

Crookwell II Wind Farm

Third Annual Report on the Implementation of the Bird and Bat Adaptive Management Plan

Prepared for Crookwell Development Pty Ltd

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Nature
Advisory

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1. Introduction

Crookwell II Wind Farm (C2WF) is situated 14 kilometres south-east of Crookwell and 12 kilometres north-west of Goulburn in the Southern Tablelands of New South Wales. The site lies on a series of higher ridges that are mostly cleared of its original vegetation after being used for decades for livestock grazing. Consequently, introduced pasture grasses now dominate the ground cover. Development consent was originally granted in 2005, before being modified in 2009 and later modified again which resulted in reducing the number of turbines to 32. Twenty-eight turbines in total were constructed.

The Office of Environment and Heritage (OEH) requested in a letter to Crookwell Development Pty Ltd dated 14th November 2016 that a Bird and Bat Adaptive Management Plan (BBAMP) be developed in accordance with Condition 84 of the Development Consent. Crookwell Development first commissioned Brett Lane & Associates Pty Ltd (now Nature Advisory Pty Ltd) to develop the BBAMP (BL&A 2018) following pre-construction Bird Utilisation Surveys (BUS), which were undertaken in February and November 2017 at the site.

Condition 84 states:

“84. Bird and Bat Adaptive Management Program must be prepared and undertaken, which takes account of bird/bat monitoring methods identified in the current editions of AusWEA Best Practice Guidelines for the Implementation of Wind Energy Projects in Australia and Assessing the Impacts of Wind farms on Birds - Protocols and Data Set Standards. The Program must be undertaken by a suitably qualified expert, approved by the Director General.

*The Program must incorporate **Monitoring, and a Decision Matrix** that clearly sets out how the Proponent will respond to the outcomes of monitoring. It must:*

- (a) Incorporate an ongoing role for the suitably qualified expert;*
- (b) Set out monitoring requirements. The requirements must account for natural and human changes to the surrounding environment that might influence bird and/or bat behaviour such as changes in land use practices, and significant changes in water levels in nearby water bodies;*
- (c) Incorporate a decision making framework that sets out specific actions and when it may be required to reduce identified impacts on bird and bats;*
- (d) Set out available mitigation measures;*
- (e) Incorporate reporting requirements on the outcomes of monitoring, on the application of the decision-making framework, the need for mitigation measures, progress with implementation of such measures, and their success. Reports must be prepared on an annual basis, from the commencement of operation, and must be prepared within 2 months of the end of the reporting period and be provided to the Director General. The Director General may vary the reporting requirement or period by notice in writing to the Applicant;*
- (f) Identify any necessary mitigation measures and implementation strategy including, but not limited to, those referred in Condition 82.*

The Applicant is required to implement reasonable and feasible mitigation measures where the need for further action is identified through the Bird and Bat Adaptive Management Program.”

Crookwell Development engaged Nature Advisory to implement the approved BBAMP for C2WF. Specifically, the scope of the investigation includes:

- Operational Bird and Bat Carcass (Fatality) Monitoring Program;
- Monitoring 'at risk' groups of birds;
- Bird utilisation surveys; and
- Annual reporting.

Nature Advisory began implementing the BBAMP upon commencement of operations at C2WF during January 2019 and has compiled two annual reports to date, providing recommendations on the continued implementation of the BBAMP at C2WF based on the above.

In accordance with section 4.6.1 of the BBAMP, annual reporting will continue following the initial two-year operational phase monitoring for a total of five years post construction.

This report constitutes the third annual report for C2WF and includes the BBAMP implementation period from January to December 2021 at C2WF. This report is divided into the following sections:

Section 2 provides previous BBAMP implementation activity summaries.

Section 3 provides the methods for continued BBAMP implementation.

Section 4 provides results of the current annual reporting period.

Section 5 provides recommendations for continued monitoring at C2WF.

This report was compiled by Joshua Brown (Zoologist) and Jackson Clerke (Senior Ecologist and Project Manager).

2. BBAMP Implementation

This section provides a brief summary of results and conclusion on previous BBAMP implementation.

2.1. Previous reporting

The following reports contain the most relevant information to the implementation of the BBAMP but is not an exhaustive list. Refer to the second annual report for a comprehensive outline of BBAMP implementation and reporting.

- Crookwell 2 Wind Farm, Annual Report on the Implementation of the Bird and Bat Adaptive Management Plan 2021. Prepared for Crookwell Development Pty Ltd, report number 8172 (25.0).
- Crookwell 2 Wind Farm, Second Annual Report on the Implementation of the Bird and Bat Adaptive Management Plan 2021. Prepared for Crookwell Development Pty Ltd, report number 8172 (40.1).
- Crookwell 2 Wind Farm, Raptor Survey 2021. Prepared for Crookwell Development Pty Ltd, report number 8172 (35.7).

The above reports are summarised below.

A total of 51 bird carcasses were recorded at C2WF during the monitoring period. These carcasses belonged to seventeen different bird species and a further four species that could not be identified. Eight Australian Magpie carcasses/feather remains were found at C2WF during the monitoring period, the highest number of any species, accounting for 16.28% of all bird mortality. The equal second most common species among bird carcasses found were Wedge-tailed Eagle and Brown Falcon, each with 10% of bird carcasses. Based on the detection of carcasses and feather spots, and measured detectability and scavenge rate; a total site loss was estimated of approximately 187 birds over the survey period, with a 95% confidence that fewer than 285 were lost. This equals approximately 3.3 birds per turbine per year.

A total of 29 bat carcasses of four species were recorded under the searched turbines at C2WF during the monitoring period. One additional bat carcass could not be identified and was recorded as an unknown species. White-striped Freetail Bat was disproportionately represented, making up over 60% of all carcass finds. Based on the detection of carcasses and measured detectability and scavenge rate; a total site loss was estimated of approximately 246 bats over the survey period, with 95% confidence that fewer than 477 were lost. This equals approximately 4.4 bats per turbine per year.

Two Black Falcon (*Falco subniger*) carcasses were recorded under turbines during the monitoring period: on 16th July 2019 and 29th August 2020. An additional carcass of this species was found on 26th February 2020 beside an access track 980 metres from a turbine. One Little Eagle (*Hieraaetus morphnoides*) carcass was found on 26th February 2020. Both species are listed as vulnerable in NSW under the *Biodiversity Conservation Act 2016* (BC Act).

These findings triggered targeted investigations involving extensive field surveys on and within ten kilometres of the wind farm from July 2020 to February 2021. These surveys found a very low and declining level of activity by both species within the survey area, and it was concluded that the risk of ongoing collision with turbines was low. This was confirmed after intensified monthly carcass searches under all 28 turbines during which no carcasses of either species were found after the August 2020 find. Reduced Black Falcon activity in the region from spring 2020 is almost certainly

due to the breaking at this time of the 2018-20 drought that likely pushed many Black Falcons coastward from Australia's arid regions.

In response to the impact of the project on Black Falcon, mitigation measures were developed in consultation with BCS and implemented. These included removal of perching opportunities near turbines and increase in the height of grass under high-risk turbines. These measures substantially reduced raptor collisions at key turbines. These measures will continue in order to maintain a reduced risk of collision by raptors with these turbines. It was recommended that an additional raptor survey be undertaken to monitor raptor utilisation of C2WF by these species.

Bird utilisation of C2WF varies noticeably over the pre- and post-construction BUS. These differences were attributed to drought conditions affecting bird abundance and activity levels at different times during the monitoring program.

Bird and bat mortality was comparable with other wind farms in south-eastern Australia that Nature Advisory has monitored. Most species are not affected differently from wind farms elsewhere and the dominant species of bird and bat affected are also comparable, with magpies, eagles and other raptors, White-striped Freetail Bat and Gould's Wattled Bat making up a significant proportion of carcasses found. The impacts on the Black Falcon were unusual but are thought to be related to the recent drought.

3. Methods

This section provides methods for the continued implementation of the BBAMP as recommended in the Second Annual Report.

3.1. Carrion removal

As Wedge-tailed Eagle (*Aquila audax*) is one of the most impacted bird species on the site, it is important that the carrion removal program be undertaken diligently and a log book maintained. The program is outlined in Section 5.1 of the BBAMP and is provided below:

This program will focus on an area of a minimum of 200 metres around turbines, where safe, feasible and practical. The procedures below will be adopted:

- A designated suitable person will be appointed (such as a wind farm employee or landowner) to perform the function of Carrion Removal Coordinator who will undertake the activities described below.
 - Monthly inspections of the wind farm site to search for any stock, introduced or native mammal and bird carcasses (to be recorded as incidental finds) that may attract raptors (e.g. kangaroos, pigs, goats, foxes, rabbits, dead stock). This search will be undertaken via vehicle and visual checks in addition to using binoculars to look for large carcasses within 200 metres of each turbine.
 - Additional, opportunistic observations by operators during normal inspections and work routines and by landowners as they travel around their properties provides further opportunity to identify and report carcasses of stock or feral animals so that timely collection can be undertaken to remove them. This can be addressed by operator and landowner protocols.
 - Any carcasses and/or remains found that are within 200 metres of turbines, will be collected and disposed of as soon as possible, in a manner that will avoid attracting raptors close to turbines.
 - Consult with landowner or site or asset manager in relation to the appropriate disposal of collected carrion, to be located at least 200 metres away from the closest turbine.
 - Wind energy facility maintenance staff and landowners will be required to notify the Carrion Removal Coordinator following identification of carrion on site in between monthly searches.
 - Carcass occurrence and removal will be recorded in a “management log book” maintained by C2WF asset manager.

Carcass occurrence and removal, and the times and dates of each monthly search should be recorded in a “management log book” maintained by the C2WF asset manager. This log book is to be provided as part of an annual report, in accordance with the approved BBAMP.

3.2. Restrict lambing and feeding near turbines

Lambing should be restricted in paddocks at least 200 metres away from turbines, in consultation with land holders, to reduce the risk that raptors (Wedge-tailed Eagles in particular) are attracted close to the turbines.

Feeding stock close to turbines should be discontinued as it may contribute to unnecessary bird impacts. Stock should not be fed grain within a 200-metre radius of wind turbines as this may attract parrots and cockatoos that can then collide with turbines.

C2WF should contact relevant land holders to discuss restricting the above activities and report the results of consultations.

3.3. Carcass search program

It is considered that two years of carcass searches, combined with the BUS surveys have provided an understanding of the impact the wind farm on birds and bats on the site.

Few threatened species were recorded after mitigation measures were implemented, further carcass searches are not recommended.

3.4. Raptor survey

Given that mitigation measures are in place for raptor species, and for Black Falcon in particular, it was recommended that monthly raptor surveys at the 2020-21 survey points *within* the C2WF be undertaken from July to December, a period that includes the breeding seasons of both Little Eagle and Black Falcon.

3.5. Incidental monitoring

Incidental reporting of carcasses by C2WF staff must continue in accordance with the approved BBAMP. C2WF should continue to photograph and store in a freezer any carcasses found by staff under turbines until identified by a qualified and experienced ecologist as per the BBAMP. This will continue to provide some indication of on-going impacts to birds and bats at the wind farm and, should impacts on threatened species be detected, the impact trigger requirements must be implemented.

If a carcass is detected (a 'find') the following variables will be recorded in the carcass search data sheet (see Appendix 1):

- GPS position, distance in metres and compass bearing of the carcass from the wind turbine tower;
- Substrate and vegetation, particularly if it was found on a track or hard-stand area without vegetation as this may assist in quantifying the number of carcasses not found in areas where ground cover makes carcasses less visible;
- Species, age, number, sex (if possible) signs of injury and estimated date of strike; and
- Weather (including recent extreme weather events, if any), visibility, maintenance to the turbine and any other factors that may affect carcass discovery.

If the species is not able to be immediately identified as there is not a qualified ecologist on-site (i.e. an incidental find), photographs will be provided to the qualified ecologist within 2 business days of the find for identification and the ecologist must reply within 2 business days for the possible reporting of an impact on a threatened species within 3 business days of confirmation.

The carcass will be handled according to standard procedures, as follows:

- The carcass will be removed from the site to avoid re-counting;
- The carcass will be handled by personnel wearing rubber gloves, packed into a plastic bag, wrapped in newspaper, put into a second plastic bag;
- The carcass will be clearly labelled to include the carcass to ensure that its origin can be traced at a later date, if required; and
- The carcass will be transferred to a freezer at the site office for storage so a second opinion on the species identity may be sought, if necessary, and for use in scavenger and/or detectability trials.

It may be necessary for the wind farm operator to obtain a permit under the *National Parks and Wildlife Act 1974* to handle and keep native wildlife (even dead wildlife) as part of the monitoring program.

3.6. Reporting

The above activities should continue to be reported to the regulator in an annual report.

Section 4.6.1 of the BBAMP states:

“The BBAMP will be reviewed and reported upon on an annual basis for the first five years and every two years after that, unless a different agreement is reached with the Secretary, the reporting will focus on the BBAMP in terms of its effectiveness together with consideration of the intensity of effort and resourcing, and emerging understanding of the level of risk to avifauna.”

4. Results

This section provides the results of the continued monitoring at C2WF.

Table 1 below displays data from the management log provided by C2WF. Monthly inspections of site were undertaken from the period including June to December 2021. No incidental carcass was identified and no carrion removal was reported during the annual reporting period.

Table 1: Management log, provided by C2WF

Date	Inspection	Stock Carcass removed	Carrion Identified	Raptors Identified	Stock feeding Identified	Avifauna carcass removed
Jun-21	Y	N	N	N	N	N
Jul-21	Y	N	N	N	N	N
Aug-21	Y	N	N	N	N	N
Sep-21	Y	N	N	N	N	N
Oct-21	Y	N	N	N	N	N
Nov-21	Y	N	N	N	N	N
Dec-21	Y	N	N	N	N	N

The recommended raptor survey has not been implemented during this reporting period. Given the information obtained during the extensive 2021 targeted raptor surveys, as summarised in Section 2.1, and no further raptor impacts being identified to date; the risk to Black Falcon particularly and Little Eagle remains low. Further impacts are considered unlikely given the climactic conditions of the last few years preventing drought conditions and making the Black Falcon's preferred habitat in arid locations much more favourable. As such, further targeted raptor surveys at C2WF are not considered necessary. Monitoring of further raptor impacts will continue through incidental carcass records.

5. Recommendations

This section provides recommendations for the continued implementation of the BBAMP moving forward.

5.1. Carrion Removal

The carrion removal program should continue in line with the methods provided in Section 3.1

5.2. Restrict lambing and feeding near turbines

Lambing should be restricted in paddocks at least 200 metres away from turbines, in consultation with land holders, to reduce the risk that raptors (Wedge-tailed Eagles in particular) are attracted close to the turbines.

Feeding livestock should not be conducted within a 200-metre radius of turbines, as this may attract parrots and cockatoos that are then at risk of colliding with turbines.

As C2WF cannot impose such restrictions on private land holders (given prior long-standing agreements), undertaking these mitigation measures must be done in consultation and cooperation with them.

5.3. Incidental Monitoring

Incidental reporting of carcasses by C2WF staff must continue in accordance with the approved BBAMP. C2WF should continue to photograph and store in a freezer any carcasses found by staff under turbines until identified by a qualified and experienced ecologist as per the BBAMP. This will continue to provide some indication of ongoing impacts to birds and bats at the wind farm and, should impacts on threatened species be detected, the impact trigger requirements must be implemented.

Section 3.5 describes detailed methods and Appendix 1 provides the carcass data sheet.

5.4. Reporting

The above activities should continue to be reported to the regulator in an annual report as per Section 3.6.

6. References

Brett Lane & Associates Pty Ltd (BL&A) 2018, Crookwell 2 Wind Farm: Bird and Bat Adaptive Management Plan, Report No. 8172 (8.3) for Crookwell Development Pty Ltd, September 2018

Nature Advisory 2021a, Crookwell 2 Wind Farm, Second Annual Report on the Implementation of the Bird and Bat Adaptive Management Plan 2021. Prepared for Crookwell Development Pty Ltd, report number 8172 (40.1)

Nature Advisory 2021b, Crookwell 2 Wind Farm, Raptor Survey 2021. Prepared for Crookwell Development Pty Ltd, report number 8172 (35.7).

Appendix 1: Carcass find data sheet

Crookwell 2 Wind FARM - BIRD AND BAT MORTALITY MONITORING PROGRAM CARCASS SEARCH DATA-SHEET*			
Please fill out all details above the heavy line for each site searched All details below the line are required if a carcass is found Do not move a carcass until the details below have been completed			
Crookwell 2 WF			
Date:			
Start Time:			
Finish Time:			
Turbine Number:			
Wind direction and strength in preceding 24 hours:			
Any unusual weather conditions in last 48 hours?			
Distance of Carcass from Tower(m):			
Bearing of Carcass from Tower (deg):			
Preliminary Species Identification:			
Photo Taken**		Yes / No	
Signs of injury:			
How old is carcass estimated to be (tick category):	<24 hrs	1-3 days	> 3 days
	Other		
Other Notes (ie. sex/age of bird):			
Post Find Actions: 1. Place carcass in sealable plastic bag then wrap it in newspaper and take to freezer at site office.			
* One form should be completed for each carcass found			
** Please attach photo to this form			