss in site value score	Credits req for TS	Ecosystem credits required
		tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion					
Long-leaved Box Dry Grass Forest derived grassland	MR598	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	Moderate to good (low diversity)	12.24	14.06	201	0
River Red Gum and riparian	MR616	Yellow Box - River Red Gum tall grassy riverine woodland of NSW South Western Slopes Bioregion and Riverina Bioregion	Moderate to good (low diversity)	0.27	31.77	8	8
					Total:		1366

Species credits

Scientific name	Common name	TS offset multiplier	Species credits required
<i>Anthochaera phrygia</i>	Regent Honeyeater	7.7	TBA

6.7 POTENTIAL TO SECURE OFFSETS

The updated credit requirement has been considered with regard to the feasibility of securing offsets for the project. The updated ecosystem credit requirement can be seen to be somewhat reduced which is mostly due to a reduction in the areas impacted within zones that are generating credits.

Under the FBA, several options to retire credits are available. Finding and securing land to retire credits onsite remains the proponent's preference.

7 BIRD AND BAT STRIKE – IMPLICATIONS FROM AN INCREASED RSA

An analysis of the incremental change to the impacts to birds and bats from the increased rotor swept area (RSA) of the proposed modified turbines has been conducted by Brett Land and Associates (BLA 2018). The full report is provided as Appendix H.

In summary (extracted from the executive summary of BLA 2018):

The proposed modified turbine dimensions are:

- Increased rotor radius from approved turbine blade length from between 45-60.5 metres to 70.15 metres increasing the total extent of each turbine's RSA to 15,460 m²;
- Minimum RSA height to approximately 30.7 metres above ground, which is over 1 metre higher than the previously planned minimum RSA height of 29.0 metres;
- Maximum RSA height (tip height) increased from 150 to 171 metres above ground.

The response to submissions layout also contains 75 turbines which is four less than the approved and modification application layout of 79 turbines.

Given the species of birds involved (common, widespread species in agricultural landscapes in south eastern Australia and few listed rare or threatened species) and the lifted lower RSA height, the higher larger turbines will likely:

- Have a slight reduction to the level of risk to the bird flights between 20 and 40 metres as the minimum turbines swept areas will increase in height by 1.7 metres and the RSA will decrease up to 40 metres in the 20 – 40 metre zone;
- Slightly increase the level of risk to birds flying between 40 and 80 metres through an increase in the extent (up to 10%) of the RSA up to 80 metres (i.e. 40-50m, 50-60m and 60-80 metres increases by 3%, 7% and 10% respectively);
- Increase risk slightly to the 1% of birds recorded flying between 80 and 100 meters due to the 15% increase in RSA between 80-100 metres;
- Increase the risk of collision by Wedge-tailed Eagles and other high-flying raptors; (The population risk to the WTE from collision with turbines is low given the low number of pairs using the area (three), the low frequency with which these flights occur and the non-threatened status of the mainland Australian sub-species of the eagle);
- Increase slightly the low risk to the Little Eagle, given its very low numbers and low frequency of interaction with turbines;
- Not significantly change risk to the Superb Parrot due to the minimal overall change to RSA extent below 60 metres, the height below which most flights by this species occur; and
- Not significantly increase risk to most of the species on the wind farm as they are common and widespread in agricultural settings in south eastern Australia.

Given the foregoing findings, the impacts of the proposed modified turbine design are not of conservation concern.

In relation to bats, most bat species recorded on the site at activity levels that indicate routine occurrence are common, widespread species in agricultural landscapes in south eastern Australia. The minimal change in RSA extent at heights where most bats fly (up to 60 metres) and small increase in the RSA between 60 and 100 metres are unlikely to lead to an increase in effects on bat populations of conservation concern.

The listed threatened bat, Eastern Bent-wing Bat is unlikely to experience any increased risk from the modification in turbine specifications proposed, since most of its flights are expected to occur in the area below the new lower RSA of approximately 30 metres.

8 ABORIGINAL CULTURAL HERITAGE

In their request (31 January 2018) DPE required confirmation of the extent of the additional Aboriginal cultural heritage assessment that was undertaken for the modified development footprint, including the location of additional survey transects.

The following advice has been provided by NSW Archaeology who conducted the Aboriginal Cultural Heritage Assessment:

The modification footprint has been comprehensively assessed by additional field survey and/or extrapolation of the relevant predictive model of site location for the area. The maps in the heritage report clearly show the survey units in respect of the proposed layout. Where, sections of the layout have not been surveyed, these areas are assessed to be of very low to negligible archaeological sensitivity and or potential. Based on the extensive survey conducted for the wind farm, the nature and distribution of the archaeological resource is very well understood. This approach to the assessment of certain areas via predictive modelling, such as for example crest landforms or steep slopes, was endorsed in detailed communications with the OEH archaeologist prior to the additional assessment and revision to the ACHAR. The heritage report clearly documents survey units that have been assessed by predictive modelling only. Where slight changes exist between Survey Units and the new layout, these areas are of very low to negligible potential and their omission is incidental.

Whitefield's Road – The entire length of Whitefield's Road has been surveyed, as documented in Table 3 and shown on Figure 8. [of the heritage report]

The Proposed Road west of the 132kV Powerline – The change in level of use on this existing road would have insignificant impacts on any Aboriginal objects that might be on that road in the vicinity of the creek. Any object on the road would already be comprehensively disturbed by previous road construction and use. Furthermore, the previous road construction and road usage would have significantly impacted the archaeological context of any object. This matter does not warrant any further consideration.

9 IMPACTS ALONG WHITEFIELD'S ROAD

Table 9-1 documents the impacts of the approved and modified project along Whitefield's Road. The impacts of the refined modified project on biodiversity are substantially less than what could have been impacted within the approved development envelope. The impacts to Aboriginal heritage items are unchanged as none have been recorded along Whitefield's Road.

Table 9-1 Impacts along Whitefield's Road for the approved and modified project

Impact	Approved project (development envelope)	Modified project (construction footprint)
Clearing of native vegetation	4.89ha	0.45ha
Removal of hollow-bearing trees	49 (potentially removed)	4 (actually expected to be removed)
Aboriginal heritage items	0	0

There are an additional eight HBTs that although not directly impacted by the modified proposal, have Structural Root Zones (SRZs¹) that extend into modified proposal design. The modified proposal utilises the existing Whitefield's Road as much as possible. The SRZs of a number of these trees have already been impacted by road maintenance activities along the existing road (refer Figure 9-1 below) however, the trees still appear healthy and stable. No further cutting or excavation would be required where the SRZs extend in to the existing Whitefield's Road. If anything, there may be a requirement to build-up the road surface slightly at these locations. As such, no additional impacts to the SRZs are anticipated and only the trees to be removed have been included in the impact calculations above (Table 9-1).

Some lopping of limbs of HBTs may be required to obtain the necessary clearances for delivery of turbine components. These limbs were assessed by NGH Environmental and a Goldwind Engineer in the field on 28 February 2018. None of the limbs requiring removal were found to be hollow-bearing.



Figure 9-1 Existing impacts to HBT SRZs along Whitefield's Road

10 IMPACTS ON BIODIVERSITY THAT REQUIRE FURTHER CONSIDERATION

According to Section 9.2 of the FBA, impacts that are considered to be 'complicated or severe' require further consideration by a consent authority. Section 9.2.1.3 defines these impacts as follows:

The assessor is required to identify impacts on biodiversity values that require further consideration. Impacts on biodiversity values that require further consideration are:

- a) *impacts on landscape features, being:*
 - i. *impacts that will reduce the width of vegetation in the riparian buffer zone bordering significant streams and rivers, important wetlands or estuarine areas in accordance with Subsection 9.2.3, or*

¹ As defined in AS 4970.

- ii. *impacts that will prevent species movement along corridors that have been identified as providing significant biodiversity linkages across the state in accordance with Subsection 9.2.3, and*
- b) *impacts on native vegetation that are likely to cause the extinction of an EEC/CEEC from an IBRA subregion or significantly reduce its viability in accordance with Subsection 9.2.4, and*
- c) *impacts on critical habitat or on threatened species or populations that are likely to cause the extinction of a species or population from an IBRA subregion or significantly reduce its viability in accordance with Subsection 9.2.5.*

Each of these criteria are considered below.

Impacts that will reduce the width of vegetation in the riparian buffer zone

The FBA defines this category as:

An impact of development on areas of native vegetation within:

- a) 20 m either side of a 4th and 5th order stream
- b) 50 m either side of a 6th order stream or higher, or
- c) 50 m around an estuarine area.

Jugiong Creek is classified as a 7th order stream where it crosses the development envelope along the proposed overhead transmission line route and as such, vegetation 50m either side constitutes the riparian zone. Works in this area would be restricted to the removal/lopping of trees where necessary for conductor clearances, however, considering the sparsity of trees these impacts are largely avoidable through the micro-siting of power pole locations. The modified project would be unlikely to reduce the width of vegetation in the riparian buffer zone of Jugiong Creek.

Impacts that will prevent species movement along corridors that have been identified as providing significant biodiversity linkages across the state

No state significant biodiversity links have been mapped or identified in a plan approved by the Chief Executive of OEH at the development site. The modified project would not impact on corridors that have been identified as providing significant biodiversity linkages across the state.

Impacts on native vegetation that are likely to cause the extinction of an EEC/CEEC from an IBRA subregion or significantly reduce its viability

The modified proposal will remove approximately 179.9 ha of the Box-Gum Woodland EEC, the majority of which (146 ha) is low diversity derived native grasslands that have been substantially modified. The Box-Gum Woodland EEC in this condition is well represented within the broader proposal site and across the locality. Areas of higher diversity Box-Gum Woodland and derived native grasslands would also be impacted by the modified project (2.4 ha). Efforts have been made to avoid these better quality areas where possible and the resulting residual impacts are only on a relatively small proportion of what is known to occur within the broader proposal area (approximately 2.4 ha would be removed from a total of a known 111 ha). As such, the proposal is unlikely to result in the extinction of the EEC within the broader proposal area nor the IBRA sub-region. The large areas that would remain within the proposal area would remain viable under current land management practices. Additionally, offsets would be established locally contributing to the long-term security of the EEC within the IBRA sub-region.

Impacts on critical habitat or on threatened species or populations that are likely to cause the extinction of a species or population from an IBRA subregion or significantly reduce its viability

The Coppabella Wind Farm occurs within the core nesting area for the Superb Parrot (Baker-Gabb 2011). The habitat at Coppabella Wind Farm would also be considered “*habitat critical to the survival of the Superb Parrot*”, according to the description provided on p.6 of the Recovery Plan (Baker-Gabb 2011). In summary, habitat critical to the survival of Superb Parrot is considered to be:

- Habitat used for nesting.
- Habitat used for foraging.

The species is known to forage within the proposal area and HBTs that occur within important habitat areas (refer to Section 5.1.1) provide potential nesting habitat. As such, the modified proposal will impact on habitat critical to the survival of the Superb Parrot. This has the potential to reduce its viability and is a matter that requires further consideration.

The information to be provided with impacts on threatened species that require further consideration is stipulated in Section 9.2.5.2 of the FBA and is provided in Section 10.2 below.

10.2 SUPERB PARROT – INFORMATION FOR FURTHER CONSIDERATION

10.2.1 Background Information

Local habitat

At the Coppabella Wind Farm project site, Superb Parrot habitat occurs in the form of Box Gum Woodland (BGW), including paddock trees within lower condition BGW; in total, there is 1003 ha of BGW of all condition classes within the broader Coppabella Wind Farm site, spread over the 6,445 ha proposal area. However, as discussed in Section 5.1.1, only a fraction of this broad habitat type is considered important for use by the species based off habitat preferences detailed for the species in literature and site surveys.

Literature indicates the following habitat preferences and use for Superb Parrot:

General

- The Superb Parrot forages in Box Eucalypt Woodland, particularly that dominated by Yellow Box or Grey Box (Webster 1988 in Baker-Gabb 2011).
- Distribution and abundance is influenced by tree cover and species composition (Manning 2004).
- The Superb Parrot is associated with low to moderate elevations and in landscapes of limited relief (Manning *et al.* 2006 & 2007).
- Superb Parrots occur where vegetation is not completely cleared but is not too dense (Manning *et al.* 2006 & 2007). Manning *et al.* (2006) suggest optimum amount of tree cover where Superb Parrots occur is between 0 and 35% (0% represents a few isolated trees).
- When making local foraging movements, Superb Parrots usually move along wooded corridors, or make local movements within breeding territory, seldom crossing extensive open areas (Manning *et al.* 2006 & 2007).
- Optimum elevation for the Superb Parrot between 350 m and 550 m. Below 350 m abundance increased with elevation and above 550 m there is a reduction in abundance as elevation increases. A general reduction in abundance was also observed as terrain variability increases (Manning *et al.* 2007).

Nesting

- Superb Parrot nest trees tend to be close to watercourses and within 10 km of BGW (Baker-Gabb 2011).
- The species is faithful to traditional nest sites (Webster 1988 in Baker-Gabb 2011).
- Blakely's Red Gum is an important nesting tree.
- Nest trees tend to be older, often affected by dieback with little regeneration (Manning 2004).
- Forests and woodland used for nesting include the following eucalypt species that occur on site include: River Red Gum *Eucalyptus camaldulensis* (limited to Jugiong Creek), Blakely's Red Gum *E. blakelyi*, Apple Box *E. bridgesiana*, White Box *E. albens* and Red Box *E. polyanthemos*.

The areas at Coppabella Wind Farm that match the microhabitat descriptions above are termed the 'important habitat' for Superb Parrot; this important habitat has been mapped for the wind farm as areas where both conditions below are met:

- BGW below 550 m elevation, and
- BGW (and derived grassland) between 0 – 35% tree cover.

There is 789 ha of important habitat for Superb Parrot within the Coppabella Wind Farm proposal area of which 48.2 ha occurs within the construction footprint (Refer Appendix E). 65 HBTs occur within important habitat in the construction footprint which provide potential nesting sites for the Superb Parrot

Regional habitat

The Coppabella Wind Farm is located near the South-west Slopes of NSW Key Biodiversity Area (KBA - formerly Important Bird Area). The KBA is very large and defined by the distribution of the south-west slopes population of Superb Parrots and key areas for wintering Swift Parrots. The boundary is determined by the core distribution of Superb Parrots and approximates to an 80 km-wide length of the inland slopes of the Great Dividing Range, with an extension south to include the important Swift Parrot sites of Livingstone NP, Tarcutta, Gundagai, Tumut and Adelong (Birdlife International 2018). Most of the wind farm lies adjacent the KBA, with a small area of the south-east section intersecting the KBA (Refer Figure 10-1 below).

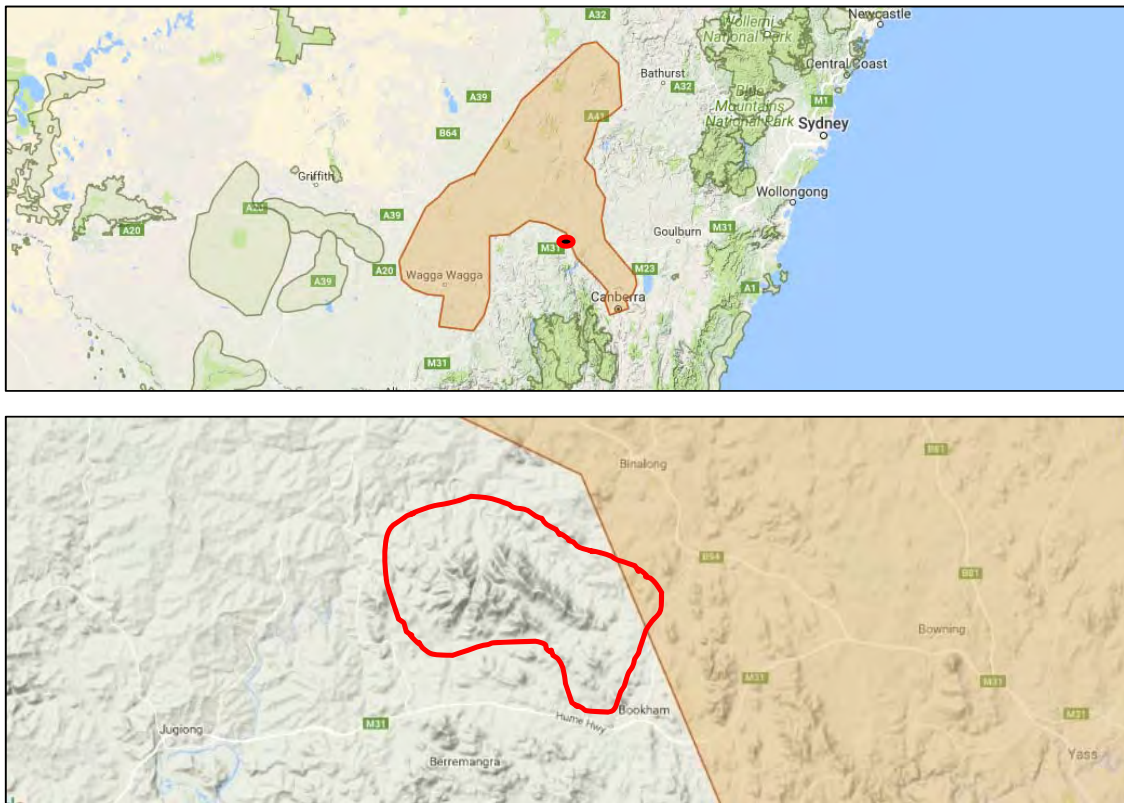


Figure 10-1 Location of the South-west Slopes Key Biodiversity Area and approximate location of Coppabella Wind Farm (identified in red). The lower figure is zoomed in to show the site's proximity to the Key Biodiversity Area.

Local Records

The Superb Parrot has been confirmed to use the Coppabella Wind Farm site with observations made during site surveys between 2008 and 2016. Observations on site include the following locations:

- Flying over woodland patch around proposed Turbines 78, 79, 80 and in the saddle to the south-east (identified in NGH Environmental 2009a as “flying ... over the woodland patch to the north of Coppabella cluster 10” p.96).
- Flying through woodland and grassland around 500 m south of proposed Turbine 41 (NGH Environmental 2015).
- 2016 targeted survey seen in woodland patches and roadside vegetation around proposed underground cabling route around 400 m west of Turbine 68 (NGH Environmental 2017a).
- 2017 targeted survey seen in woodland patches and roadside vegetation and south-east of Turbine 130 (NGH Environmental 2018).

Opportunistic observations outside of the Coppabella Wind Farm have been more numerous and include observations in remnant habitat:

- Along Whitefield's Road.
- North of Garry Owen Road.
- Along Coppabella Road.

- Along Illalong Road.
- Along the nearby railway corridor.

Additionally, the species has been seen on private property adjoining the project, in woodlands, planted shelterbelts and other linear corridors in the locality (Appendix D). Targeted flight path surveys undertaken 2014, 2016, and 2017 map the flight paths, generally in low lying area of the project site and surrounds, avoiding most of the proposed turbine ridges (Appendix D).

Regional Records

There are numerous records of the Superb Parrot in the region (refer Figure 10-2). There have been 277 individual records of the Superb Parrot within 50km of the project boundary since the first official records in 1982.

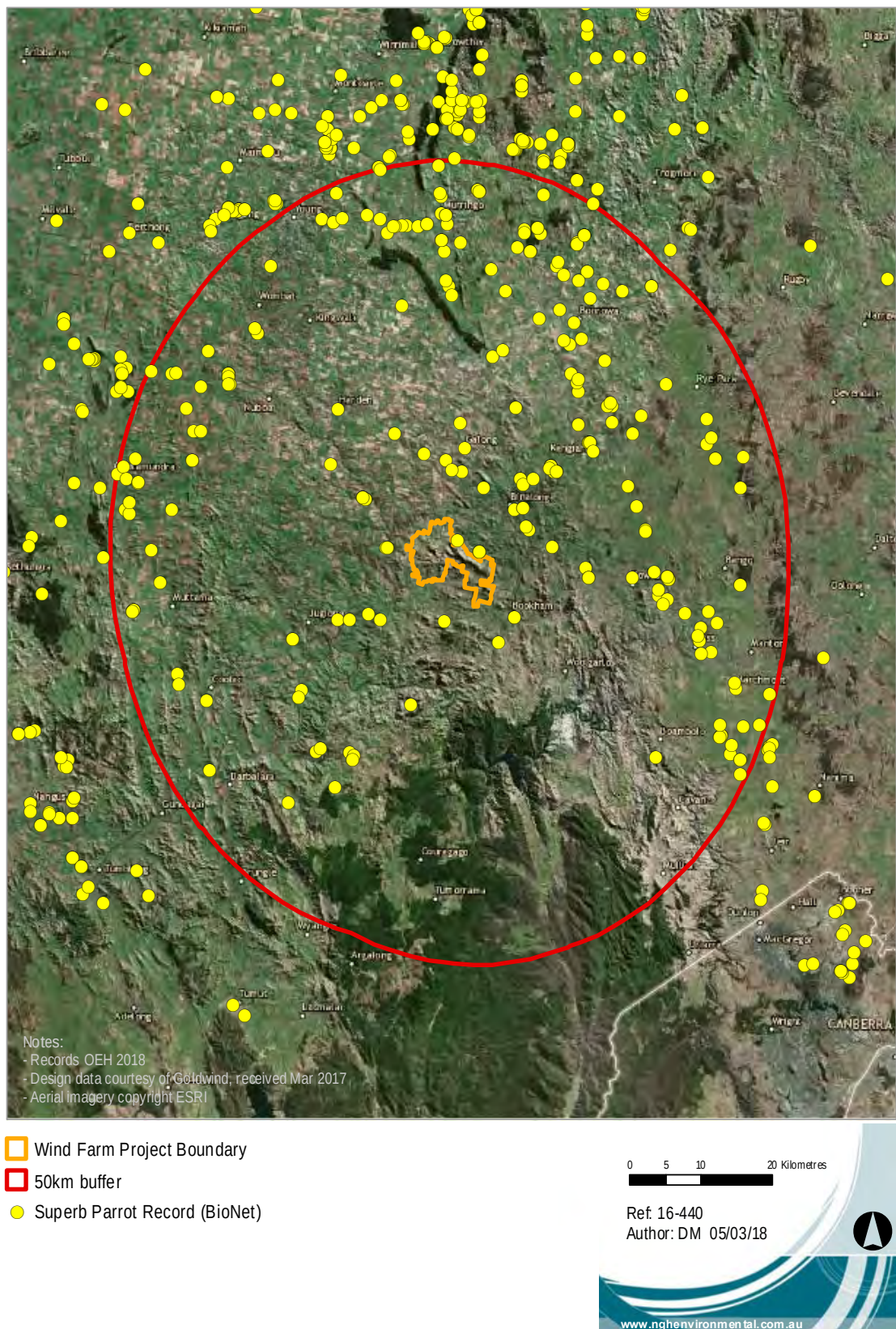


Figure 10-2 Regional records of the Superb Parrot (source: NSW OEH BioNet 05/03/18)

10.2.2 Information required to be provided by the FBA

a) the size of the local population directly and indirectly impacted by the development

Regional population estimates are generally ambiguous or limiting in their application as: 1) the species is a mobile landscape species it is hard to estimate the exact number of birds; and 2) the species is likely to respond to climate variation. The total population has been previously estimated at 5,000–8,000 birds and 6,500 adult birds (Garnett & Crowley 2000), while the re-assessment of the species for the Action Plan for Australian Birds 2010 (Garnett *et al.* 2011) concluded the number may be substantially greater than 10 000 with no evidence of recent declines. Regional estimates include 'several thousand' in the South-west Slopes KBA (NSW) including 50–100 birds in the ACT (Baker-Gabb 2011). The project site is located south of the KBA but borders its eastern arm south of Binalong.

In a survey of road verges on the NSW south-western slopes, there were 2.5 possible nesting trees per kilometre whilst just prior to the start of the breeding season there were 0.62 birds per kilometre (Davey, & Purchase 2004). While Manning *et al.* (2004) cites 106 nest trees for the South-west Slopes.

However, the abundance of the parrot in the south-west slopes has consistently been predicted to be higher compared to other areas it is known (Manning *et al.* 2007). This was supported by Manning *et al.* (2006) whereby systematic field surveys showed that the Superb Parrot is found throughout the agricultural matrix within the South-west Slopes. As a crude estimate if one assumes a minimum for the 'several thousand' population estimate for the South-west Slopes to be 2000, then the 22 observations of the species observed within the wind farm boundary would comprise 1.1% of this population (assuming all observations were different birds).

While 22 observations were recorded during biodiversity assessments at Coppabella Wind Farm, exact populations counts are not considered vital to this assessment as birds have not been regularly seen across the project area or within areas proposed for turbines.

b) the likely impact (including direct and indirect impacts) that the development will have on the habitat of the local population, including but not limited to:

- an estimate of the change in habitat available to the local population as a result of the proposed development
- the proposed loss, modification, destruction or isolation of the available habitat used by the local population, and
- modification of habitat required for the maintenance of processes important to the species' life cycle, genetic diversity and long-term evolutionary development.

The area of occupancy for Superb Parrot is estimated at approximately 5,360 km² (or 536 000 ha) and in NSW includes the Riverina, South-West Slopes and Southern Tablelands (TSSC 2016). The action would involve the clearing of around 48.2 ha of important habitat for Superb Parrot within the wind farm boundary. Clearing of 48.2 ha equates to less than 0.01% of the total area of occupancy.

Up to 65 hollow-bearing trees would be removed specifically from clearing of important habitat. Across the whole construction footprint, around 283 hollow-bearing trees are estimated to require removal. It is assumed that all HBT cleared within the important habitat area are potentially suitable Superb Parrot nest trees although in actuality only a portion of these are likely to meet the parrot's requirements which are detailed in the Recovery Plan (e.g. close to water, with entrance 5-13 m above ground, within 10 km of extensive foraging habitat; Baker-Gabb 2011). Another assumption made is that the density and suitability

of HBT is similar in important habitat adjacent to the construction footprint². The percentage of hollow-bearing trees cleared to that assumed available in important habitat is 6.9%.

The loss of 76.9% of assumed available breeding habitat (i.e. hollow-bearing trees) within the areas mapped as important habitat by NGH Environmental, is considered unlikely to lead to a long-term decrease in the size of the important Superb Parrot population that occurs at Coppabella Wind Farm.

The Superb Parrot habitat within or nearby the project area includes scattered trees in pasture, woodland and forest patches and vegetated corridors along roads, gullies and waterways. Direct impacts to Superb Parrot habitat are spread across the 6,445 ha project area rather than concentrated in a small area and although the action would reduce 'important habitat' through clearing small discrete areas, the landscape within the project area and overall habitat availability would essentially remain unchanged.

The 48.2 ha of important habitat to be removed within the wind farm boundary is not considered critical to the ongoing viability of the species. While some hollow-bearing trees will be removed for the project, the quality of the hollows and number of them to be removed within and already agricultural landscape is not considered to be critical to maintain genetic diversity or for evolutionary development. Further discussion of breeding habitat is detailed below.

c) the likely impact on the ecology of the local population. At a minimum, address the following: breeding, foraging, roosting, dispersal or movement pathways.

Breeding, foraging and roosting impacts

There is no formally listed Critical Habitat relevant to Superb Parrot. However, the project site is within one of the three main known breeding areas for the species which is bounded by Molong, Rye Park, Yass, Coolac, Cootamundra and Young (this is linked to the South-west Slopes KBA) (Baker-Gabb 2011). Given the wind farm is located within this core breeding area, removal of hollow-bearing trees may be a potential risk for this species. As already discussed, it is estimated that 65 hollow-bearing trees would be removed in important Superb Parrot habitat within the wind farm boundary. As detailed information is not available for each hollow-bearing tree at this time, a worst-case scenario is assumed that all the hollow-bearing trees removed within the important habitat would be suitable nesting habitat for Superb Parrot.

Boorowa is a known breeding area regularly used by the Superb Parrot that is approximately 30 km north of the proposed wind farm. Parrots are commonly observed in this area and it is expected the flatter, low-lying terrain (i.e. < 550 m) that extends out between 10 and 15 km from Boorowa township provides appropriate resources used by this species, including large number of crops surrounded by Box Gum Woodland habitat. Superb Parrots were regularly observed in greater numbers (i.e. within flocks and commonly as individuals) along remnant roadside habitat nearby Binalong which is north of the project boundary and about 15 km south of Boorowa during targeted Superb Parrot flight path mapping surveys. The higher numbers observed near Binalong and Boorowa compared to the wind farm indicate a preference for the low-lying habitats nearby these townships over higher altitudes such as ridge tops associated with the proposed wind farm. The preference of the Superb Parrot for the low-lying areas

² In important habitat in construction footprint, there is assumed to be 76 HBT within 60 ha, or 1.27 HBT per hectare (i.e. $76 \text{ HBT} \div 60 \text{ ha}$). Assuming density and suitability of HBT is equal in important habitat outside of the construction footprint, there would be 926 HBT in important habitat outside of the construction footprint. This is calculated by $1.27 \text{ HBT} \times 789 \text{ ha important habitat on site (1002 HBT)}$ minus 76 HBT in the construction footprint. Clearing represents 7.5%, i.e. $76 \text{ HBT} \div 1002 \text{ HBT} \times 100\%$.

suggests that infrastructure development, which will be concentrated on ridges, will generally be outside of breeding habitat.

It is possible that the breeding cycle of Superb Parrot could be disrupted during the wind farm construction phase (expected to last 18 – 24 months, Epuron 2014). Impacts, such as loss of a potential or historical nesting trees, are likely to be confined to a discrete number of breeding pairs though, rather than disrupting breeding at a population scale. Specifically, mature woodland that would typically support a higher number of hollows have been designated as high constraints and the proposal has primarily committed to avoiding these areas. Further commitments of the proposal include minimisation of tree hollow removal and offsetting of all hollows removed so minimal impact on breeding habitat is anticipated.

Manning *et al.* (2006) further suggests that although the Superb Parrot has been recorded traveling up to 10 km from nest sites, surrounds of up to 2 km of a location seem to be most important in the South-West Slopes, i.e. suggesting it is more efficient to forage closer to nest sites. Flight path mapping at Coppabella Wind Farm shows the parrots did not undertake long range and large-scale movements across ridge lines. In particular, the species was most regularly sighted roosting or foraging along roadsides (particularly Whitefield Road, Garryowen Road and the Hume Highway) which supports better quality woodland habitat as opposed to the more degraded woodland of the project area, indicating the species is likely to prefer better quality habitat if available. While foraging habitat would also be cleared, the action would not substantially change the overall foraging habitat availability or habitat matrix. The proposal would primarily impact upon breeding habitat for the species.

Dispersal or movement impacts

Regional records of the Superb Parrot are concentrated to the west and north of the project site but are less frequent nearby the project site. The records suggest the parrot relies on movement to the west of the project site confirming the assumption of Webster 1988 that the breeding population move west from the inland slopes during winter after the breeding season (Figure 10-3).

Results from Coppabella Wind Farm flight path mapping over three years (2014, 2016 and 2017) conclusively indicate that:

- The occurrence of Superb Parrots is very low within areas marked as potential turbine locations at the Coppabella precinct. The species has been observed only on one occasion during each survey week in every monitoring year.
- The Superb parrot is predominantly observed outside the wind farm site within the surrounding areas of the region. The most notable location the species has been observed outside the wind farm in higher numbers across the three monitoring years is at Whitefield's Road within an Acacia shelter belt.
- All observations of Superb Parrots within and outside of the site suggest that Superb Parrots typically favour habitat outside the wind farm boundary and follow corridors of vegetation, particularly roadside vegetation in lower lying areas.
- The average flight height was between approximately 10-15m, with very few records above 30m and only two records at a maximum height of 40m. The 40m flight height was recorded offsite at the shelter belt on Whitefield's Road both in 2014 and 2016. Typically, however, the species was predominantly recorded flying relatively low to the ground and below canopy height.
- The species was never observed flying across or along the top of large ridgelines where proposed turbine locations are sited, with the one exception in 2016 of the observed flights near Turbines 126 – 129. The area around Turbines 126-129 supports hills and

ridges of lower elevation in comparison with the other turbine locations which are sited on steeper hills and ridgelines of higher elevation.

Overall, results indicate that Superb Parrots are not moving across the ridges proposed for turbines and do not undertake large-scale movements at higher elevations (i.e. at rotor-swept-area height) across the Coppabella Precinct. Given the large survey effort undertaken across three different monitoring years, the number and location of Superb Parrot records overall (within and outside the Coppabella precinct) and the flight heights observed, it is considered unlikely that any high use flight pathways exist in areas that would be developed for the Coppabella wind turbines.

Local migration routes are not known nearby the project site. As suggested above, the species is most likely to forage up to 2 km from nesting sites and at the micro scale, distribution and abundance is thought to be influenced by tree cover and foraging availability (Manning *et al.* 2006). Therefore, the wind farm is unlikely to affect flight behaviour or dispersal of the species from that already occurring.

An analysis of the collision risks for birds and bats and specifically the Superb Parrot that would arise from the modified project was undertaken by BLA (BLA 2017b). This is discussed in more detail in Section 7. Relevant to the Superb Parrot, the BLA report concluded that the larger, higher turbines would likely:

- *Reduce the overall level of risk to the 20% of all bird flights between 20 and 30 metres as the turbines will increase in height by 7.85 metres.*
- *Decrease the level of risk to birds flying between 30 and 100 metres by a reduction in the extent of the RSA below 60 metres.*
- *Decrease risk to the Superb Parrot due to the decrease in RSA extent below 60 metres, the height below which most flights by this species occur.*

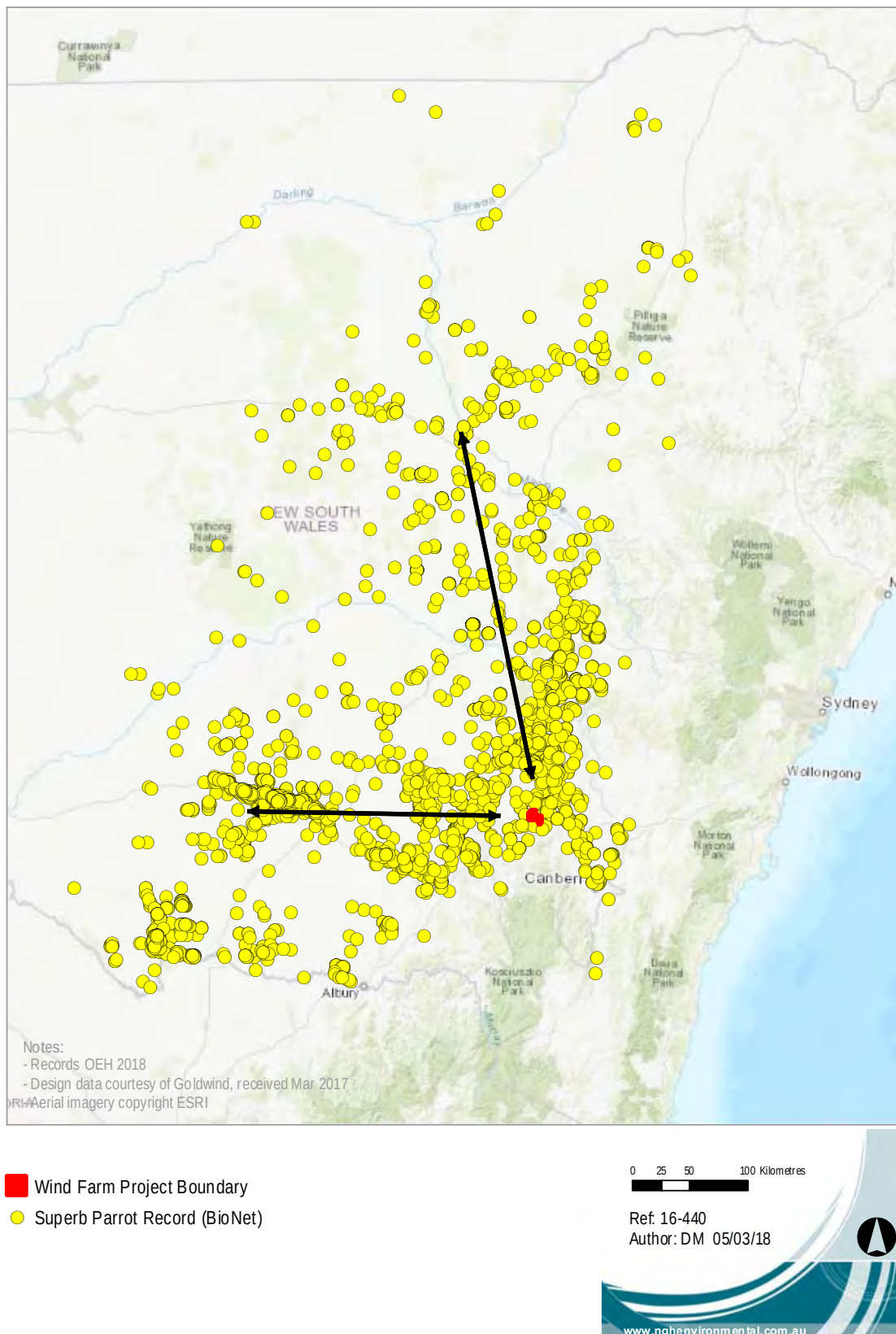


Figure 10-3 Regional NSW records for the Superb Parrot.

d) a description of the extent to which the local population will become fragmented or isolated as a result of the proposed development

As mentioned above, the area of occupancy for Superb Parrot is estimated at approximately 5,360 km² (TSSC 2016). To reduce the area of occupancy, the action would need to effectively render an area of habitat unusable to the species. The action would not reduce the area of occupancy as the Superb Parrot would be able to continue utilising the matrix of habitat scattered throughout the Coppabella Wind Farm. The low risk of collision verified by BLA supports this assumption.

Fragmentation of habitat for this highly mobile species could occur if large areas of wooded habitat, vegetated corridors or hollow-bearing trees were completely removed. The construction of the wind farm would not affect the ability of Superb Parrot to move through the landscape as the matrix of vegetated corridors, patches of woodland and scattered trees throughout grassland would be largely retained over the project area. The action would not affect the nature of the landscape (agricultural matrix) or interrupt vegetated movement corridors (lower relief areas) and so is unlikely to affect dispersal.

While a small area of the south-east section of the wind farm will intersect the South-west Slopes KBA (Figure 10-1), the vast majority will remain unaffected by the proposal. This KBA is a large area and considered core habitat area for the species, the project will not reduce the viability of the KBA or fragment the area.

e) the relationship of the local population to other population/populations of the species. This must include consideration of the interaction and importance of the local population to other population/populations for factors such as breeding, dispersal and genetic viability/diversity, and whether the local population is at the limit of the species' range

As mentioned in point a), population estimates are outdated and precise population and abundance of Superb Parrots cannot be estimated for specific regions as this information is not available. For the purposes of this report we assume the local population to include the South-west Slopes region and KBA. As very few individuals of the species have been observed within the actual wind farm, the South-west population occurs across a relatively large area and includes at least several thousand birds, the proposal will not affect genetic viability or diversity. Please refer to point a) for more detailed discussion on population.

f) the extent to which the proposed development will lead to an increase in threats and indirect impacts, including impacts from invasive flora and fauna, that may in turn lead to a decrease in the viability of the local population

The National Recovery Plan notes that cats and foxes pose a risk to Superb Parrot when foraging on the ground although does not list them as a major threat (Baker-Gabb 2011). Fox was recorded once during surveys; Atlas of Living Australia shows many records in the region including around the site. Cat records are scattered through the district, the closest two records being approximately 10 km south and east of the site. A major threat to Superb Parrot is competition for nest hollows, such as from the invasive and exotic Common Starling (Baker-Gabb 2011). Regional and local records for Common Starling are more numerous than Superb Parrot (ALA 2017). Thus, the action would not cause or facilitate these invasive species becoming establish as they are already established in the Superb Parrot habitat.

Superb Parrot may be susceptible to *Psittacine* beak and feather disease. This viral disease spread between birds, is of most concern in captivity situations and parrots under stress due to environmental conditions may be most susceptible (DEH 2004). The disease is already present in the wild bird population and would not be introduced by the action.

g) the measure/s proposed to contribute to the recovery of the species in the IBRA subregion

Several measures relevant to management of biodiversity impacts are committed to by the proponent. In particular, the Modification Application (NGH Environmental 2017c) currently with NSW DPE for determination commits to all original NSW approval conditions, including the Statements of Commitment (SoC's) made by the proponent. These commitments are still considered relevant to the Coppabella Wind Farm and work toward satisfying them has commenced. Approval conditions were also issued by the Commonwealth Department of Environment.

The measures and commitments relevant to the Superb Parrot include:

- *Preparation of a Biodiversity Management Plan to minimise impact on BGW during construction and birds and bats during operation.*

The plan requires the accurate identification, mapping and quantification of all HBTs within the final construction footprint prior to construction. This has now been completed (as of March 2018).

- *Investigation of site usage by Superb Parrot to review importance of the site and potential collision risk of the species.*

Occupancy and flight mapping surveys have now been completed over 2014, 2016 and 2017, confirming no high use flight paths coincide with the approved turbine sites.

- *Condition 19 (proposed condition): the applicant shall ensure no more than 181 ha of Box Gum Woodland EEC ... is cleared for the development unless the Secretary agrees otherwise.*

This updated impact area was proposed in the Modification Application (submitted in September 2017; MAEAR, NGH Environmental 2017).

- *Requirement for an Offset Strategy that provides for the ongoing protection of the Superb Parrot:*

It is noted that there is approximately 886 ha of NSW listed EEC available on residual areas of the project site that will more than satisfy Superb Parrot offset requirements. There is a continuing commitment to offset hollow-bearing trees removed by the project. There is a commitment to ensure that offset lands meet the following criteria where possible:

- Secure land within or on land immediately adjacent the wind farm;
- Areas identified as high constraint within the wind farm, where these areas occur sufficient distance from wind farm infrastructure;
- Areas of EEC vegetation in better quality in the lower elevation landscape providing specific habitat for Superb Parrot; and
- Areas of more intact woodland to retain hollow-bearing trees and provide landscape connectivity in a relatively cleared and open landscape.

11 CONCLUSION

The proposed modifications to the Development Consent being sought in the MAEAR are required to deliver an efficient, constructible and commercially viable project utilising current wind farm technology while minimising impacts to the extent practically and reasonably feasible. The changes proposed reflect technological improvements in the wind farm industry, improved site knowledge and understanding of the construction process following detailed design, additional site investigations and pre-construction planning.

In consideration of the submissions from OEH and DPE this report provides supplementary information to the biodiversity and Aboriginal heritage assessments in the Coppabella Wind Farm Environmental Assessment for Modification One (MAEAR, NGH Environmental 2017).

The key additional information informing the responses provides improved confidence in mapping including:

- More robust vegetation mapping, informed by OEH advice and site inspection
- More comprehensive hollow bearing tree mapping
- Additional targeted surveys including threatened flora and Koala
- Additional Superb Parrot mapping results
- Additional Regent Honeyeater habitat mapping
- Further review of assessments for GSM
- Updated offset calculations and additional information on key decision points for the calculations
- Provision of information for impacts that require further consideration.

This report also provides the results of further efforts to minimise impacts of the project:

- Four turbines removed (T75, 76, 77 and T36)
- Adjustments to layout (track routes) and avoidance of impacts.

This information has resulted in an updated and more accurate assessment of:

- Hollow bearing tree impacts and impacts on relevant hollow-dependant fauna
- Updated FBA credit requirement for the project.

With the exception of the updated credit requirement, no changes to the proposed mitigation strategies or project commitments concerning biodiversity or Aboriginal heritage are considered warranted or are proposed on the basis of the additional information provided in this report.

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APPENDIX A ADDITIONAL INFORMATION REQUEST FROM DPE

Sent: Wednesday, 31 January 2018 3:33 PM

To: Jeff Bembrick <jeffbembrick@goldwindaustralia.com>

Cc: Tom Nielsen <TomNielsen@goldwindaustralia.com>

Subject: Yass Valley (Coppabella) Wind Farm - Biodiversity / Aboriginal cultural heritage additional information

Hi Jeff,

As you are aware, the Department has received a letter from OEH, dated 25 January 2018, outlining the outcomes from the site visit held on 15 January 2018, regarding updates required to the vegetation mapping for the modification application for the Yass Valley (Coppabella) Wind Farm.

In light of this most recent letter, and the previous advice received from OEH, dated 23 October 2017, the Department is seeking the following further information to supplement the biodiversity and Aboriginal cultural heritage assessments in the Environmental Impact Statement, in order to inform it's assessment of the modification application.

The Department notes that some of the below matters were addressed by Goldwind in its comments to the Department, dated 28 November 2017. The Department requests that a single consolidated response be provided that addresses all of the residual matters, inclusive of anything addressed in those previous comments.

1. Framework for Biodiversity Assessment (FBA)

- update the biodiversity assessment to meet the requirements of the FBA, as agreed by representatives of NGH Environmental, Goldwind and OEH at the site visit on 15 January 2018.

2. Vegetation mapping

- update vegetation mapping in accordance with OEH's advice; and
- consider and address OEH's comments regarding the potential relocation of infrastructure away from areas of Box Gum Woodland EEC in moderate to good condition.

3. Threatened species surveys

- provide clarification regarding additional surveys undertaken and threatened species considered (as per comments dated 28 November 2017); and
- consider and address OEH's comments regarding the Golden Sun Moth (as per comments dated 28 November 2017).

4. Hollow bearing trees

- confirm which, and to what extent, species would be impacted by the removal of hollow-bearing trees; and
- consider and address OEH's comments regarding the potential relocation of infrastructure away from areas with large numbers of hollow bearing trees.

5. Offsets

- recalculate offset requirements based on updated vegetation mapping in accordance with OEH's advice.

6. Bird and bat strike

- clarify the incremental change to the impacts to birds and bats from the increased rotor swept area (RSA) of the proposed modified turbines.

7. Aboriginal cultural heritage

- confirm the extent of the additional Aboriginal cultural heritage assessment that was undertaken for the modified development footprint, including the location of additional survey transects.

8. Whitefield's Road

- confirm that the project as modified would not result in any impacts additional to those of the project as approved along Whitefield's Road, including impacts to vegetation, hollow bearing trees and aboriginal heritage items.

The Department requests that this information be provided as soon as possible to assist in progressing the assessment of the modification application, but at the latest by 28 February 2018.

Thank you and feel free to contact me with any questions.



APPENDIX B REVISED VEGETATION MAPPING

APPENDIX C SURVEY LOCATIONS FOR CANDIDATE SPECIES

**SURVEY LOCATIONS FOR
CANDIDATE SPECIES**

Coppabella Wind Farm

- Approved turbines/hardstands
- Construction footprint with 5m buffer
- Proposed 132kV powerline
- Project Area

2008

- Frog census and aquatic habitat assessment
- Bird census survey
- Habitat assessment
- Reptile survey
- Vegetation survey points
- Rock rolling and habitat searches 2008
- Tree Elliot traps

2009

- Barking Owl, Squirrel Glider and Bush Stone Curlew targeted survey areas

2012

- Bird census survey
- Reptile survey

2013

- GSM survey locations

2014

- Biometric plots

2015

- GSM and SLL survey tracks
- Biometric plots

2016

- Biometric plots

2017

- Biometric plots
- Targeted threatened flora species survey tracks

2018

- Koala SAT survey points



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Ref: 16440
Author: JB 15/03/2018



Notes:
- Design courtesy of Goldwind, received March 2018
- Aerial imagery courtesy of Epuron 2012
- Survey effort NGH Environmental 2008-2018

APPENDIX D TARGETED SURVEY REPORTS

D.1 THREATENED FLORA OCTOBER 2017

D.2 THREATENED FLORA JANUARY 2018

D.3 KOALA SURVEYS FEBRUARY 2018

D.4 GOLDEN SUN MOTH SURVEYS 2013

D.5 GOLDEN SUN MOTH SURVEYS 2014 – 2015

D.6 HOLLOW-BEARING TREE SURVEYS

D.7 TARGETED SUPERB PARROT SURVEYS

APPENDIX E SUPERB PARROT AND REGENT HONEYEATER HABITAT MAPPING

SUPERB PARROT IMPORTANT HABITAT

Coppabella Wind Farm

- Construction footprint with 5m buffer
- Proposed 132kV powerline
- Project Area
- Hollow-bearing trees
- Superb Parrot observation
- Superb Parrot preferred habitat

Notes:
- HBT recorded by NGH Environmental
- Habitat digitised by NGH Environmental 2017
- Design courtesy of Goldwind, received March 2018
- Aerial imagery courtesy of Epuron 2012



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Ref: 16440
Author: JB 15/03/2018



REGENT HONEYEATER HABITAT

Coppabella Wind Farm

- Construction footprint with 5m buffer
- Proposed 132kV powerline
- Project Area
- Regent Honeater habitat

Notes:
- Habitat provided by BLA 2018
- Design courtesy of Goldwind, received March 2018
- Aerial imagery courtesy of Epuron 2012



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Ref: 16440
Author: JB 15/03/2018



**APPENDIX F NSW BIODIVERSITY OFFSETS POLICY
FOR MAJOR PROJECTS: PRACTICE NOTE -
OFFSET THRESHOLD FOR VEGETATION
BELOW A CERTAIN CONDITION LEVEL**



NSW Biodiversity Offsets Policy for Major Projects: Practice note

Offset threshold for vegetation below a certain condition level

Overview

The purpose of this practice note is to make a correction to the Framework for Biodiversity Assessment (FBA) to confirm the circumstances where an offset is not required due to vegetation being below a certain condition level. This change makes the FBA consistent with the NSW Biodiversity Offsets Policy for Major Projects (the policy).

Background

The policy defines the circumstances where a biodiversity offset is not required (page 17). These include where vegetation is either:

- below a certain condition level, or
- not an endangered or critically endangered ecological community, or threatened species habitat.

The policy states that an offset is required for threatened species, populations, ecological communities and their habitat (provided the ecological community or habitat is above the condition threshold).

The condition threshold for where an offset is not required for impacts on native vegetation is set out in section 9.4.1 of the FBA. The condition threshold is defined as vegetation that has a site value score of less than 17 when compared to vegetation that is in benchmark condition (i.e. vegetation that has a site value score of 100).

However, the FBA further states in paragraph 9.4.1.1(b) that the condition threshold does not apply where the vegetation is also an endangered or critically endangered ecological community. This means that the application of the offset threshold in the FBA is not consistent with the policy.

What does the condition threshold mean?

Vegetation that is below the condition threshold is vegetation that is in a poor condition state. Typically this is vegetation where the majority of the site condition attributes are substantially outside of benchmark condition. Any offset requirements for vegetation in this condition state are low in comparison to impacts on vegetation in good condition. Where a development site includes areas of vegetation in good condition and in poor condition, it is preferable that the development site is configured to avoid impacts on vegetation in good condition.

Application of the condition threshold

To ensure consistent application of the policy and the FBA during the transition period, this practice note makes a correction to the FBA to confirm that a biodiversity offset is not required for impacts on native vegetation below the condition threshold.

This means that an offset is not required for an impact on native vegetation that has a site value score of less than 17, including native vegetation that is an endangered or critically endangered ecological community, and/or vegetation that is associated with threatened species habitat (as represented by ecosystem credits). An offset may still be required for impacts on species credit species.

The condition threshold applies to any vegetation zone on the development site with a site value score of less than 17 following an assessment of the vegetation according to section 5 of the FBA.

Example of how the offset threshold applies

Native vegetation on a proposed development site is assessed to identify the plant community types present. An area of vegetation on the development site is in poor condition. This area of vegetation consists of the same plant community type and is defined as a vegetation zone as per section 5 of the FBA. Information collected by the assessor determines that the site value score for this vegetation zone is less than 17.

Scenario 1:

The assessment confirms that the plant community is also an endangered ecological community. Threatened species surveys undertaken on the development site reveal that the plant community is not habitat for any threatened species. Accordingly, no ecosystem credits or species credits are required for the impact of development on this vegetation zone.

Scenario 2:

An assessment of the native plant community determines that it is not an endangered community. However, threatened species surveys undertaken on the development site reveal that the plant community is habitat for an endangered flora species. As a result, no ecosystem credits are required for the impact of the development on this vegetation zone. However, species credits are required for the impact of development on the flora species.

Next steps

OEH will monitor the application of the condition threshold during the transition period of the policy to assess the frequency that the offset threshold is triggered by a major project, the context of its use in the planning and design of a development and the extent of area to which the threshold applies.

Authorised by:

Director – Conservation and Development Policy Branch,
NSW Office of Environment and Heritage

Director – Environmental Programs Branch,
NSW Office of Environment and Heritage

Published by:
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59 Goulburn Street, Sydney NSW 2000
www.environment.nsw.gov.au

OEH 2015/0420
July 2015

APPENDIX G BCC CREDIT REPORTS FOR THE DEVELOPMENT SITE

Biodiversity credit report



This report identifies the number and type of biodiversity credits required for a major project.

Date of report: 26/03/2018

Time: 2:13:44PM

Calculator version: v4.0

Major Project details

Proposal ID: 144/2017/4423MP

Proposal name: Coppabella Wind Farm

Proposal address: Hume Highway Bookham NSW 2582

Proponent name: Goldwind

Proponent address: Suite 2, Level 23 201 Elizabeth Street Sydney NSW 2000

Proponent phone: 02 9008 1770

Assessor name: Dave Maynard

Assessor address: PO Box 470 Bega NSW 2550

Assessor phone: (02) 64928311

Assessor accreditation: 144

Summary of ecosystem credits required

Plant Community type	Area (ha)	Credits created
Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	257.05	1,006.30
Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	18.94	360.00
Yellow Box - River Red Gum tall grassy riverine woodland of NSW South Western Slopes Bioregion and Riverina Bioregion	0.27	8.02
Total	276.26	1,374

Credit profiles

1. Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion, (MR528)

Number of ecosystem credits created	1,006
IBRA sub-region	Upper Slopes - Murrumbidgee

Offset options - Plant Community types	Offset options - IBRA sub-regions
Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion, (MR528) White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion, (MR561) Red Box - White Box +/- Red Stringybark hill woodland in the NSW South Western Slopes Bioregion, (MR677)	Upper Slopes - Murrumbidgee and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

2. Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion, (MR528)

Number of ecosystem credits created	0
IBRA sub-region	Upper Slopes - Murrumbidgee

Offset options - Plant Community types	Offset options - IBRA sub-regions
Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion, (MR528) White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion, (MR561) Red Box - White Box +/- Red Stringybark hill woodland in the NSW South Western Slopes Bioregion, (MR677)	Upper Slopes - Murrumbidgee and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

3. Yellow Box - River Red Gum tall grassy riverine woodland of NSW South Western Slopes Bioregion and Riverina Bioregion, (MR616)

Number of ecosystem credits created	8
IBRA sub-region	Upper Slopes - Murrumbidgee

Offset options - Plant Community types	Offset options - IBRA sub-regions
Yellow Box - River Red Gum tall grassy riverine woodland of NSW South Western Slopes Bioregion and Riverina Bioregion, (MR616) Western Grey Box - Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Penepplain Bioregion, (MR564) Western Grey Box - White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion, (MR565) Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions, (MR566) Riverine Western Grey Box grassy woodland of the semi-arid (warm) climate zone, (MR615)	Upper Slopes - Murrumbidgee and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

4. Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion, (MR598)

Number of ecosystem credits created

360

IBRA sub-region

Upper Slopes - Murrumbidgee

Offset options - Plant Community types	Offset options - IBRA sub-regions
Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion, (MR598) Apple Box - Broad-leaved Peppermint - Red Stringybark shrubby hill open forest in the upper NSW South Western Slopes Bioregion and adjacent South Eastern Highlands Bioregion, (MR508) Apple Box - Nortons Box - Blakely's Red Gum valley flat moist grassy tall open forest in the southern NSW South Western Slopes Bioregion and adjoining South Eastern Highlands Bioregion, (MR511) Riparian Blakely's Red Gum - Broad-leaved Sally woodland - tea-tree - bottlebrush - wattle shrubland wetland of the NSW South Western Slopes Bioregion and South Eastern Highlands Bioregion, (MR527) Broad-leaved Peppermint - Nortons Box - Red Stringybark tall open forest on red clay on hills in the southern part of the NSW South Western Slopes Bioregion, (MR533) Broad-leaved Sally grass - sedge woodland on valley flats and swamps in the NSW South Western Slopes Bioregion and adjoining South Eastern Highlands Bioregion, (MR534) Mugga Ironbark - Inland Scribbly Gum - Red Box shrub/grass open forest on hills in the upper slopes sub-region of the NSW South Western Slopes Bioregion, (MR578) Nortons Box - Red Box - White Box tussock grass open forest of the southern section of the NSW South Western Slopes Bioregion, (MR585) Nortons Box - Red Stringybark grassy tall open forest on sheltered slopes in the Tumbarumba - Murray River region of the NSW South Western Slopes Bioregion, (MR586) Red Box - Red Stringybark - Nortons Box hill heath shrub - tussock grass open forest of the Tumut region, (MR592) White Box - Blakely's Red Gum - Red Box - Red Stringybark shrubby woodland on shallow soils on metamorphic hills in the Albury region of the NSW South Western Slopes Bioregion, (MR642) Mugga Ironbark - mixed box woodland on hills in the Cowra - Boorowa - Young region of the NSW South Western Slopes Bioregion, (MR674)	Upper Slopes - Murrumbidgee and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

BioBanking Credit Calculator

Ecosystem credits

Proposal ID : 144/2017/4423MP

Proposal name : Coppabella Wind Farm

Assessor name : Dave Maynard

Assessor accreditation number : 144

Tool version : v4.0

Report created : 26/03/2018 14:15

Assessment circle name	Landsc ape score	Vegetation zone name	Vegetation type name	Condition	Red flag status	Management zone name	Management zone area	Current site value	Future site value	Loss in site value	Credit required for bio diversity	Credit required for TS	TS with highest credit requirement	Average species loss	Species TG Value	Final credit requirement for management zone
Coppabella	23.50	MR528_Moderate/Good_High	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate/Good_High	Yes	1	0.33	49.48	0.00	49.48	14	14	Barking Owl	66.67	3.00	14
Coppabella	23.50	MR528_Moderate/Good_Poor	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate/Good_Poor	No	2	31.44	32.29	0.00	32.29	946	946	Barking Owl	55.56	3.00	946
Coppabella	23.50	MR528_Low	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Low	No	3	77.15	9.90	0.00	9.90	0	0		0.00	0.00	0
Coppabella	23.50	MR528_Moderate/Good_Derived grassland	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate/Good_Derived grassland	No	4	2.12	20.83	0.00	20.83	46	46	Barking Owl	38.89	3.00	46
Coppabella	23.50	MR528_Moderate/Good_Other	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate/Good_Other	No	5	146.01	14.58	0.00	14.58	2,454	2,454	Barking Owl	44.44	3.00	0
Coppabella	23.50	MR598_Moderate/Good_High	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	Moderate/Good_High	Yes	6	0.44	32.81	0.00	32.81	0	13	Barking Owl	66.67	3.00	13
Coppabella	23.50	MR598_Moderate/Good_Poor	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	Moderate/Good_Poor	Yes	7	6.26	66.15	0.00	66.15	0	347	Barking Owl	100.00	3.00	347

Assessment circle name	Landsc ape score	Vegetation zone name	Vegetation type name	Condition	Red flag status	Management zone name	Management zone area	Current site value	Future site value	Loss in site value	Credit required for bio diversity	Credit required for TS	TS with highest credit requirement	Average species loss	Species TG Value	Final credit requirement for management zone
Coppabella	23.50	MR598_Moderate/Good_Derived grassland	Red Stringybark - Red Box - Long-leaved Box - Inland Scribbly Gum tussock grass - shrub low open forest on hills in the southern part of the NSW South Western Slopes Bioregion	Moderate/Good_Derived grassland	Yes	8	12.24	14.06	0.00	14.06	0	201	Barking Owl	0.00	3.00	0
Coppabella	23.50	MR616_Moderate/Good_Poor	Yellow Box - River Red Gum tall grassy riverine woodland of NSW South Western Slopes Bioregion and Riverina Bioregion	Moderate/Good_Poor	No	9	0.27	31.77	0.00	31.77	8	8	Barking Owl	55.56	3.00	8

APPENDIX H PROPOSED TURBINE MODIFICATION IMPACTS ON BIRDS AND BATS

COPPABELLA WIND FARM

PROPOSED TURBINE MODIFICATION IMPACTS ON BIRDS AND BATS

NGH Environmental Pty Ltd



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March 2018

Report No. 16079 (5.4)

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1. EXECUTIVE SUMMARY

The proponent for the Yass Valley Wind Farm, now called Coppabella Wind Farm (CWF), located near Yass in southern New South Wales, is submitting a modification application including provision for a larger turbine specification for this wind farm.

The consent approved the construction of 79 wind turbines with a maximum blade tip height of 150 metres above foundation level. The consent does not specify blade length, hub height or minimum ground clearance for the operating turbines.

This document is prepared to support an application for modification of consent. The proponent is seeking to make a variation to turbine specifications by increasing the consented blade tip height for the rotor swept area (RSA) resulting in maximum blade tip height of up to 171 m above foundation level.

In summary, the proposed revised turbine dimensions are:

- Increased rotor radius from approved turbine blade length from between 45-60.5 metres to 70.15 metres increasing the total extent of each turbine's RSA to 15,460 m²;
- Minimum RSA height to approximately 30.7 metres above ground, which over 1 metre higher than the planned height of 29.0 metres;
- Maximum RSA height (tip height) increased from 150 to 171 metres above ground.

In summary, given the species of birds involved (common, widespread species in agricultural landscapes in south eastern Australia and few listed rare or threatened species) and the lifted lower RSA height, the higher larger turbines will likely:

- Have a slight reduction to the level of risk to the bird flights between 20 and 40 metres as the minimum turbines swept areas will increase in height by 1.7 metres and the RSA will decrease up to 40 metres;
- Slightly increase the level of risk to birds flying between 40 and 80 metres through an increase in the extent (up to 10%) of the RSA up to 80 metres (i.e. 40-50m, 50-60m and 60-80 metres increases by 3%, 7% and 10% respectively);
- Increase risk slightly to the 1% of birds recorded flying between 80 and 100 meters due to the 15% increase in RSA between 80-100 metres;
- Increase the risk of collision by Wedge-tailed Eagles and other high-flying raptors; (The population risk to the WTE from collision with turbines is low given the low number of pairs using the area (three), the low frequency with which these flights occur and the non-threatened status of the mainland Australian sub-species of the eagle);
- Increase the low risk to the Little Eagle, given its very low numbers and low frequency of interaction with turbines;
- Not significantly change risk to the Superb Parrot due to the minimal overall change to RSA extent below 60 metres, the height below which most flights by this species occur; and
- Not significantly increase risk to most of the species on the wind farm as they are common and widespread in agricultural settings in south eastern Australia.

Given the foregoing findings, the impacts of the proposed modified turbine design are not of conservation concern.

In relation to bats, most bat species recorded on the site were at activity levels that indicate routine occurrence are common, widespread species in agricultural landscapes in south eastern Australia. The minimal change in RSA extent at heights where most bats fly (up to 60 metres) and small increase in the RSA between 60 and 100 metres are unlikely to lead to an increase in effects on bat populations of conservation concern.

The listed threatened bat, **Eastern Bent-wing Bat** is unlikely to experience any increased risk from the modification in turbine specifications proposed, since most of its flights are expected to occur in the area below the new lower RSA of approximately 30 metres.

2. INTRODUCTION

The proponent for the Coppabella Wind Farm (CWF), formerly referred to as the Yass Valley Wind Farm, located near Yass in southern New South Wales, is submitting a modification amendment including a new turbine specification for this wind farm.

The CWF was received consent on 30th March 2016 for the construction of 79 wind turbines with a maximum blade tip height of 150 metres above foundation level. The consent does not specify blade lengths, hub heights or minimum ground clearance for the operating turbines.

This document is prepared to accompany an application for a modification of consent. The proponent is seeking to vary the specifications for the envelope in which the turbines will operate by increasing the permitted blade tip height by 20.15m for the upper rotor swept area (RSA) height (tip height) resulting in an overall blade tip height of up to 171 m above foundation level.

In this report, RSA (rotor swept area) refers to the zone encompassing the area of an operating wind turbine within which the blades rotate, defined in terms of an upper “maximum” and lower “minimum” RSA height, and a total circular swept area of the RSA.

2.1. Previous ecological studies at CWF

Previously NGH Environmental conducted a number of studies into CWF. These included:

- NGH Environmental (2009a), “Biodiversity Assessment: Marilba Hills Precinct Wind Farm”, NGH Environmental, Surry Hills, New South Wales.
- NGH Environmental (2009b), “Biodiversity Assessment: Coppabella Hills Precinct”, NGH Environmental, Surry Hills, New South Wales.

Brett Lane and Associates Pty. Ltd. (BL&A) have been involved with the CWF project since 2016 and have undertaken a range of flora and fauna field surveys and assessments, including:

- BL&A (2016a) CWF – Bird and Bat Adaptive Management Plan - Risk Assessment, Report 16079 (1.0) for Goldwind Australia;
- BL&A (2016b) CWF – Superb Parrot Literature Review, Report 16079 (2.0) for Goldwind Australia; and
- BL&A (2016c) Proposed CWF – Targeted Superb Parrot Survey Breeding Season 2016, Report 16079 (3.0) for Goldwind Australia.

2.2. The proposed modification

This assessment compares the turbine parameters proposed to be utilised for CWF against new, modified GW140 turbine parameters. It documents the change in potential impacts as a result of the proposed modification. The proposed modification is outlined in the table below.

Table 1: Proposed modifications to turbine specifications (largest permitted turbine used as base reference)

	Representative turbine within permit specifications *	Modification (March 2017)	Total extent of change
No of turbines	79	75	Reduction of four turbines (5%)
Rotor radius	60.5 metres	70.15 metres	Increase by 9.65 metres
Max upper RSA (tip)	150 metres	Up to 171 metres	Increase up to 21 metres
Lower Minimum RSA	29.0 m	30.7 m	Lift height of minimum RSA up to 1.7 metres
Total Rotor Swept Area / turbine (m ²)	11,485 m ²	15,460 m ²	Increase by 3,960 m ² (+34%)
Total Rotor Swept Area for wind farm (m ²)	907,266.36	1,159,489	Increase by 252,222 m ² (+28%)

* turbine specifications provided by the GWA

In summary, the proposed revised turbine dimensions are:

- Increased rotor radius from 60.5 metres to 70.15 metres increasing the total extent of each turbine's RSA to 15,460 m² (note: permitted turbine base reference is largest permitted turbine);
- Minimum RSA height to approximately 30 metres above ground, which is over 12.5 metres higher than the currently planned turbine envelope;
- Maximum RSA height (tip height) increased from 150 to 171 metres above ground.

These larger blades will be capable of generating a greater energy output per turbine and while some turbines will be micro-sited in accordance with provisions of the permit all to be installed at the permitted locations.

2.3. The assessment

This assessment compares the impacts of the former and modified turbine specifications on birds and bats based on reviews of previous assessments and field surveys between 2007 and 2016.

This assessment also considers the 18 focussed bird utilisation surveys and incidental observations that recorded presence and flight behaviour of birds identified as potentially being “at higher risk” conducted by NGH (NGH 2018). These surveys collected numbers and flight heights of species. It did not record all birds, but specifically those listed species of interest and raptors.

Therefore, in addition, this assessment is informed by the results of BUS from eleven other proposed and operational wind farms in agricultural settings in south-eastern Australia (southern NSW and Victoria). These data were collected to document bird flight height in 10 metre intervals up to 60 metres then in 20 metre intervals up to 120 metres above the ground. They provide a detailed picture of bird flight heights in largely cleared, agricultural landscapes in south eastern Australia similar to the CWF.

3. BIRD AND BAT ASSESSMENT

This section of the report summarises information on the birds and bats of the site from existing studies then assesses the difference in impacts on these fauna groups from the changed turbine specifications.

3.1. Bird assessment

3.1.1. Bird species of CWF

This assessment reviewed the previous data on bird activity at the site. Most bird species at CWF were common, widespread species in agricultural landscapes of south eastern Australia.

A review of previous studies indicated that seventy-three species of birds have been recorded at CWF. This includes the Superb Parrot surveys at CWF in September 2016 (BL&A, unpublished data) and the spring 2014 field survey work (NGH Environmental 2015) and 2008-2009 *Biodiversity Assessment: Coppabella Hills Precinct* (NGH Environmental, 2009b).

Species recorded and listed under that state TSC Act or Commonwealth EPBC Act as rare or threatened included:

- Brown Treecreeper *Climacteris picumnus victoriae* (vulnerable, TSC Act)
- Diamond Firetail *Stagonopleura guttatus* (vulnerable, TSC Act)
- Hooded Robin *Melanodryas cucullata* (vulnerable, TSC Act)
- Little Eagle *Hieraaetus morphnoides* (vulnerable, TSC Act)
- Superb Parrot *Polytelis swainsonii* (vulnerable, TSC Act; vulnerable, EPBC Act)
- Turquoise Parrot *Neophema pulchella* (vulnerable, TSC Act)
- Varied Sittella *Daphoenositta chrysoptera* (vulnerable, TSC Act)

Of these listed threatened bird species, the majority forage on the ground or in the foliage layer of woodland and as such are unlikely to be impacted by the wind farm. However, the Superb Parrot and the Little Eagle may undertake flights at RSA height and are therefore discussed in more detail later in this section.

3.1.2. Review of flight height data at Coppabella Wind Farm

Birds have mainly been recorded at CWF in 2008, 2009, 2015, 2016, and 2017. Targetted surveys have also been carried out for the listed Regent Honey-eater and Superb Parrot (NGH Environmental 2009a, b; BL&A 2016a, b, c). During the initial surveys records were kept of bird flight heights above 30 metres but not to the additional level of detail that would facilitate a detailed analysis of the impacts to the changes to RSA heights. Initial surveys were undertaken from 2007 to 2009, before the use of a smaller height interval for recording bird flight height became standard.

Seventy-three species of birds were recorded during field work in September 2016 (BL&A 2016c). Most species were common birds of farmland and open country –

similar species diversity to other wind farm sites in southern New South Wales (Brett Lane & Associates Pty Ltd [BL&A], unpubl. data).

Four other listed species were recorded opportunistically during bird surveys and included:

- Brown Treecreeper (*Climacteris picumnus victoriae*, NSW Vulnerable)-small numbers - recorded in tree canopy and roosting on logs not above 20 metres;
- Dusky Woodswallow (*Artamus cyanopterus cyanopterus*, NSW Vulnerable) – 1-2 individuals recorded in or above canopy up to 40 metres in height;
- Little Eagle (*Hieraaetus morphnoides*, NSW Vulnerable) – a small number of records flying at or above canopy height and up to 40 metres; and
- Rainbow Bee-eater (*Merops ornatus*, Commonwealth Migratory) – recorded within tree canopy.

3.1.3. Review of flight height data at other wind farm sites

More recent bird utilisation surveys from other wind farm sites have collected data in 10 metre height increments to 60 metres, enabling a more precise prediction of changes in impact from adjustments to turbine specifications as technology changes. This method post-dates the original CWF surveys for which no detailed height data were recorded.

The data on bird flight heights from eleven other proposed and operational wind farms in agricultural settings in south-eastern Australia (southern NSW and Victoria) have been collated (BL&A, unpublished data). These data describe flights typical of these landscapes and are considered to be a comparable proxy for the CWF. These data were pooled and are summarized in Figure 1 below.

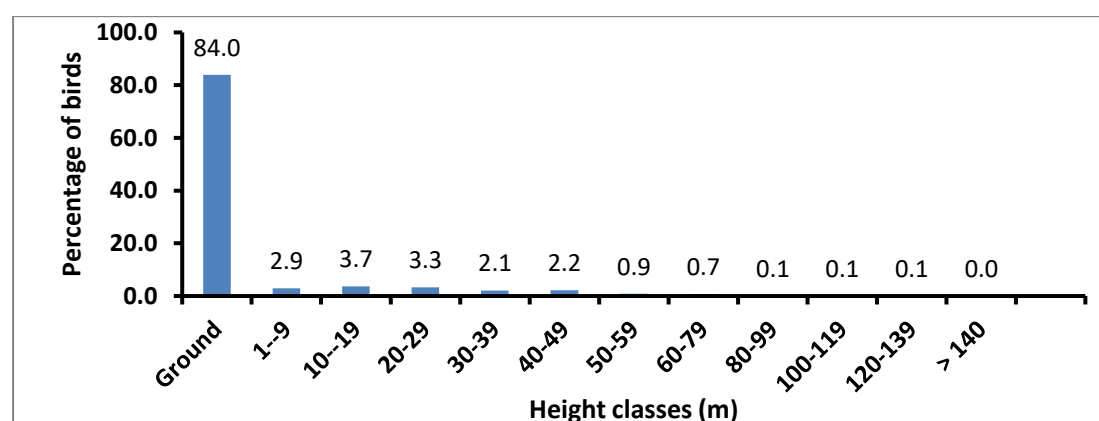


Figure 1: The distribution of bird heights observed from bird utilisation surveys at 11 similar wind farm sites.

Across eleven wind farms in south-eastern Australia the percentage of birds observed below 40 metres was on average 96%. The flight height distribution of birds at the CWF is unlikely to be significantly different from similar sites where more precise information on flight height has been collected as the habitat on CWF is similar to such sites in southern NSW and elsewhere.

Table 2 below provides more detailed analysis of flight height distribution of birds across the 11 wind farms in agricultural settings in south eastern Australia for the

16% of bird flights between 1 metre and 140+ metres from Figure 1 allocated into height ranges.

Table 2: Flight height distribution of birds across 11 wind farms in agricultural settings in south eastern Australia.

Height range (m)	% bird flights from 11 other sites (previous data)
0-10 m	18%
10-20 m	23%
20-30 m	20%
30-40 m	13%
40-50 m	14%
50-60 m	6%
60-80 m	4%
80-100 m	1%
100-120 m	0%
120-140m	1%
140-160 m	0%
160-175 m	0%

3.1.4. *Assessment of impacts of modified turbine parameters*

The consent permit for CWF specified an upper RSA height of 150 metres. To ensure a maximum blade tip height of 150m above foundation level, the proponent proposed turbine model with a 121 diameter blade with a minimum RSA height of 29 metres and a maximum RSA height of 150 metres. This is the maximum approved turbine specification against which proposed change is assessed.

The project modification proposes a rotor of 140.3 metres diameter, with a maximum RSA height up to 171 metres and a minimum RSA height of approximately 30.7 metres. The change in the area of RSA at various height bands is shown in Table 3.

Table 3: Change in RSA at each height range

Height range (m)	RSA of 121 m diam (29.0-150) (m2)	RSA of 140.3 m diam (30.7-171.0) (m2)	Change in RSA (m2)	Incremental % change in RSA
0-10				
10-20			-	
20-30			- 15	-100%
30-40	506	439	- 67	-13%
40-50	815	843	28	3%
50-60	991	1,059	68	7%
60-80	2,278	2,507	229	10%
80-100	2,409	2,762	353	15%
100-120	2,264	2,772	509	22%
120-140	1,770	2,540	770	43%
140-160	452	1,975	1,523	337%
160-180	-	562	562	Increase
Total	11,485	15,460	3,961	34%

Aspects of the modified turbine design are discussed below.

Increase in minimum lower RSA height

The proposed modified turbine (GW140) increases the lower minimum RSA height for turbines by up to 12.5 metres (i.e. from 17.5 to 30 metres). This change will lift the lower minimum RSA by up to 12.5 metres will result in less risk to the 20% of all bird flights between 20 and 30 metres (see Table 2).

Change in extent of RSA at various heights

As a result of the proposed modifications:

- The total area of RSA per turbine between 20-30m and 30-40m actually decreases;
- The total area of RSA per turbine between 40-50m, 50-60m and 60-80 metres increases by 3%, 7% and 10% respectively. This may have a corresponding small increase in risk to the 3.9 % of bird typically recorded flying between 40 and 80 metres;
- The change in RSA between 70-80 metres is an increase of 1%, and between 90 to 100 metres 9% (Table 3). This is a relatively small increase in risk to the less than 1% of birds recorded flying between 60 and 100 meters.
- Above 100 metres there is an larger increase in the total extent of RSA. This is the height range where the fewest bird flights were recorded: approximately 1% of bird flights were recorded above 100 metres and no bird flights were recorded above 140 metres. This would present an increased risk to high flying

species such as raptors but not to most other species, which make up the bulk of birds observed below 40 metres.

This analysis demonstrates the increase in RSA area at heights above 80 metres is more likely to impact on higher-flying species. These include raptors as a group, and specifically the Wedge-tailed Eagle and other high-flying raptor species, as well as the White-throated Needletail *Hirundapus caudacutus*. None of these species are listed as threatened species although the White-throated Needletail is a listed migratory species under the EPBC Act. The decreased number of turbines will also contribute to reducing risk.

Change in maximum RSA height

The change in maximum RSA height from 150 meters to 171 meters occurs at the height where the fewest bird flights were recorded. The studies from 11 other wind farm sites recorded no flights above 140 metres. This would present an increased risk to high flying species including the Wedge-tailed Eagle and other high flying raptor species, as well as the White-throated Needletail. None of these species are listed as threatened species although the White-throated Needletail is a listed migratory species under the EPBC Act. The decreased number of turbines will also contribute to reducing risk.

3.1.5. Impacts on species or groups of interest

Superb Parrots

Superb Parrots have been the subject of three targeted survey (2014, 2016 and 2017(NGH 2018) which only recorded very few observations within the CWF site and small numbers of the species around CWF (NGH 2018, NGH 2016, BL&A 2016c). Based on the 2014, 2016 and 2017 surveys, specifically given the intensity of survey, the number and location of Superb Parrot records overall (within and outside the Coppabella precinct) and the flight heights observed, it is considered unlikely that any high use flight pathways exist in areas that would be developed for the Coppabella wind turbines and that collision risk for this species is relatively low (NGH 2017). Observations of the species were generally in low lying areas, around the wind farm site, with the majority of observations of the species made in surrounding areas outside of the wind farm site (NGH 2018), however there was one incidental observation within the south west portion of the wind farm.

Based on all observations of Superb Parrots in the 2014, 2016 and 2017 survey periods the recorded observations noted that flight height was generally between 10 to 15m, with occasional records above 20 metres, few records up to 30m and only one record of a maximum height of 40m (NGH 2017, NGH 2018). Additionally, the species was never seen flying across or along the top of the large ridgelines that characterise the majority of the proposed turbine locations, with the one exception of the observed flights in the vicinity of Turbines 126 – 129 (NGH 2017). This area is generally quite low in elevation in comparison with the majority of the site where turbines are proposed and which characteristically are much steeper and higher hills and ridges.

The risk to Superb Parrot at CWF from the proposed modification is therefore expected to be little changes with the small increase in the height of the lower minimum RSA and the minimal change in RSA up to 60 metres in height.

Wedge tailed Eagles

Wedge tailed Eagles (WTE) were recorded at CWF (three pairs). The WTE is known to fly at RSA height and has collided with turbines at other wind farms in New South Wales and elsewhere in Australia (BL&A, unpublished data).

The WTE may be at increased risk from both the increased extent and increased maximum RSA height. Some risk to WTE may be reduced by the implementation of a Bird and Bat Adaptive Management Program (BBAMP) which will set out mitigation measures such as removal of prey close to turbines (i.e. rabbits) and carcass removal. However, the decrease in the number of turbines will also contribute to reducing risk.

Wedge-tailed Eagle collisions with turbines are likely to occur occasionally at the CWF, however given the non-threatened status of the mainland Australian sub-species of the eagle there are unlikely to be significant population consequences as a result of the modification compared with the approved turbine specifications.

Other raptors

For the same reasons as described for the Wedge-tailed Eagle, there may be an increased risk to other raptors from the proposed modification to turbine specifications. It is expected however that because like WTE most of these are relatively common and widespread species the potential for a significant impact on their populations would be negligible.

The one record of the Little Eagle in 2016 was an incidental observation. It is expected to be less frequent at CWF than many more common raptors, and to occur on the wind farm, if resident, in low numbers. The modification represents a small potential increase in risk to the Little Eagle, although this species is expected to occur in very low numbers and any potential interaction with turbines is unlikely.

White-throated Needletail

Although not recorded on previous surveys, the White-throated Needletail (WTNT) is likely at CWF in summer and early autumn months when present in south-eastern Australia (Higgins 1999). The WTNT is known to fly at RSA height and has collided with turbines at other wind farms in New South Wales and elsewhere in Australia (BL&A, unpublished data).

The risk to this species from collision with turbines was considered to be low given the brief period of visitation to CWF expected (December to March) and the lack of site records to-date. The WTNT is a listed migratory species under the EPBC Act, however, it does not have the status of a listed threatened species under the EPBC Act.

In summary, the potential for a significantly greater population impact on WTNT from the proposed modification compared with the currently permitted turbine specification is considered low.

3.1.6. Summary of potential impact on birds from modification

In summary, given the species of birds involved (common, widespread species in agricultural landscapes in south eastern Australia and few listed rare or threatened species), the reduced number of turbines, combined with a lifting of lower RSA height, removing risk from the lower heights where most birds fly, the larger, higher turbines will likely:

- Reduce the overall level of risk to the 20% of all bird flights between 20 and 30 metres as the turbines will increase in height by 7.85 metres;

Decrease the level of risk to birds flying between 30 and 100 metres by a reduction in the extent of the RSA below 60 metres;

- Increase risk slightly to the 1% of birds recorded flying between 60 and 100 meters due to the less than 10% increase in RSA in this height zone;
- Increase the risk of collision by Wedge-tailed Eagles and other high-flying raptors; (The population risk to the WTE from collision with turbines is low given the low number of pairs using the area (three), the low frequency with which these flights occur and the its non-threatened status);

Increase slightly the low risk to the Little Eagle, given its very low numbers and low frequency of interaction with turbines;

- Decrease risk to the Superb Parrot due to the decrease in RSA extent below 60 metres, the height below which most flights by this species occur; and
- Not significantly increase risk to most of the species on the wind farm as they are common and widespread in agricultural settings in south eastern Australia.

Given the foregoing findings, the impacts of the proposed modification in size and reuction in number of turbines is not of conservation concern.

3.2. Impacts of modification on bats

3.2.1. Bats recorded in the area

The bat species recorded at CWF (NGH Environmental 2009 a,b) are mostly common, widespread species in agricultural landscapes in south eastern Australia. One threatened species listed the under TSC Act was confirmed during survey work:

- Eastern Bent-wing Bat *Miniopterus schreibersii oceanensis* (vulnerable TSC Act; vulnerable EPBC Act).

Common species recorded included:

- Gould's Wattled Bat *Chalinolobus gouldii*;
- White-striped Freetail Bat *Tadarida australis*;
- Long-eared Bat sp. *Nyctophilus* sp.; and
- Western Broad-nosed Bat *Scotorepens balstoni*.

Because ultrasonic bat detectors only record the number of bat calls, not the number of individual bats, it is not possible to record absolute numbers of bats in the same way as for birds.

Pooled data from other wind farms in south-eastern Australia (BL&A, unpubl. data) show that at 50 metres above the ground bat call numbers are about 15% of the

number recorded from ground level. At 25 m above the ground numbers are about 25% of the number recorded from ground level. The majority of the proposed change in turbine height and RSA occurs in the recording zone sampled at 50 metres and above, where the least number of bat calls are recorded.

3.2.2. *Assessment of modified turbine parameters on bats*

The proposed turbine modification for a rotor of up to 140.3 metre diameter blade, with a maximum RSA height of up to 171 metres and a minimum RSA height of approximately 30.7 metres. The change in the extent of RSA at various height ranges is shown in Table 3. The consequences of these changes are discussed below.

Increase in lower minimum RSA height

The proposed modified turbine (GW140) will raise the lower minimum RSA by 1.7 metres and will avoid impacts to the proportion of bats flying up to 30 metres. It is noted that pooled data from wind farms where bat recording has been done at varying heights indicates this height zone has a small proportion of all bat calls (25% of ground level call numbers).

Change in extent of RSA at various heights

The changes in bat impacts as a result of the proposed change in RSA extent are discussed below:

As a result of the proposed modifications:

- The total area of RSA per turbine between 20-30m and 30-40m actually decreases. This will have a correspondingly lower risk bats flying below 40 metres;
- The total area of RSA per turbine between 40-50m, 50-60m and 60-80 metres increases by 3%, 7% and 10% respectively. This may have a corresponding small increased those bat species flying between 40 and 80 metres.
- The pooled bat data also indicate that species diversity at 50 metres and above is lower, with recorded bats dominated by higher-flying species such as White-striped Freetail Bat and Gould's Wattled Bat, both of which are common and widespread.
- Above 80 metres, the modified turbine design puts turbine blades into an additional zone likely to have very little bat activity (i.e. between 80 and 175 metres). If any bats were recorded above 100 metres, the species diversity would be low and include the species not listed as of conservation concern.

The larger turbines are unlikely to lead to significant impacts on listed threatened bat species. The bat species potentially impacted are higher flying species that are not listed as threatened either at national or state level. The change in turbine specifications is not expected to have increased impacts of population consequence for these abundant and widespread species.

3.2.3. *Eastern Bent-wing Bat (EBWB)*

The Eastern Bent-wing Bat (EBWB) was recorded from the CWF (NGH Environmental 2009b). This species is known to congregate in the October – March breeding season at its maternity cave at Wee Jasper, some 35 kilometres south of the CWF.

Although on the edge of the likely nightly commuting range of these cave-dwelling bats, the CWF nonetheless may lie in a zone used during pre- and post-breeding migration by the species to and from this cave. Such movements, if they occur, would involve one-way flights through the wind farm site in spring and autumn.

The species usually forages over forested areas at or above treetop height but have also been recorded on the sparsely-treed areas (Churchill 1998). In more open habitats they tend to fly at lower heights up to a few metres above ground (Churchill 1998, 2008). There are very few calls of the EBWB flying above 25 metres, although several have been recorded striking wind turbines at wind farms in southern NSW.

Given that the CWF is predominantly cleared country and thus the EBWB would be expected to fly below RSA height, the increase in minimum RSA height proposed (from 29 to 30.7 metres) would reduce the potential for interaction between the EBWB and turbines. The decrease in the area of RSA below 40 metres is also likely to reduce risk to this species.

3.2.4. *Summary of potential impact on bats from modification*

In relation to bats, most bat species recorded on the site at activity levels that indicate routine occurrence are common, widespread species in agricultural landscapes in south eastern Australia. The minimal change in RSA extent at heights where most bats fly (up to 60 metres) is unlikely to lead to an increase in effects on bat populations of conservation concern.

The listed threatened bat, **Eastern Bent-wing Bat** is unlikely to experience any increased risk from the modification in turbine specifications proposed, since most of its flights are expected to occur in the area below the new lower RSA of 29.85 metres.

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