

COPPABELLA WIND FARM

PROPOSED TURBINE MODIFICATION IMPACTS ON BIRDS AND BATS

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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 between 45 and 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 metres above ground, which is over 12 metres higher than the currently planned turbine envelope;
- 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 increased 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 12 metres;

Decrease the level of risk to birds flying between 30 and 80 metres by a reduction in the extent of the RSA below 60 metres;

- Increase risk slightly to the 1% of birds recorded flying between 80 and 100 metres due to the 14% 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;

- 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 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 decrease 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 (see figure1). It documents the change in potential impacts as a result of the proposed modification. The proposed modification is outlined in the table below.

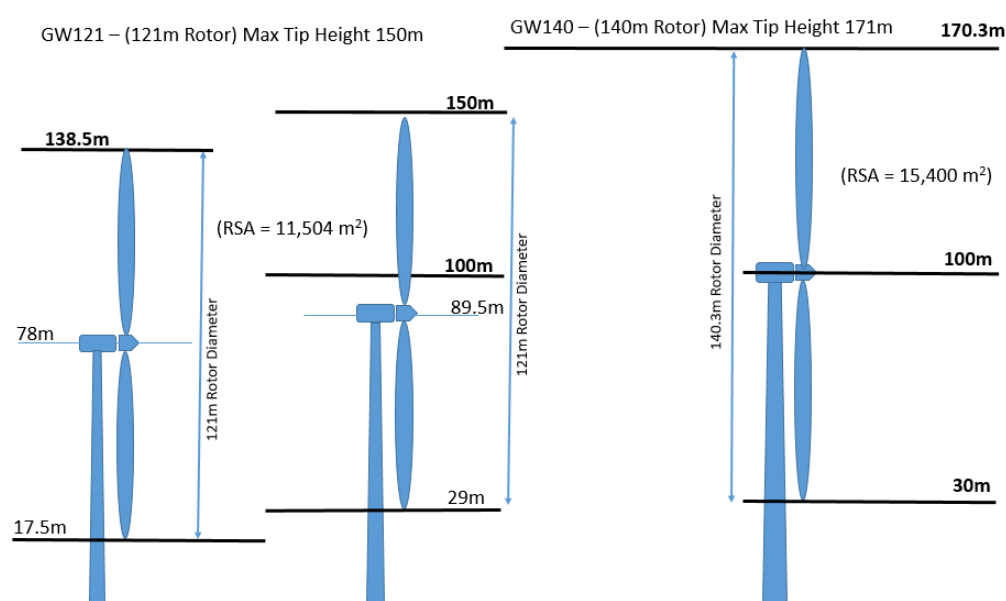


Figure 1: Proposed modification to turbines of 121 diameter vs 140.3 metres

Table 1: Proposed modifications to turbine specifications

	Turbines proposed within permit specifications *	Modification (March 2017)	Total extent of change
No of turbines	79	79	No change
Rotor radius	Between 45 and 60.5 metres	70.15 metres	Increase upto 25.15 metres
Max upper RSA (tip)	150 metres	Upto 171 metres	Increase up to 21 metres
Lower Minimum RSA	(with Hub height 78-100) 17.5m – 29m	Approximately 30 metres	Lift height of minimum RSA up to 12.5 metres
Total Rotor Swept Area	13,478m ²	15,460m ²	Increase by 1,982 m ² (15%)

* turbine specifications provided by the GWA

In summary, the proposed revised turbine dimensions are:

- Increased rotor radius from between 45 and 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 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 will 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.

There have been no previous formal bird utilisation surveys (BUS) at CWF collecting data on flight heights of recorded birds. Therefore, 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 definitive 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. It is noted that the Spotted Harrier is recorded widely in the region but it was never recorded field surveys at Coppabella Wind Farm.

3.1.2. *Review of flight height data at Coppabella Wind Farm*

Birds have mainly been recorded at CWF on an incidental basis, with the exception of the listed Superb Parrot for which targeted surveys were carried out (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 analysis 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).

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, including four data sets from south-west 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.

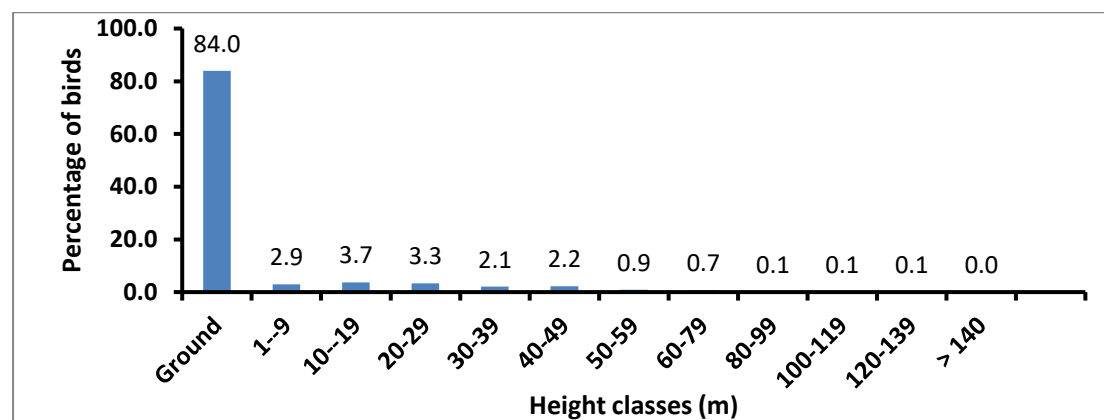


Figure 2: The distribution of bird heights observed from bird utilisation surveys at 10 similar wind farm sites.

Across eleven wind farms in south-eastern Australia the percentage of birds observed below 40 metres was on average 96.6%. 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 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 128 diameter blade with a minimum RSA height of 22 metres and a maximum RSA height of 150 metres. This is the approved turbine specification against which change is assessed.

The turbine modification proposes a rotor of approximately 140.3 metres diameter, with a maximum RSA height upto 171 metres and a minimum RSA height of approximately 30 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 131 m diameter blades (m2)	RSA of 140.3 m diameter blades (m2)	Change in area of exposure /turbine (m2)	Incremental % change in RSA
0-10				
10-20	60	0	- 60	
20-30	655	1	- 654	-100%
30-40	887	499	- 389	-44%
40-50	1,065	866	- 199	-19%
50-60	1,183	1,074	- 109	-9%
60-70	1,258	1,214	- 44	-4%
70-80	1,299	1,309	11	1%
80-90	1,308	1,369	61	5%
90-100	1,286	1,398	112	9%
100-120	2,373	2,768	394	17%
120-140	1,793	2,523	730	41%
140-160	371	1,939	1,569	423%
160-180		499	499	Increase
Total	13,478	15,460	1,982	15%

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 upto 12.5 metres (i.e. from 17.5 to 30 metres). This change will lift the lower minimum RSA by upto 12.5 metres will result in less risk to the 20% of all bird flights between 20 and 30 metres (see Table 2).

This will also increase the height of the lower RSA from areas of treed vegetation that are immediately below and around the turbines. The change in turbine radius from 60.5 to 71 will not place the blades any closer to vegetation and will maintain the clearance.

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, 30-40m, 40-50m, 50-60m and 60-70 metres actually decreases. This will have a corresponding decrease in risk to the 98% of birds recorded flying below 70 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 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.

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.

3.1.5. *Impacts on species or groups of interest*

Superb Parrots

Superb Parrots have been the subject of two targeted survey (2014 and 2016 NGH 2017) which only recorded two observations within the CWF site and small numbers of the species around CWF (NGH 2016, BL&A 2016c). Based on the 2014 and 2016 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, predominantly to the West, North and South of the wind farm site, with the majority of observations of the species made in surrounding areas outside of the wind farm site (NGH 2017).

Based on all observations of Superb Parrots in the 2014 and 2016 survey periods the recorded observations noted that the average flight height was between about 10-15m, with very records above 30m and only one record of a maximum height of 40m (NGH 2017). 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 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 decrease with the increase in the height of the lower minimum RSA.

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.

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 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 to be recorded 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 because the species is not threatened, although it is a listed migratory species under the latter.

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) and the increased 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 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;

- 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 modified turbine design are 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 upto 140.36 metre diameter blade, with a maximum RSA height of upto 171 metres and a minimum RSA height of

approximately 30 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 lift the lower minimum RSA by 12.5 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,

- The total area of RSA per turbine between 20-30m, 30-40m, 40-50m and 50-60m actually decreases. This will have a correspondingly lower risk bats flying below 50 metres, as well as those flying between 50 and 60 metres.
- The change in RSA between 70 to 80 metres is an increase of 1%, and between 80 to 100 metres is change in RSA is 14% (Table 3). This is a relatively small increase in risk given that bat activity at these heights is 15% of bat activity at ground level. The pooled bat data also indicate that species diversity at 50 metres 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 100 metres, the modified turbine design puts turbine blades into an additional zone likely to have very little bat activity (i.e. between 100 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 additionally 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 22 to 29.85 metres) would reduce the potential for interaction between the EBWB and turbines. The decrease in the area of RSA below 60 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 decrease 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 29.85 metres.

4. REFERENCES

- BL&A 2016a, Yass Valley Wind Farm – Bird and Bat Adaptive Management Plan Risk Assessment, Report No. 16079 (1.0) for Goldwind Australia.
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