

Appendix E

Bird and Bat Impact Assessment (Brett Lane & Associates)

FLYERS CREEK WIND FARM

PLANNING MODIFICATION 4

BIRD AND BAT IMPACT ASSESSMENT

Flyers Creek Wind Farm Pty Ltd

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1. INTRODUCTION

The Flyers Creek Wind Farm (FCWF) located near Orange in the Central Tablelands region of New South Wales received Planning Approval on 14 March 2014. There have been 3 subsequent planning modifications, with the latest modification gaining approval on 30 November 2017. The current Project Approval details the specifications of the wind farm and allows the construction of up to 38 wind turbines with a maximum blade tip height of 150 metres above ground level.

This document provides an assessment of the change in potential impacts to birds and bats in relation to planning modification 4.

1.1. The proposed modification

In this report, rotor swept area (RSA) is defined as 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.

This document assesses the changes in bird and bat impacts arising from the proposed new turbine specifications indicated in Table 1, below.

Table 1: Proposed modifications to turbine specifications

Turbine specification	Approved turbine specifications	Proposed modification	Change
Maximum RSA height (tip height)	150 m	160 m	10 m higher blade tip height
Minimum RSA height (above ground)	30 m	20 m	10 m lower minimum RSA
Rotor diameter	112 m (radius 56 m - in an envelope between 30 – 1560 metres)	Up to 140 m (radius up to 70 m)	28 m larger blade diameter (14 m increase in radius per blade)
Total RSA m ² / turbine	9,852 m ²	15,394 m ²	56% increase in RSA
Number of turbines	38	38	Original assessment based on 42 turbines. Most recent approval (November 2017) allows 38 turbines

Modification 4 also includes a 132kv electrical line which will connect the project substation to the wider grid network. This is noted, but not considered further in this assessment because the potential for impact from the electrical line on birds and bats in the pine forest plantation to the north is considered as low.

1.2. The assessment

Previous reports that assessed the potential bird and bat impacts of the project have been reviewed for the current assessment, including:

- Kevin Mills & Associates 2011, ‘Flora and Fauna Assessment, Flyers Creek Wind Farm, Shire of Blayney, Central Tablelands, New South Wales’. Prepared for Aurecon Australia Pty Limited, Sydney, April 2011; and

- Richards, G.C. 2011, 'An Assessment of the Bat Fauna at the Proposed Flyers Creek Wind Farm, NSW', Appendix E of Flyers Creek Wind Farm Environmental Assessment, Aurecon Energy, Sydney, April 2011.

2. BIRD AND AVIFAUNA ASSESSMENT

This report considers the impacts of modification 4 on birds and bats separately.

2.1. Impacts of modification on birds

2.1.1. Review of bird species at FCWF

The site has been extensively cleared with only scattered paddock trees and remnant patches of trees remaining. It is not located to national parks or areas of substantial forest.

The original bird utilisation surveys (BUS) of the Flyers Creek Wind Farm (KMA 2011) were undertaken in November 2008, February 2009 and October 2010. During these, the height of birds above the ground was recorded at:

- Ground level;
- Less than 10 metres,
- 10-20 metres;
- 20-50 metres; and
- Greater than 50 metres.

In total, eighty-six bird species were recorded during the bird surveys within the overall wind farm study area, the majority of which were common farmland or open woodland birds (KMA, 2011). Bird diversity during the survey period was in line with expectations for similar wind farms in the central and southern tablelands regions of New South Wales.

No species were recorded flying above 150 m during the bird utilisation surveys. This does not indicate that these flights do not occur, but rather that the frequency with which these flights occurs is very low.

In relation to listed species

- The Superb Parrot listed as threatened on both the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and *NSW Biodiversity Conservation Act 2016* (BC Act) was recorded in small numbers;
- The EPBC Act listed migratory species, the White-throated Needletail, was recorded nearby at the Cadia mine site or its vicinity (Western Research Institute & Resource Strategies, 2009 cited in KMA 2011) and although not since recorded, is likely to be an occasional visitor to the wind site while feeding on insects above the site.
- Three additional threatened species listed on the BC Act were recorded during the BUS. These were:
 - Diamond Firetail, a seed-eater that mainly feeds on the ground and not expected to fly above treetop height;
 - Varied Sittella - a tree dwelling species considered unlikely to fly at RSA height; and
 - Little Eagle - occurred at low frequency such that it was considered at low risk of a collision with a turbine at Flyers Creek Wind Farm.

2.1.2. Review of flight height data

The flight height results from the FCWF BUS data are presented in Figure 1 below.

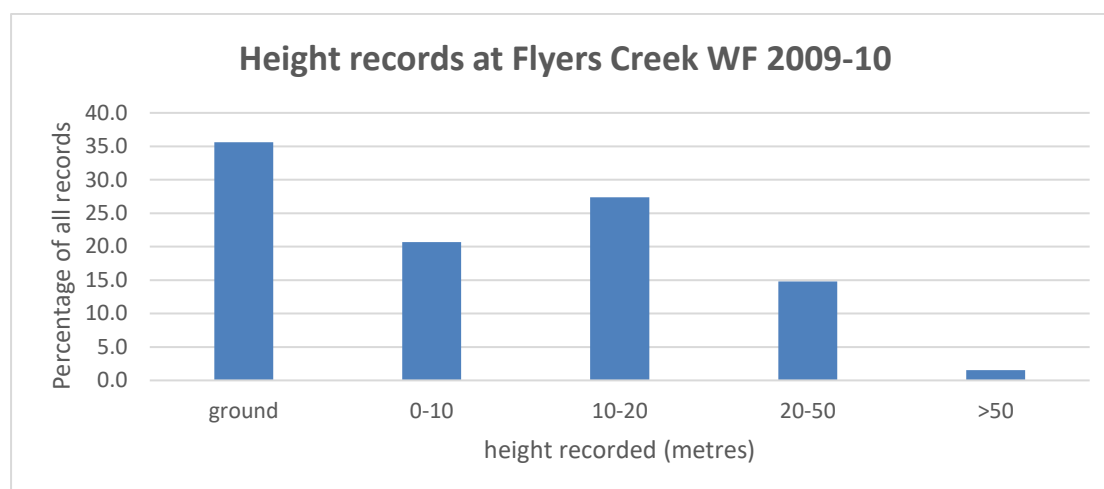


Figure 1: Height records at proposed turbine locations (source: KMA, 2011)

2.1.3. Assessment of modified turbine impacts

The change in the area of RSA at various height bands is analysed in Table 2 below.

Table 2: Change in RSA at each height range (Source: KMA 2011)

Height range (m)	% bird flights at height interval	RSA of 112 m diameter blades (m ²)	RSA of 140 m diameter blades (m ²)	Change in area of exposure /turbine (m ²)	Incremental % change in RSA area
Ground	36%				
0-10	21%				
10-20	27%				
20-30	14.5%	-	488	488	increase
30-40		434	861	427	98%
40-50		758	1,070	312	41%
50-60		930	1,211	280	30%
60-80		2,133	2,672	539	25%
80-100	1.5%	2,222	2,790	568	26%
100-120		2,008	2,672	665	33%
120-140		1,327	2,280	953	72%
140-160		40	1,349	1,309	3299%
160-180		-	-	-	-
Total	100%	9,852	15,394	5,542	56%

The total area of RSA between 20 and 50 metres increases by just over 100%, representing a doubling of the collision risk in this height band. The percentage of bird flights recorded between 20 to 50m is 14.6% and are assessed to be about twice as likely to collide with the turbine proposed in modification 4. The majority of the birds recorded in this range are common birds from this largely agricultural landscape.

Above 50 metres there is an increase in the total area of RSA in bands up to 160 metres of about 50%. Only 1.5% of bird flights were recorded above 50 metres. The bird species likely to be impacted at heights above 50 metres are higher flying

species. These include raptors as a group, including the Wedge-tailed Eagle and Little Eagle, and the migratory White-throated Needletail (see discussion below).

Although flights may occur above 150 metres, none were recorded during the BUS. Studies from 11 other wind farm sites across south-eastern Australia (BL&A, unpublished data) recorded no flights above 140 metres. This does not mean that these flights do not occur, but rather they were not recorded during the surveys. These results indicate that flights in the zone affected by increased turbine height are rare and the increase in height is unlikely to lead to an increase in collision rates of conservation concern.

Impacts of the proposed changes on listed bird species are considered in more detail below.

Superb Parrot

The Superb Parrot was recorded in low numbers at FCWF site during formal surveys in October 2010 (Kevin Mills & Associates, 2011). Ten birds were recorded, three of them flying at a height of between 20 and 50 metres. The Superb Parrot is listed as Vulnerable under the both the Commonwealth EPBC Act and BC Act (NSW).

The Superb Parrot is primarily a ground feeder, eating grass seeds and other herbaceous plants. Flowering or fruiting trees are also visited for nectar and berries in the tree canopy (Higgins 1999). While known to fly at heights up to 50 metres above ground, most flights are typically recorded at tree height (BL&A unpublished observation). The Orange region is at the north-eastern edge of a core breeding area that extends from Cowra in the north to Yass in the south (Webster & Ahern 1992).

The increase in RSA between 20 to 50 metres will increase the risk of Superb Parrot flights to blade strike due to the decrease of the minimum RSA to 20 metres and the doubling of the RSA extent between 20 and 50 metres.

This species feeds within treed canopies and on the ground, and its routine flights are within and between wooded habitats. The species has been observed flying up to 30 metres above the ground (BL&A, unpublished data) and KMA (2011) recorded it in the 30 to 50 metre height band. The increase in risk results from the lowering of the RSA height from 30 to 20 metres above the ground.

During the site flora and fauna investigations between 2008 and 2011, the Superb Parrot was found in small groups of between one and seven individuals. All were found associated with treed vegetation, most on treed roadside reserves. All but two records were in lower-lying country away from the ridgetops where wind turbines are to be constructed. As most of the wind farm comprises untreed ridges, only a small proportion of turbines are likely to have the Superb Parrot flying near them. For this reason, the changed turbine height and dimensions is unlikely to increase the risk to the species to a level of conservation concern.

The activities of the Superb Parrot on the site should be further monitored through the implementation of the project Bird and Bat Adaptive Management under Condition D4 of the Project Approval.

Little Eagle

The Little Eagle was recorded at FCWF site once in February 2009 (Kevin Mills & Associates, 2011) flying over the site (height not recorded since the sighting was an incidental record outside formal survey periods.) There are no other records of the Little Eagle at the site.

The increase in the total RSA and height of the turbines will increase the number of Little Eagle flights potentially at risk of collision. This species is considered Vulnerable at the state level under the BC Act. The proposed modification presents a theoretical increase in risk when compared with the currently permitted turbine envelope for the Little Eagle. However, given the single record at the site the overall level of risk remains low. The risk to Little Eagle should however be further monitored and evaluated, and risks reduced through the implementation of mitigation recommendations in a Bird and Bat Adaptive Management Plan. This will be managed under Condition D4 of the Project Approval which states that a Bird & Bat Adaptive Management Plan will be developed pre-construction.

Other BC Act listed species

Two other threatened species listed under the NSW *Biodiversity Conservation Act* (BC) Act may be at increased risk from the modification:

- Diamond Firetail - is a ground and tree dwelling species considered rarely to fly at RSA height; the lower RSA of the proposed modification is unlikely to place flights of this species at risk of collision;
- Varied Sittella – usually a bark-forager in trees and is not expected to fly regularly above tree top height, therefore unlikely to be at increased risk of collision under the modification scenario;

Other species of note – raptors and Wedge tailed Eagles

Wedge tailed Eagles (WTE) were recorded at FCWF site and flew at greater than 50 metres (Kevin Mills & Associates, 2011) within the RSA heights.

The increase in both the total RSA and height of the turbines will increase the overall risk of collision by the WTE. However, as this species is considered secure at the state and national level and is not listed by the EPBC Act and BC Act as threatened or endangered, the potential for a significant population impact from the proposed modification compared with the approved turbine envelope is considered unlikely. The risk to WTE should also be reduced through the implementation of mitigation recommendations in a Bird and Bat Adaptive Management Plan. This will be managed under Condition D4 of the Project Approval which states that a Bird & Bat Adaptive Management Plan will be developed pre-construction.

White-throated Needletail

The EPBC Act White-throated Needletail (WTNT) was not recorded at FCWF site during the 2009-10 surveys, however it was recorded at the nearby Cadia mine site environs (Western Research Institute & Resource Strategies, 2009) and is likely to be an occasional visitor to the area around FCWF in summer and early autumn. The WTNT is a listed migratory species under the EPBC Act and as it annually migrates from the northern to the southern hemisphere. It is not listed as a threatened or

endangered. The Needletail is an aerial forager over a variety of habitat although preferring forested ranges (Higgins 1999). It is known to fly at RSA heights and occasional casualties are known from wind farms in south-eastern Australia (BL&A, unpublished data). It is a common species that ranges over much of eastern Australia during its non-breeding season in Australia from breeding grounds in north-east Asia (e.g. Higgins 1999).

The increase in both the total RSA and height of the turbines will increase the number of needletail flights potentially at risk of collision. However, as this species is considered secure at the state, national and international level, and is not listed by the EPBC Act and BC Act as threatened or endangered, the potential for a significant population impact from the proposed modification compared with the approved turbine envelope is considered negligible.

2.1.4. *Summary of potential impact on birds from modification*

The species of birds recorded at FCWF include common, widespread species which occur in wooded agricultural landscapes in south eastern Australia. Given that the rotor-swept area (RSA) will increase between 20 and 50 metres, (85% of birds were recorded under 20 metres height during formal surveys), the increased risk of the larger turbines may impact on up to 16% of all bird observations at FCWF, and unlikely to lead to significant population impacts for those species not listed on state and federal lists as species of conservation concern.

Of those species listed state and federal lists as species of conservation concern:

- The Superb Parrot is listed as Vulnerable under the EPBC Act and NSW BC Act (2016). This species was recorded in small numbers and is likely to be seasonally recorded around the FCWF. It would be exposed to an increased risk of collision from the lowered minimum RSA from 30 to 20 metres and the larger RSA between 30 and 50 metres. However, given the low numbers of records of the Superb Parrot on-site and characteristic flights at tree canopy height, the increase in risk is not considered as significant;
- The Little Eagle, listed under the state BC Act, was considered to be potentially at greater risk from a turbine collision. However, given the limited records from FCWF the overall risk remains low;
- Two woodland species listed under the BC Act were considered unlikely to be at increased risk as they typically fly at tree height and are unlikely to be recorded at RSA height (Diamond Firetail and Varied Sittella);

In relation to other species potentially at risk, that are not listed as threatened or endangered:

- The Wedge-tailed Eagles (WTE) and other high-flying raptors may be at increased in risk of collision from the larger and higher turbines. However, overall the risk to the WTE from collision with turbines was considered to be low given the low population using the area, the low frequency with which these flights occur and the non-threatened status of the mainland Australian sub-species of the eagle; and
- The White-throated Needletail, listed as a marine and migratory species listed under the EPBC Act (not listed as a threatened species), may be at increased risk from the larger turbine rotor swept area. However, the incremental change

in risk is low given that the species is widespread, and its frequency at the wind farm is likely to be low;

The implementation of mitigation measures in a Bird and Bat Adaptive Management Plan will contribute to lowering any potential risk.

2.2. Impacts of modification on bats

2.2.1. *Bat species recorded on site*

The bat surveys were conducted at the FCWF and surrounding areas in October–November 2008 (9 nights) and March 2009 (11 nights). Ultrasonic bat detectors were deployed at a number of sites at ground level and on three wind towers (in Oct/Nov 2008) at between 50–70 metres in height. The recordings were distributed across representative habitats near planned wind turbine locations (October–November 2008) and larger remnant woodland blocks in the surrounding area (March 2009). A total of ten sites were surveyed (Richards, 2011).

Twenty calls per night were recorded in the open pasture habitat at the meteorological towers, which is indicative of poor quality habitat for bats. The recording of 140 calls per night recorded in the remnant woodland is indicative of a higher quality habitat. In the wooded remnants survey of March 2009, the vast majority (>99%) of calls from 7,120 calls recorded were from widespread, common and secure species (Richards, 2011). Listed threatened species are discussed below.

The Yellow-bellied Sheathtail Bat listed as a *vulnerable* threatened species under the BC Act was recorded at very low frequencies (totalling 7 calls combined out of over 7,120 calls identified, i.e. less than 0.1% of all bat calls recorded at Flyers Creek Wind Farm). No species listed on the Commonwealth EPBC Act were recorded (Richards, 2011).

The 2008 surveys of the meteorological towers recorded 210 calls from the ground-based detectors while 50 calls were recorded from the detectors at 50 to 60 metres height. This provides a comparison of the distribution of flights between ground level and at height. As bat detectors generally do not record bat calls beyond about 25 metres from the recorder and for some species less. Thus, for the recordings at height, a 25-metre height separation can be assumed to be sampling different height zones. At Flyers Creek data was recorded from both ground level and 50-70 metres.

The results indicated that with increasing height bat activity became lower (Richards, 2011). Thus, in general terms, calls of bats 25-30 metres and above were 19% of those at ground. Two species represented over 67% of the calls at height and were from the known high-flying bat species namely the White-striped Free-tailed bat and other freetail bats, i.e. *Mormopterus* sp (Richards, 2011).

2.2.1.1. *Yellow-bellied Sheathtail Bat*

This species is listed as Vulnerable under the NSW BC Act. It was recorded seven times out of a total 7,120 calls in the March 2009 survey (<0.1% frequency of calls). Work cited by Richards (2011) from a variety of locations around the NSW tablelands, shows that densities of Yellow-bellied Sheathtail Bat (YBSB) are strongly correlated with large patches of natural woodland or forest remnants. Richards

(2011) found that the number of YBSB calls increased sharply once remnant size exceeded 650 hectares and even more so above 800 hectares. It is therefore expected that there is some increased risk of collision with the lower and larger turbines. However, given the low numbers of bats that move through the site the species would be unlikely to suffer any regional population decrease due to turbine mortality because the turbines are located in sub-optimal habitat with low populations of the bat.

2.2.2. **Assessment of modification on bats**

The impact to bats is assessed in relation to the turbine proposed in modification 4 as outlined below.

The turbine proposed in Modification 4 decreases the lower minimum RSA height from the approved turbines by 10 metres. This decrease in the lower minimum RSA from 30 metres above ground to 20 metres above ground will increase the risk to bats flying between 20 and 30 metres. This increase in risk will be predominately on species that are not listed as threatened or endangered.

The total area of RSA between 20 and 50 metres increases by just over 100%, representing a doubling of the collision risk in this height band. Bats flying between 20-50 metres above the ground are at about twice as likely to collide with the larger turbine. The majority of the bats recorded in this range are common bats from this largely agricultural landscape.

It is expected that bats that fly at tree top level (20 to 25 metres) or below would not be affected by the altered turbine specifications as there is some separation between the turbines and vegetation. Pooled bat data (BL&A, unpublished data) indicates that the number of bats flying at and above 50 metres is 15% of those recorded at ground level and 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, which are not listed as species of conservation concern. This accords closely with data collected from FCWF which found 25% of bat flights were recorded from detectors placed at 50-70 metres height when compared to recordings at ground level.

Above 100 metres the difference between the proposed and larger turbine design puts turbine blades into an additional zone likely to have very little bat activity (i.e. between 100 and 160 metres). If any bats were recorded above 100 metres, the species diversity is lower and bats likely to be higher-flying species such as White-striped Freetail Bat and Gould's Wattled Bat, which are not listed as species of conservation concern.

The change in turbine proposed in planning modification 4 is unlikely to cause significant adverse impacts to the populations of bat species, both threatened and non-threatened, at FCWF for the following reasons:

- The species of bats recorded during spring 2008 and autumn 2009 survey work overwhelmingly (>99%) comprised common, widespread species of wooded agricultural landscapes in south-eastern Australia;
- One listed threatened species under the TSC Act (Yellow-bellied Sheathtail Bat *Saccolaimus flaviventris*) was present and recorded at very low frequencies (i.e. present on less than 30% of sampling nights and from 3 of 10 sites at Flyers Creek Wind Farm). The habitat on-site was considered suboptimal with of small

woodland remnants on the wind farm as opposed to being present in much larger numbers in wooded remnants of 650 hectares or greater in the wider Orange region (Richards, 2011). Given the low frequency of its occurrence an increase in the low risk commensurate with the proposed modification is expected under the modified scenario;

- No EPBC Act-listed species are known to occur at the FCWF (Kevin Mills & Associates, 2011) therefore there are no known risks to nationally listed threatened bats;
- Bat species potentially at increased risk are mainly the higher-flying species such as White-striped Freetail Bat *Tadarida australis* and Gould's Wattled Bat *Chalinolobus gouldii*, both species are not listed as species of conservation concern.

3. CONCLUSION AND SUMMARY

3.1. Impacts of modification on bats

The species of birds recorded at FCWF include common, widespread species which occur in wooded agricultural landscapes in south eastern Australia. Given that the rotor-swept area (RSA) will increase between 20 and 50 metres, the increased risk of the larger turbines may impact on up to 16% of all bird observations at FCWF, and unlikely to lead to significant population impacts for those species not listed on state and federal lists as species of conservation concern.

Species listed as state/federal lists as species of conservation concern, including the Superb Parrot (Vulnerable - EPBC Act and NSW BC Act (2016)), and the BC listed Little Eagle, Diamond Firetail and Varied Sittella are considered not to be at significant increased risk from the modification.

The non- listed Wedge-tailed Eagles (WTE) and other high-flying raptors may be at increased in risk of collision from the larger and higher turbines. However, overall the risk to the WTE from collision with turbines was considered to be low.

The White-throated Needletail, listed as a marine and migratory species listed under the EPBC Act (not listed as a threatened species), may be at increased risk from the larger turbine rotor swept area. However, the incremental change in risk is low given that the species is widespread, and its frequency at the wind farm is likely to be low.

3.2. Impacts of modification on bats

3.2.1. *Bat species recorded on site*

The change in turbine proposed in planning modification 4 is unlikely to cause significant adverse impacts to the populations of bat species, both threatened and non-threatened, at FCWF as most bats recorded at the site comprised common, widespread species of wooded agricultural landscapes in south-eastern Australia and the increased risk will impact on mainly the higher-flying species such as White-striped Freetail Bat *Tadarida australis* and Gould's Wattled Bat *Chalinolobus gouldii*, both species are not listed as species of conservation concern. No EPBC Act-listed species are known to occur at the FCWF (Kevin Mills & Associates, 2011) therefore there are no known risks to nationally listed threatened bats

The BC Act listed Act Yellow-bellied Sheathtail occurred with a low frequency and the there is an increase in the low risk commensurate with the proposed modification under the modified scenario.

3.3. Bird & Bat Adaptive Management Plan (BBAMP)

Condition B4 of the Project Approval requires the preparation and approval of a Bird and Bat Adaptive Management Program prior to the commencement of construction. The Bird and Bat Adaptive Management Program must incorporate specified monitoring, and a decision matrix that clearly sets out how the Proponent will respond to the outcomes of monitoring. This is required to include identification of the "potential mitigation measures and implementation strategies in order to reduce impacts on birds and bats such as swift carcass removal, pest control including rabbits, use of deterrents, and sector management including switching

off turbines that are predicted to or have had an unacceptable impact on bird / bat mortality at certain times".

Condition B4 requires the Proponent to implement all feasible and reasonable mitigation measures where the need for further action is identified through the Bird and Bat Adaptive Management Program, or as otherwise agreed with the Secretary. It is considered that the impacts arising from the increased maximum turbine envelope will remain able to be appropriately managed under the Bird and Bat Adaptive Management Program required under condition B4 of the Project Approval.

4. REFERENCES

- Aurecon Australia, 2011, 'Flyers Creek Wind Farm Environmental Assessment', Aurecon Australia Pty Ltd, Sydney, April 2011.
- Higgins, PJ (ed) 1999, *Handbook of Australian, New Zealand and Antarctic Birds*, Volume 4: Parrots to Dollarbird, Oxford University Press, Melbourne.
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