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Dear Michael

Brolga and Southern Bent-wing Bat Independent Peer Reviews - Willatook Wind Farm

Our ref: Matter 37341

Thank you for the opportunity to provide independent peer-review of assessments undertaken on Brolga *Antigone rubicunda* and Southern Bent-wing Bat *Miniopterus orianae bassanii* (SBWB) for the proposed Willatook Wind Farm.

We provide our peer review of the Nature Advisory assessments of Brolga and SBWB in accordance with the scope addressing a series of primary questions for each species, as set out in bold below. The assessment documents provided to us, and reviewed here are:

- Willatook Wind Farm Planning Application Report Appendix P Biodiversity April 2022 [Nature Advisory 2021a. Willatook Wind Farm Brolga Impact Assessment. Report for Willatook Wind Farm Pty Ltd No. 16087 (10.9) April 2022] (*Brolga report*)
- Willatook Wind Farm Planning Application Report Appendix P Biodiversity April 2022 [Nature Advisory 2022b. Willatook Wind Farm Flora and Fauna Assessment. Report for Willatook Wind Farm Pty Ltd No. 16087 (7.8) May 2022] (*Flora and Fauna report*)
- Willatook Wind Farm (undated). Willatook Wind Farm Environment Effects Statement. Chapter 11 Brolga (*EES chapter 11*)

The Nature Advisory reports reviewed here are updated from previous versions. We have provided peer-reviews of earlier versions of these reports in our advice dated 18 October 2021 and 14 April 2022. Reference to that earlier advice alongside the present review provides a history of iterative changes to the reports and consequently to our reviews.

Our peer reviews for each species' assessment documentation are presented in separate sections below. The Brolga peer review was completed by Ian Smales – Principal Zoologist and the SBWB peer review was completed by Mark Venosta – Team Leader Zoology. Assistance was provided by Dr Inka Veltheim – Senior Zoologist. The reviews here provide a summary of key aspects by addressing the questions as they relate to each of the two species.

Note: Whether something is 'appropriate' or 'reasonable' has been considered in light of the 'Environment Effects Act 1978 Advisory Note – Peer Review and Quality Assurance' which states:

"A peer review is undertaken by reviewers external to an organisation to verify that investigation and assessment methods are suitable and meet best practice environmental assessment and are consistent with the body of technical knowledge in the subject area. In the context of an EES, a peer review typically verifies that work is technically sound, conclusions are supported and clearly covers the relevant matters identified in scoping requirements and Ministerial Guidelines. This will include reviewing whether it is based upon appropriate data, has adopted suitable methods for assessment and that conclusions are supported by the work presented".

EES Scoping Requirement & Ministerial Guidelines

We have considered how documentation in reports prepared for the project address matters related to the Brolga and SBWB that are specified in the *Scoping Requirements for Willatook Wind Farm Environment Effects Statement* (DELWP 2019) (*EES Scoping Requirements*). We have also considered the guidance provided in the *Ministerial guidelines for assessment of environmental effects under the Environment Effects Act* (DSE 2006) (*Ministerial guidelines*).

The majority of 'Key issues' specified for the two species in the *EES Scoping Requirements* are addressed in sections below. In summary, we consider the project assessment has appropriately and addressed matters raised by the *EES Scoping Requirements* related to Brolgas and SBWB within the constraints of existing available information.

Brolga

At the outset, we note that Victorian regulatory guidance with regard to managing potential impacts of wind energy facilities on the Brolga population is provided by *Interim Guidelines for the Assessment, Avoidance, Mitigation and Offsetting of Potential Wind Farm Impacts on the Victorian Brolga Population 2011 Brolga* (DSE 2012) (*Interim Brolga Guidelines*).

In late 2020 DELWP published *Brolga assessment and mitigation standards for wind energy facility permit applications* (DELWP 2020a) (*Draft Brolga Standards*). The *Draft Brolga Standards* were provided for public comment and to-date they have not been finalised or ratified. DELWP also published an explanatory document (DELWP 2020b) to accompany the *Draft Brolga Standards*. The intention is that a final *Brolga Standard* will be incorporated into planning schemes and will replace the *Interim Brolga Guidelines*.

At present, advice from DELWP to wind energy proponents has been that the *Interim Brolga Guidelines* continue to apply. However, in the period between 2012 and the present much has been learnt about Brolga biology, in particular their movements in Victoria, as a result of dedicated investigations spearheaded by Dr I. Veltheim. There is also now a body of experience with Brolgas at operating wind farms.

The proposed Willatook wind energy project and information about Brolgas in the local area triggered all three sequential levels of assessment as prescribed by the *Interim Brolga Guidelines*.

Are the survey methods used, and the quantum of surveys undertaken, to gain an understanding of the existing population status appropriate and in-line with best practice and statutory guidelines?

In our view, the combined EHP and NA survey effort, their geographic and temporal coverage and methods used are adequate and appropriate and in line with requirements of the three levels of assessment set out in the *Interim Brolga Guidelines*. Investigations were carried out during 2009 – 2013 and 2018 – 2020. They included:

Level one assessment

- desktop review of databases for historical and recent records of Brolgas
- on-ground searches of potentially suitable habitats in summer 2009/10
- initial community consultation, particularly with local landowners, undertaken to obtain additional first-hand information about Brolga usage and activity in the local area in 2011

Level two assessment

- aerial survey to locate additional Brolga nesting sites, followed by ground investigation in 2010 and 2018
- a second round of community consultation was undertaken in 2018 and 2019 and has been on-going, particularly with local landowners, to obtain additional first-hand information about Brolga usage and activity in the local area.
- on-ground searches of potentially suitable habitats between 2018 and 2020
- searches to document Brolga breeding activities, including flight behaviours at wetland areas within the project site during 2012/13

Level three assessment

- development and application of turbine-free buffered zones around breeding wetlands within 3.2 km of the wind farm
- preparation of collision risk modelling to provide estimates of turbine collision risk for Brolgas
- application of population viability analysis to estimate potential impacts on the Victorian Brolga population
- an outline for a Brolga compensation plan aimed at achieving a zero net impact on the Victorian Brolga population

Evaluation of the suitability of wetlands for Brolgas was undertaken using the DELWP Victorian Wetland Inventory, but was enhanced by a tailored investigation and modelling of hydrology of the landscape within two kilometres of proposed turbines. We consider this to be an improvement over simple reliance on the DELWP mapping that does not necessarily reflect modification and current conditions of wetlands.

Is the ecological understanding (and predictions) of the species abundance, distribution and behaviour reasonable and supported by scientific understanding?

Overall, the assessment set out in the *Brolga report* is in line with current understanding of the ecology, abundance, distribution and behaviour of the south-western Victorian Brolga population. The assessment

uses and cites the existing body of published literature and general knowledge of those aspects including information from the most recently available science. As prescribed by the *Interim Brolga Guidelines*, the assessment also included targeted investigations of Brolgas and their habitats within the proposed wind farm site and the prescribed radius of investigation. The assessment is thus based on current understanding of Brolga biology in the study area.

Definition of suitable breeding wetlands

The footnote on page 33 of the *Brolga report* clarifies that the criterion related to a 120-day period of inundation used as part of defining suitability of wetlands as breeding habitat for Brolgas, was established with advice to that effect from DELWP early in the assessment.

The *Brolga report* considers that wetlands are unsuitable for Brolgas if they are surrounded by tree plantations, but Brolgas are known to occasionally breed in such wetlands (Veltheim et al. 2019).

Home range assessment

The *Interim Brolga Guidelines* set out the purpose of provision of turbine-free buffer zones around a Brolga breeding wetland, as follows:

> *"In the case of breeding habitat "turbine siting would be used to exclude any significant reduction in breeding success caused by turbines" (Brolga Scientific Panel 2008). This will be achieved by establishing turbine-free areas around all potential Brolga nesting sites sufficient to have no significant impact on the likelihood of successful reproduction."*

The application of turbine-free buffers themselves is addressed later in this review, but an important precursor to that process is the determination of the size of a Brolga breeding home range. This is necessary in order to ensure that buffers provide protection sufficient to permit successful reproduction by Brolgas.

In the absence of relevant data from Brolgas at Cockatoo Swamp, Section 4.2.4 of the *Brolga report* describes methods used to determine the size of a home range for Brolgas breeding there. It uses information from flight distance (and height) observations of Brolgas obtained by Nature Advisory from 24 Brolga nests over a period of 15 years. The use of distances flown by adult Brolgas is a quite different measure from the method used by Veltheim et al. (2019) to determine the sizes of Brolga breeding home ranges which used GPS tracking to document the area used by pre-fledged juveniles (i.e. prior to their ability to fly) while they were accompanied by their parents. Veltheim et al. (2019) measured Brolga breeding home ranges by means of utilisation distribution (UD) records obtained from GPS tracked birds. In our view the published, peer-reviewed method of Veltheim et al. (2019) is appropriate because it investigated the habitat resource requirements of Brolgas during the period of reproductive efforts in which chicks were constrained by their inability to fly. Once juveniles fledge, they and the adult pair have capacity to fly over much greater distances and are no longer constrained by a breeding home range around a particular wetland or wetland complex.

The implication of home range size to requirements for turbine-free buffers are discussed later in this review.

Section 4.2.4 of the *Brolga report* notes that:

> *"Collision risk from wind turbines arises from birds flying, so the Nature Advisory flight observations are particularly valuable additional data set for assessing impacts."*

While that is indisputable, collision risk is assessed separately by the *Brolga report* and it is clear from the *Interim Brolga Guidelines* that the intention of determining a home range and a consequent turbine-free buffer around a breeding wetland is to protect Brolgas from all forms of wind farm disturbance or impacts upon their reproductive success.

Are the methods and assumptions used to generate the predictions of impacts reasonable? This would include assessment of impacts including collision risk and population viability modelling for the Brolga.

In the absence of empirical information indicating that Brolgas collide with wind turbines, the review of international work related to other species of cranes is appropriate and in accordance with our own reviews of this information.

The great majority of Brolga activity occurs on the ground. Flights are relatively rare and it is thus difficult to obtain a large body of flight data for the species. For this reason, collision risk modelling was undertaken using informed scenarios for Brolga flights. The use of informed assumptions is routine for collision risk assessment for this species for wind energy assessments in Victoria. Based on the described scenarios, the collision risk modelling appropriately aims to estimate the residual risk of Brolga collisions with turbines, i.e. the potential risk once protective measures including provision of turbine-free buffers are in place.

The *Brolga report* notes that the collision risk scenario for the breeding season was developed on the basis of flight observations at 24 breeding sites obtained over 15 years by Nature Advisory. Assumptions used as inputs to the model for Brolga activity are set out in Section 5.2.1. On the basis of information provided about the site and its environs and the existing body of knowledge about Brolgas in south-western Victoria, the input values are reasonable and appropriate. The conservatism built into various assumptions is routine for this kind of scenario collision risk modelling.

Section 5.2.1 says:

> *"Movements during the flocking season were not considered as Brolga move away from the study area during these times".*

The flocking season refers to the non-breeding portion of the year. While it is the case that much of the south-western Victorian Brolga population moves to traditional flocking areas during this portion of the year, it is also the case that some birds remain near breeding sites year-round. This behaviour is likely to be a response to variably favourable local conditions. Risk modelling for other wind farms has allowed for this possibility and we consider that it would be better to accommodate it in the modelling for the project.

Dot point 5 on page 70 says:

"A proportion of the flights are at a height and distance where turbine interaction is possible, being 40 metres above the ground"

It would be better to stipulate what proportion of flights at relevant heights were used for the modelling.

With regard to flight speed of Brolgas, it is no longer necessary to rely on overseas species of cranes. Veltheim (2018) has provided the first documentary evidence for Brolga flight speed based on data from satellite tracked birds. Instantaneous in-flight speeds during seasonal movements varied from 37.0 km/h to 79.6 km/h with a mean speed of 57.7 km/h.

Section 5.2.2 says that collision risk modelling has been run for two wind farm layouts:

- *"An original layout from a wind energy production viewpoint that includes a one kilometre turbine-free buffer around Brolga breeding co-ordinate locations;*
- *An updated layout that integrates the Brolga breeding site turbine free buffers".*

The latter evidently refers to the buffers adopted by the assessment. It is not clear what the first actually consists of and why it resulted in a higher prediction (at 90% avoidance rate) of Brolga collisions as shown in Table 12. We presume it refers to a one kilometre buffer around the centroid of a wetland or around a Brolga nest, rather than a buffer around the edge of a relevant wetland and/or that it does not entail the linkage of buffers between wetlands within 2 kilometres of each other as adopted by the project assessment. Given that, on the face of it, one kilometre is generally wider than the buffer adopted by the project, this requires clarification.

It is not apparent why 90% is the only avoidance rate reported in Table 12. This is a particularly low rate in light of the fact that Brolga collisions with turbines have never been reported. It equates to one in ten Brolga flights that make no attempt to avoid an impending collision. For consistency across wind energy projects in western Victoria, we note that for Stockyard Hill Wind Farm, the lowest avoidance rate modelled was 95% and that the planning Panel Report for Dundonnell Wind Farm referred to results at 95% avoidance rate.

The collision risk model input parameter metric for bird activity used in the Band model, and used for the project, is the measured number of flights. As noted by Chamberlain *et al.* (2006) and Smales (2017) and as set out in Appendix 5 of the *Brolga report*, this estimate is likely to provide output values that are higher than the actual rate of bird collisions that might occur. This is because the number of flights used as an input to the model is greater than the number of birds making the flights. As this model incorporates no method to accommodate a flight-rate per bird, its output estimates are a measure of the number of flights-at risk of collision, not the number of birds at risk of collision. The body of the report should be clear that its results are a measure of Brolga flights at risk of collision, not the number of birds that might collide. Without this distinction being clear the results are likely to represent an overestimate of potential collision risk.

Assumptions and methods used for the population viability analysis are reasonable and appropriate, although use of the collision risk results, measured by flights at risk, appear to have been carried forward into the population viability analysis. This means its results are also likely to overestimate risk to Brolgas.

Are the measures proposed to limit impacts to the species (including development of Brolga breeding habitat buffers) appropriate?

The primary measures proposed to limit potential for effects on Brolgas are:

- implementation of turbine-free buffers around Brolga breeding wetlands
- commitment to a clearance between the ground and lowest rotor tip height of at least 40 metres
- addition of land to the project site that enables reduction of the length of overhead transmission line between the on-site substation and the grid connection point from five kilometres to about 300 metres
- application of offset measures for residual effects with the intention of achieving a zero net impact on the Victorian Brolga population

The concepts underlying these measures are as prescribed or outlined in the *Interim Brolga Guidelines* (DSE 2012).

Turbine-free buffers

The *Interim Brolga Guidelines* prescribe that a turbine-free buffer must be in place around a Brolga breeding site, which the *Interim Brolga Guidelines* defines as,

> *"The nest of a Brolga breeding pair and the perimeter of the surrounding wetland".*

The *Interim Brolga Guidelines* set out the purpose of provision of turbine-free buffer zones around a Brolga breeding wetland, as follows:

> *"In the case of breeding habitat "turbine siting would be used to exclude any significant reduction in breeding success caused by turbines" (Brolga Scientific Panel 2008). This will be achieved by establishing turbine-free areas around all potential Brolga nesting sites sufficient to have no significant impact on the likelihood of successful reproduction."*

The *Interim Brolga Guidelines* are clear that the option is open to proponents to use current science (as the time of their development application) to propose a breeding buffer distance other than the default 3.2 km distance proposed in the *Interim Brolga Guidelines*. Recent science about the size of Brolga breeding home ranges, undertaken specifically to inform the question of buffer size is provided by Veltheim et al. (2019). It is based on the resource requirements for a pair of Brolgas to successfully nest and rear chicks to fledging. DELWP (*Draft Brolga Standards* 2020a) has proposed that turbine-free buffers around Brolga breeding wetlands should comprise of a 600 metre wide buffer to encompass the home range of breeding birds and a further 300 metre wide disturbance buffer, thus providing a total turbine-free buffer from the perimeter of relevant wetland(s) of 900 metres. DELWP (2020b) says that:

> *"The breeding habitat buffer requirements have been informed by key findings of Veltheim et al. (2019), which outline the important habitat elements of pre-fledged chicks."*

The assessment for Willatook Wind Farm appropriately involved an initial determination of whether wetlands were known or potentially suitable as breeding sites for Brolgas and/or were nocturnal roost sites during the breeding season. In accordance with findings of Veltheim et al. (2019) about movement distances of Brolga families that included pre-fledged juveniles, all suitable wetlands within 2 km of each other were grouped so that the buffered area is continuous around and between them.

Section 5.1.2 of the *Brolga report* says:

> *"Turbine-free buffers represent the area around a Brolga breeding site beyond which a wind turbine tower can be placed to avoid impacts on Brolga breeding success from collision or disturbance."*

For the complex of wetlands known as Cockatoo Swamp the *Brolga report* details a buffer comprised of three concentric widths:

1. An inner 400 metres width around the perimeter of the relevant wetlands (to encompass the home range)

2. A further 300 metres width as a disturbance buffer

3. A final 95 metres width "turbine blade length buffer"

The total buffer proposed is thus 795 metres wide. The actual distances of turbines from the edges of the relevant wetlands is discussed below.

The *Interim Brolga Guidelines* make no reference to the placement of turbine *towers*, but simply to 'turbine-free' buffer areas. It is our understanding that the intent of the *Interim Brolga Guidelines* is that no part of a turbine should encroach on a turbine-free buffer. In this context, reference to a *"95-metre turbine blade length buffer"* is confusing and in our view, inappropriate. The space in which the blades of a turbine operate (i.e. distance from blade tip to the hub) cannot be considered to represent any kind of buffer from the turbine and the width of the proposed turbine-free buffer is thus 700 metres.

The assessment determined its base buffer distance of 400 m for the Cockatoo Swamp complex from flight observations of Brolgas by Nature Advisory which indicated that 54% of all flights recorded were within 400 metres of a breeding wetland and that Veltheim et al. (2019) recorded 50% of Brolga observations being less than 315 metres from a breeding wetland. The method used by Veltheim et al. (2019) to determine the sizes of Brolga breeding home ranges was to document the area used by pre-fledged juveniles (i.e. prior to their ability to fly) while they are accompanied by their parents. The distances flown by adult Brolgas is a quite different measure. The key to adequate protection of a Brolga breeding attempt is to sufficiently buffer the breeding home range.

Veltheim et al. (2019) measured Brolga breeding home ranges by means of utilisation distribution (UD) records obtained from GPS tracked birds. They showed the average distance moved from a wetland by pre-fledged Brolgas they tracked was 442 metres; 50% were within 315 metres and 95% were within 1369 metres. On this basis, a home range buffer of 400 metres will not be sufficient to encompass even the average distance moved from a wetland by pre-fledged Brolgas.

We note that the process of linking relevant wetlands within 2 km of each other and application of a single buffer zone around the entire complex, in line with the findings of Veltheim et al. (2019) and the proposal of the *Draft Brolga Standards*, means that there are substantial turbine-free areas between individual wetlands and that the distances between the perimeters of wetlands and turbines is thus an issue only around the external boundary of the single buffered polygon.

We recognise that since our previous review of October 2021, changes have been made to the turbine layout and it no longer includes turbines north of Woolsthorpe – Heywood Road, however that has not altered the configuration of turbines close to Cockatoo Swamp.

It is not clear why considerable rationale is provided for a total buffer distance of 700 metres when this seems to have little bearing on the actual distances between Brolga breeding wetlands and turbine locations as proposed. Figure 16 of the *Brolga report* shows the proposed buffers from the perimeter of various wetlands in the Cockatoo Swamp complex and the turbine layout (in pale grey). While the actual distances of turbines can only be scaled approximately, only a few turbines appear to be less than 900 metres from the perimeter of wetlands. One is north of FD36; one is north of FD5; two are east of FD24; and two or three are to the east and north of FD21.

In our view, adoption of a total 900 metre-wide turbine-free buffer (i.e. in which no part of a turbine encroaches) would meet the requirements proposed by DELWP in the *Draft Brolga Standard*. It would appear to entail the relatively slight relocation of a very few turbines.

Blade clearance

The minimum rotor blade height of 40 metres above the ground is a design measure that can be expected to reduce the potential for Brolga collisions because the evidence provided and summarised in Figure 6 indicates that approximately 9i% of a sample of 67 Brolga flights were below 40 metres high and that the frequency of Brolga flights decreases with increased height above the ground. Our experience is in agreement with this. A minimum ground clearance of 40 metres is substantially higher than the majority of currently operational wind turbines in Victoria, for which ground clearance is generally about 30 metres.

External powerline

Brolga collisions with overhead powerlines are known to occur occasionally and the reduction of the proposed overhead transmission line to export electricity from the project to the external grid from five kilometres to about 300 metres is a significant measure that can be expected to substantially reduce the probability of Brolgas colliding with the transmission line.

Offsets

The application of offsets to compensate for residual impacts on the Brolga population is considered generically in the *Interim Brolga Guidelines* (DSE 2012). Step Three set out there relates to use of population viability analysis to collision predictions as a means to ascertain the level of effect of the wind farm on the Brolga population. The purpose of its Step Four is to identify appropriate compensation strategies to ensure a zero net impact on the Victorian Brolga population. It notes that, *"The objective of Step Four is to identify and, as much as possible quantify, appropriate strategies to fully offset the predicted impact from Step Three*".

The processes described in the *Brolga report* follow the collision risk and population viability analysis methods to determine a level of offsetting that would be required if the wind farm has the impacts indicated.

We note that now, ten years since publication of the *Interim Brolga Guidelines*, there is no evidence of any Brolga collisions with wind turbines having ever occurred (Moloney *et al.* 2019; DELWP 2020b). This is not a point of contention with the assessment for Willatook Wind Farm, but we question the concept of compensatory offsetting of an effect for which there is no empirical evidence.

Cumulative impacts

The *EES Scoping Requirements* call for consideration of potential for the project to contribute to cumulative effects on the Brolga population in combination with the construction and operations of other energy facilities. Section 6 of the *Brolga report* provides specific consideration of this question.

In particular we note that all wind energy projects within the species range that have been approved since the publication of the *Interim Brolga Guidelines* in 2012 have been approved subject to their compliance with *Interim Brolga Guidelines*. This has entailed mechanisms for each of them to achieve a zero net impact on the Victorian Brolga population. We also note that, despite approved regimes of monitoring, no turbine collisions by Brolgas have been reported at any Victorian wind farm. Overall there is thus no known cumulative effect of wind energy projects on the Brolga population.

The Willatook Wind Farm project has adopted the mechanisms of the *Interim Brolga Guidelines* designed to achieve a zero net effect on the Brolga population. We agree with the approach and conclusions set out in the *Brolga report* related to potential for the project to contribute to cumulative effects on the Brolga

Whether the measures proposed to limit impacts on these species (including development of Brolga breeding habitat buffers) are appropriate. Disturbance from noise and construction activities (particularly Brolga breeding).

The first part of this question is addressed in the previous section.

The principal further measure intended to minimise residual impacts of the project on Brolgas is the siting of an on-site quarry, proposed to operate during the construction stage of the project, approximately 2.1 kilometres from the closest Brolga breeding wetland. The *EES Chapter 11* provides that information and a qualitative assessment that quarry blasting at that distance would be unlikely to have a negative effect on Brolgas.

Biosis undertook monitoring of the effects of quarry blasting on wetland birds close to an operational basalt quarry in southern Victoria for an EES investigation in 2005 and on the basis of results of that study, we agree with the project's assessment.

Provide an assessment on the report's conclusions of the assessed impact significance for the species.

The assessment's quantifications of potential impacts on Brolgas are provided as the results of collision risk modelling and population viability analysis. As outlined above, the process undertaken for collision risk modelling is likely to have resulted in a projection that has overestimated the risk to Brolgas, and as a consequence the population viability analysis is also likely to have overestimated this risk to the Victorian population of the species. As it stands, the assessment's results for these analyses indicate extremely low potential for impact on the population and we agree with that as an overall assessment. Empirical experience, with no documentary evidence for any Brolga collisions with turbines at operational wind farms, also suggests that this form of impact on the species is very unlikely to occur.

It is possible that turbine-free buffers as proposed by the assessment for Cockatoo Swamp will adequately protect breeding Brolgas there, but the proposed total buffer distance of 700 metres does not conform to the 900metres proposed by the DELWP *Draft Brolga Standards*, as informed by the Brolga home-range studies of Veltheim *et al.* (2019). In our view, it would be prudent to adopt a total turbine-free buffer distance of 900 metres from the perimeter of Brolga breeding wetlands.

We consider that all other measures proposed by the assessment for reduction of potential impacts on Brolgas are sound and that adopting them and an adequate turbine-free buffer distance will result in a very low probability of the project resulting in an impact on the Victorian population of the species.

Southern Bent-wing Bat

Are the survey methods used, and the quantum of surveys undertaken, to gain an understanding of the existing population status appropriate and in-line with best practice and statutory guidelines?

The combined (EHP and NA) survey effort, their temporal coverage and methods used on the wind farm site are appropriate and exceed requirements of *Survey guidelines for Australia's threatened bats: Guidelines for detecting bats listed as threatened under the EPBC Act* (DEWHA 2010). We note that in recent times and due to improving understanding of the species, DELWP has generally required more survey effort (number of nights and seasonal periods of bat call detector deployment) than are indicated by the *Survey guidelines*, however to the best of our knowledge they have not provided written guidance for this. The survey effort in 2019 and 2020, in particular was substantial. Overall, we consider that the survey effort on-site was appropriate and adequate.

The *EES Scoping Requirements* consider that key issues to be assessed for SBWB may be:

- "disruption of the movement of fauna between areas of habitat across the broader landscape, including between roosting or breeding sites for the Southern Bent-wing Bat";
- potential for collision with project infrastructure including turbines; and,
- cumulative effects on SBWB.

They also call for the project assessment to "identify the presence of roosting or breeding sites for the Southern Bent-wing Bat within movement distances from the project site". Sections 8.3.2 of the *Flora and Fauna report* discusses the known nightly flight distance of SBWB from roost sites and/or breeding caves. It also details the proximity of known roost sites and breeding caves.

The primary consideration of potential turbine collision risk for SBWB provided by the *Flora and Fauna report* relates to the documented infrequency of their flights at turbine rotor swept-height.

An evaluation of possible cumulative impacts on SBWB of Willatook Wind Farm in combination with other wind energy projects in south-western Victoria is provided in Section 8.4.3 of the *Flora and Fauna report*. It acknowledges limitations on capacity to done this due to the lack of a single repository for results of fauna monitoring at wind farms. Nonetheless, it notes that data from a number of operational wind farm have been analysed and that these provide evidence that turbine collisions by SBWB are rare events and any mortalities that might occur at Willatook Wind Farm are likely to contribute little to overall cumulative effects on the SBWB population.

It is not clear to the reader whether filtering and identification of files was done manually or in an automated way. The initial reference at Section 8.2.4 to calls being "*viewed in Kaleidoscope® software (Wildlife Acoustics, USA)*" indicates that call identification was completed manually and the following further information provided from Mr Gration notes that a broad 10-55 kHz filter was used to capture all bat species calls (and presumably to filter out lower frequency noise). This process would leave mostly bat call data to then manually identify above 10 kHz. If this is the process applied, that would be acceptable as a standard manual identification process. The confirmation of call identifications for threatened species by peer reviewer process is also acceptable.

Of concern is the statement on page 174 that "*The reference call used for the Southern Bent-wing Bat was of the species exiting Panmure Cave recorded by Rob Gration*". Bat calls recorded from individuals exiting caves are known to present different characteristics compared to other call characteristics more typically recorded in flight. This difference has been attributed to bats in close proximity to each other, as they are when exiting a cave, needing to alter their calling in order to successfully echolocate. However, the call subsequently displayed in Spectrogram 1 is typical of Southern Bent-wing Bat call pulse characteristics, albeit displayed at a very small scale.

Is the ecological understanding (and predictions) of the species abundance, distribution and behaviour reasonable and supported by scientific understanding?

Current understanding of these aspects is provided in the recently published *Conservation Advice* Miniopterus orianae bassanii *Southern Bent-wing Bat* (TSSC 2021). This provides results of recent and on-going research that has improved understanding of various aspects including empirical data for movement distances and the suggestion that the three known maternity cave populations may be somewhat discrete entities. The assessment has cited information from the *Conservation Advice* and reflects the current understanding of Southern Bent-wing Bat biology. Van Harten et al. (2020) is also referred to (although the correct reference is Van Harten et al. (2022), so this may be referred to erroneously although the publication title is the same), which contains the most up to date understanding of the species population dynamics and movement patterns.

Are the methods and assumptions used to generate the predictions of impacts reasonable?

The characterisation of risk for Southern Bent-wing Bat relative to the height zones in which their calls were recorded is reasonable and the levels of activity at different heights is in accord with our experience. This indicates that the majority of Southern Bent-wing Bat flights were below rotor swept height and thus will be

at little danger of turbine collision and our experience with call data for the species at various heights is in agreement with that conclusion.

Are the measures proposed to limit impacts to these species appropriate?

The assessment is reliant on the species being at low risk due to a general lack of favoured treed habitat for it at the site and its routine flight heights being below rotor-swept-height. In light of the open nature of the site and that minimum rotor ground clearance will be 40 m, we consider the impact assessment is appropriate in those respects.

An additional measure that will limit potential for impacts will be the application of turbine-free buffers around wetlands. The assessment did not find a pattern of usage by Southern Bent-wing Bat that demonstrated a preference for the area above or in proximity to wetlands, but it is widely accepted that this species and many other insectivorous bats forage for insects in such areas.

Provide an assessment on the report's conclusions of the assessed impact significance for the species.

In light of the low level of detected Southern Bent-wing Bat mortalities at wind energy facilities within the species range to-date, we consider that the report's assessment conclusions related to significance of impact on the species are appropriate.

Thank you for the opportunity to provide this review. Please contact Mark or myself if there are aspects you would like to discuss.

Kind regards,

Ian Smales

Principal Zoologist

References

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