

PROPOSED ARARAT WIND FARM

EXPERT WITNESS STATEMENT
OF BRETT LANE

RES Australia Pty Ltd



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June 2010

Report No. 7169 (5.2)

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1. WITNESS NAME AND SUMMARY

1.1. Name and Address

Brett Alexander Lane

Director, Brett Lane and Associates Pty. Ltd., 25 Burwood Road, Hawthorn, 3122

1.2. Area of Expertise

Brett Lane has over 30 years of experience in wildlife research and management, including development impact assessment. He has worked in consulting for over 20 years and has also been involved in work with non-government environment groups (e.g. Birds Australia, Asian Wetland Bureau).

Brett has undertaken a range of impact assessments for over 80 planned or existing wind energy developments. This work has included:

- Flora and fauna impact assessments, with particular emphasis on impacts of wind energy development on native vegetation, threatened species, birds and bats.
- Design and implementation of pre- and post- construction flora and fauna impact monitoring programs;
- Strategic advice to wind energy development companies on regulatory, technical and community issues related to wildlife impacts of wind farms;
- Participation in regulatory processes, including the preparation of Referrals and Assessments under the EPBC Act and various state planning assessment processes.

This experience has given him an excellent overview of overseas and local wind energy impacts on birds and bats.

Previous work also includes the preparation of documents for the Australian Wind Energy Association that outlined data set standards and data gathering protocols when assessing and monitoring wind farm risks to birds.

Curricula Vitae are attached to this statement (Attachment 1).

1.3. Work Undertaken

Brett Lane and Associates Pty. Ltd. has been involved with the proposed Ararat Wind Farm since 2007. Detailed flora and fauna field assessments were undertaken in the study area to inform the design and impact assessment of the project. This included the following surveys and assessments:

- Mapping of the remnant vegetation and scattered trees within designated infrastructure zones on the two portions of the site and in surrounding roadsides based on air photo interpretation and ground-truthing.
- Spring flora surveying (October 2007) for areas of the proposed footprint identified at that time as being suitable habitat for rare or threatened flora.
- An overview fauna survey of the site. A survey of the entire site for ground fauna (e.g. reptiles and frogs) was not considered necessary.

- Two separate targeted surveys for the Powerful Owl in remnant treed vegetation adjacent to the northern portion of the site.
- A bird utilisation survey to detail bird life on the proposed wind farm site, including bird abundance, diversity, distribution, flight patterns and heights and general aspects of bird behaviour on the site (part of a Level one bird risk assessment as per the AusWEA interim standards).
- An Anabat® ultrasonic bat survey to detail bat diversity and activity levels on those parts of the proposed wind farm site where turbines are proposed to be located.
- A desktop flora and fauna assessment for a potential overhead powerline route.

An initial meeting was held with Nick Jaschenko of the Department of Sustainability and Environment (DSE) in 2007 to discuss flora and fauna issues of concern. These issues have been considered in the work that has been undertaken. The scope of work and progress of the assessments have been discussed on a number of occasions with DSE. The final impact assessment report prepared for RES Australia included responses to comments by DSE.

The following four reports have been created for this project:

- BL&A (2007) Proposed Ararat Wind Farm Preliminary Flora and Fauna Assessment, Report 7169 (1.3)
- BL&A (2009a) Proposed Ararat Wind Farm Flora and Fauna Assessment, Report 7169 (2.7);
- BL&A (2009b) Ararat Wind Farm: Targeted Powerful Owl Survey, Report 7169 (3.1);
- BL&A (2010b) Ararat Wind Farm: Potential Overhead Powerline Desktop Flora and Fauna Assessment, Report 7169 (6.0).

A description of the methods used to undertake the surveys is presented in Section 2 of this statement. The results obtained from these assessments are presented in Section 3.

1.4. Declaration

I am sufficiently expert to make this statement because of my extensive experience in environmental impact assessment, and vegetation and wildlife research and management. I have also assessed the impacts on flora and fauna of many wind farm projects in Victoria and elsewhere in southern Australia.

I have made all the inquiries that I believe are desirable and appropriate and no matters of significance which I regard as relevant have to my knowledge been withheld from the Planning Panel.

Signed



Brett Alexander Lane , 14th June 2010

2. SOURCES OF INFORMATION

2.1. Existing Information

Table 1 provides details of the sources of existing information used for the flora and fauna impact assessment and their reliability.

Table 1: Sources of Information and their Reliability

Source	Reliability of Information
Atlas of Victorian Wildlife (AVW)	This database is administered by the DSE and holds all records of fauna species within Victoria prior to 2007. Data for this database has been gathered from ecological surveys undertaken by DSE, professional zoologists outside DSE and competent field naturalists, supplemented by museum specimen records and information from the zoological literature. It is considered a reliable source of such information for this reason. Records from this database provide an indication of which species are present in an area but not an estimate of population size.
EPBC Act Protected Matters Search Tool	This online database is administered by the Department of Environment, Water Heritage and the Arts (DEWHA). Information originates from AVW and Flora Information System (FIS) and Bioclim modelling of potential species occurrence.
Flora Information System	This database is administered by the DSE and holds all records of flora within Victoria prior to 2007. Data has been collected by ecological surveys undertaken by the DSE, herbarium specimens, botanists outside of DSE, competent field naturalists and botanical literature. Records from this database provide an indication of which species are present in an area and not an estimate of population sizes.
Biodiversity Interactive Maps	Mapping and modelling of the extent and location of Ecological Vegetation Classes in Victoria and of their conservation significance.

2.2. Field Methodology

2.2.1. Initial flora and fauna assessment

2.2.1.1. Flora and Native Vegetation

Native Vegetation

Initial native vegetation surveys were undertaken at the site during 23rd to 30th October 2007. Prior to the site visits, aerial photography and DSE's EVC mapping of the site were viewed in detail to gain an appreciation of the extent of vegetation cover and adjoining land uses. During the field assessment, the study area was surveyed by 4WD vehicle and areas within the proposed Infrastructure Zone containing native vegetation were surveyed on foot. The infrastructure zone generally comprised a discreet area, provided by the proponent, extending up to 100 metres either side of proposed access tracks, turbines, powerlines and site

compounds. Wind farm infrastructure will generally be located along the ridges, subject to micro-siting within the infrastructure zone. This zone is shown in the vegetation mapping in our main flora and fauna report (BL&A 2009, Report No. 7169 [2.7]). It is understood that this zone was narrowed to 50 metres either side of the development footprint for the purposes of archaeological assessment.

During the survey, incidental records of flora species were made and threatened species searches were undertaken throughout the proposed infrastructure zone based on random intuitive sampling methods. Mapping of native vegetation was undertaken using a handheld GPS (to an accuracy of 5 metres) combined with aerial photography interpretation. Detailed mapping of individual scattered trees was not undertaken. Areas supporting significant numbers of scattered trees within the study area were mapped.

Additional botanical field surveys were undertaken during the following dates in response to changes to the wind farm layout, in particular the addition of additional turbines, tracks and internal powerlines:

- 15th and 16th April 2008;
- 20th to 27th October 2008; and
- 10th to 12th December 2008.

Threatened flora

Targeted searches for threatened flora species were undertaken within previously identified remnant native vegetation in the infrastructure zone during October 2007 and October 2008. Transect surveying and quadrat surveys (30m by 30m intensive survey areas) were used to identify any occurrence of threatened flora within these areas.

Roadside vegetation

The Ararat Rural City Council previously conducted a Roadside Vegetation Assessment for the Ararat/Warrak regions, which identified that many minor roads in the immediate vicinity of the proposed wind farm contain vegetation of high conservation significance. During the botanical field assessments, roadsides potentially impacted by access points to the proposed wind farm were assessed.

2.2.1.2. Fauna

The initial fauna field survey was conducted from 23rd to 26th October 2007. An additional assessment was conducted on the 15th and 16th of April 2008 to survey added turbine sites and access tracks. Most of the study area was reached by vehicle and sections considered likely to harbour significant fauna were examined in detail on foot. Fauna habitat types were characterised in the study area. Techniques used to detect fauna species inhabiting the study area comprised:

- Searches for mammal scats, tracks and signs (e.g. diggings, signs of feeding and nests/burrows);
- Active bird observation; and

- Random intuitive searches for reptiles and frogs where considered appropriate (no trapping was undertaken). Searches consisted of turning over logs and rocks to look for reptiles and listening for frog calls at appropriate sites.

2.2.2. Targeted Powerful Owl surveys

There are seven records (excluding duplicates) of Powerful Owl from the AVW search region, between 1995 and 1997. Three of the records of Powerful Owl are from Ararat Hills Regional Park, close to the northern cluster of the proposed Ararat wind farm site. The remaining records are from Mount Cole State Forest and Langi Ghiran State Park, south of the southern cluster of the wind farm site. There are 27 records in the AVW database of Powerful Owl from a 20 km radius of the same point, from 1994 to 2001. All of the additional records are from the Mt Cole – Langi Ghiran area.

Targeted surveying for the Powerful Owl was undertaken of forest blocks abutting the northern sub-section of the proposed wind farm over two nights in October 2007 as part of the initial fauna survey, followed by more extensive surveying during two separate periods totalling five nights in 2009 (see below).

Call playback was carried out around dusk to maximise the likelihood of detecting calling individuals. Call playback was undertaken at the edge of the public land south of the north-western part of the wind farm and in the private bushland north of this part of the wind farm. At each location, 5 minutes were spent listening to detect individuals calling voluntarily. A Powerful Owl call was then played through a megaphone for three minutes followed by a 5 minute listening period. Then the Powerful Owl call was played again at a higher volume followed by a 5 minute listening time. After call playback 30 minutes was spent spotlighting along a transect originating at the call playback site.

The Powerful Owl was not found during the initial targeted survey and DSE requested that additional survey work be undertaken of both forest blocks to explore the possibility that the owl might move between these habitats across part of the northern section of the wind farm site. In response to this request, a supplementary targeted survey of the two forest blocks was undertaken on the nights of 19-21 October and 4-5 November 2009, (five nights in total).

The surveys covered a large, privately owned block of remnant woodland dominated by Red-Stringybark, Red Box, Long-leaved Box, Grey Box and Yellow Gum. As a comparison, a woodland block nearby where the Powerful Owl is known to occur (Ararat Hills Regional Park) was also surveyed. Nocturnal call playback and spotlighting to determine the presence or absence of the Powerful Owl were conducted in forested habitats. Prey-density surveys along fixed transects were also undertaken to determine prey abundance. Overall, three transects per night were surveyed by call playback and spotlighting for arboreal mammal prey species.

2.2.3. Bird Utilisation Survey

A fixed-point bird count method was used at six sites where turbines are proposed to be located within the wind farm. An observer was stationed at each survey point for 15 minutes. Counts were undertaken of all bird species observed within 200 metres of each survey point. Species, number observed and flight heights were documented, with flight height being classified as below, at or above rotor

swept area height (RSA height). RSA height lies between 31 metres and 135 metres above ground level.

During the survey, each observation point was counted eight times at different times of the day to ensure that time-of-day differences in bird movements and activity were accounted for comparably between points in the pooled data set.

2.2.4. Bat Survey

Automated Anabat® bat detectors were used to record the species-specific ultrasonic echolocation calls of free-flying bats at a series of sampling points that were representative of the habitats across the proposed wind farm. The detectors were programmed to commence operation approximately 30 minutes before dusk, and to cease approximately 30 minutes after dawn.

The Anabat unit recorded each bat echolocation call, along with the time and date of each call, on a compact flash card. These calls were subsequently analysed and identified by two experts on bat vocalisations, Dr Greg Richards of Greg Richards and Associates Pty Ltd, Canberra and Dr. Lindy Lumsden of the Arthur Rylah Institute, Heidelberg, Victoria. *Anabat* and *Anascheme* software, together with a separate key to bat species of box-ironbark woodlands, were used to identify species by their ultrasound recordings.

In *Anascheme*, a minimum of five good quality pulses were required from an unknown call sequence for an identification to be attempted. Positive identifications were only made when more than 50% of the pulses were identified as a particular species. In *Anabat*, only those recordings that contained at least two definite and discrete calls were classified as bat calls. For most species, a call sequence of several seconds in duration was required before identification could be made confidently.

2.2.5. Potential Powerline Route Desktop Assessment

A desktop assessment was undertaken during June 2010 for a potential overhead powerline route for the proposed Ararat Wind Farm. This was undertaken as a desktop assessment only and no field surveys were undertaken. This assessment utilised DSE's online biodiversity mapping (DSE 2010) and database searches to determine any potential impacts on native vegetation, flora and fauna within the powerline route alignment.

Based on the location of vegetation within property boundaries, scope exists for reducing impacts on native vegetation through route realignment. However, definitive recommendations on changes would require on-site inspection to confirm the presence or otherwise of treeless EVCs and some threatened flora, and the practicality from a construction viewpoint of any recommended changes.

2.3. Limitations, Assumptions and Exclusions

Flora and native vegetation

Botanical field surveys usually fail to record all species present for various reasons, including the seasonal undetectability of some species or absence of flowers or fruit. Rare or cryptic species are often missed in short surveys.

The seasonal timing of the October 2007 and October 2008 surveys were considered adequate for detecting most threatened flora species likely to occur in the areas surveyed at this time. These surveys included both quadrat and transect searches in areas of suitable habitat (i.e. remnant indigenous vegetation and/or ground cover). Surveying undertaken in December 2008 may not have detected spring-emergent annual flora species that had become dormant by December.

Fauna

The timing of the surveys and prevailing environmental conditions were considered suitable to record most fauna that may occur on the site. Spring is considered an appropriate time to survey for mammals and birds. Due to the cool weather prevailing at the time of the survey, some reptile and frog species that are more active during warmer conditions in spring and summer may not have been detected.

Powerful Owl surveys

October and early November are considered suitable times for using call playback to elicit a response from Powerful Owls without disrupting breeding activity.

Nocturnal sampling for Powerful Owl was constrained by strong winds on one night during the 2007 surveys. Weather during the 2009 surveys was favourable: fine with light breezes and cool to moderate temperatures.

The timing and conditions of the targeted surveys were considered suitable to detect the presence of Powerful Owl using the methods deployed.

Bird Utilisation Survey

The bird utilisation survey was conducted in late spring 2007. At that time of year, most migratory bird species would be present.

Utilisation rates and species abundances recorded during the spring 2007 survey are therefore considered to be representative of the study area, and provide a strong basis on which to assess the bird risks of the proposed Ararat Wind Farm.

Bat Survey

The identification of echolocation calls from microbats in southeastern Australia is constrained by the fact that although many calls are species-specific, not all species can be consistently or reliably identified. There is a large overlap in the call characteristics of some Victorian species and many calls are attributable only to species “complexes” and not to single species.

The Anabat technique cannot census bats accurately. That is, the Anabat unit may record 10 calls of a particular species but it is not known if this represents 10 individuals or one individual flying past 10 times. Therefore, it is not possible to determine utilisation rates as it is for birds.

Potential Powerline Route Desktop Assessment

The assessment of the potential overhead powerline route was a desktop assessment. No field survey was undertaken of this powerline route option. The aim of the desktop review was to provide an overview of the potential effects of the potential powerline route on native vegetation, threatened flora and all fauna, and to provide recommendations on adjustments to the route (within the relevant property boundaries) that would minimise impacts on vegetation, flora and fauna.

3. FINDINGS

3.1. Flora and native vegetation

3.1.1. *Flora Species*

A total of 101 flora species were recorded within the proposed infrastructure zone, 75 of which were indigenous, 24 of which were introduced species and two of which were planted, non-indigenous trees.

Flora records of fifteen flora species threatened at a state and/or national level were recorded in existing information from the 20-kilometre radius search region. No threatened flora species were recorded within the proposed infrastructure zone during the surveys. Two threatened flora species, Clover Glycine and Spiral Sun-orchid, were considered potentially to occur in limited areas of suitable habitat within the study area.

Known flowering times for these species are:

- Clover Glycine: September to December; and
- Spiral Sun-orchid: August to October.

Targeted surveys undertaken in October 2007 and October 2008, within the known flowering times for both these species, failed to record any threatened flora species. It was therefore considered that no threatened flora species occur within the study area, and the provisions of the EPBC Act and FFG Act for threatened flora do not apply.

3.1.2. *Native Vegetation*

The Ararat Wind Farm site lies on sedimentary geology on a series of ridges that formerly supported forest. These ridges range in elevation between 350 and 500 metres. The majority of the ridges proposed to have generators and access tracks have been cleared of their original native vegetation and sown to exotic pasture grasses. Most farming properties that make up the site are sheep grazing properties.

On some ridge tops, remnant forest vegetation has been retained and in some areas native ground layer grasses, herbs and forbs remain where the forest canopy has been removed. On three properties, extensive indigenous revegetation works have been undertaken over approximately 120 hectares of land that has been fenced off and excluded from grazing.

A total of ninety-one patches of remnant native vegetation ('habitat zones') occur within or in the vicinity of the proposed infrastructure zone. Observed vegetation consisted of the following Ecological Vegetation Classes (EVCs):

- Grassy Dry Forest (EVC 22);
- *Low Rises* Grassy Woodland (EVC 175_61);
- Alluvial Terraces Herb-rich Woodland (EVC 67); and
- Creekline Grassy woodland (EVC 68).

The majority of the patches comprised remnant Grassy Dry Forest (EVC 22), with varying degrees of understorey intactness. In others, the forest canopy has been

removed and native ground layer flora species remain, defined for this project as Treeless Grassy Dry Forest.

The majority of the proposed wind farm lies within the Goldfields bioregion, while the boundary with the Central Victorian Uplands is mapped as occurring in the southeast part of the study area. Field observations indicated that the ecological characteristics of this latter section of the proposed wind farm conform to those of the Goldfields bioregion. Most of the study area is situated within the Ararat, Rural City Council area, with the balance located in the Northern Grampians Shire Council area. Most of the study area lies within the Glenelg Hopkins CMA region, while the northern section lies in the Wimmera CMA region.

Roadside vegetation

The most significant roadsides identified in the immediate vicinity of the proposed Ararat Wind Farm by Ararat Rural City Council were Hopkins River Road, Big Hill Road, Warrak Road, Warrayadin Road and Warrayatkin Road. Native vegetation in the form of Grassy Dry Forest (EVC 22), Alluvial Terraces Herb-rich Woodland (EVC 67) and *Low Rises* Grassy Woodland (EVC 175_61) was recorded along these roadsides. These areas support important habitat corridors for fauna and link larger patches of treed vegetation.

Minimal impacts are proposed on native vegetation along these roadsides. A number of access points into the proposed wind farm from these main roads have been deliberately located in gaps in the vegetation.

Any necessary lopping or pruning of the canopy along these roadsides should be undertaken by a qualified arborist to avoid damage to the health of the trees.

Victoria's Native Vegetation Management Framework

The design of the wind farm layout has, for the most part, avoided impacts on minor roads known to support significant roadside vegetation, including Hopkins River Road, Warrayadin Road and Big Hill Road.

The wind farm footprint and proposed access tracks avoid the majority of intact native vegetation on the site and within the infrastructure zone investigated in detail for this assessment. A number of additional changes, namely re-routing of various access tracks to avoid mapped areas of native vegetation, have been implemented following discussions between Brett Lane & Associates Pty Ltd and RES Australia Pty Ltd (BL&A 2009a).

Of the 91 habitat zones identified within the study area (in the vicinity of the infrastructure zone), 38 habitat zones as well as 11 patches of revegetation area are proposed to be impacted by works within the infrastructure zone.

Detailed habitat hectare assessments were not carried out during the botanical field surveys. Rather, default scores (detailed in BL&A Report 7169 (2.7)) were used to calculate the offset requirements for the proposed wind farm.

A total of 8.53 hectares, (equivalent to 5.89 habitat hectares) of native vegetation is proposed to be removed from within the infrastructure zone. Prescribed offset targets for the removal of native vegetation within the infrastructure zone are summarised as follows:

- 0.32 habitat hectares for the removal of 0.16 habitat hectares (0.31 hectares) of Very High conservation significance vegetation;

- 5.82 habitat hectares for the removal of 3.88 habitat hectares (5.58 hectares) of High conservation significance vegetation; and
- 1.85 habitat hectares for the removal of 1.85 habitat hectares (2.64 hectares) of Medium conservation significance vegetation.

A total of 8 habitat hectares is required to achieve the associated offset target for the removal of the above native vegetation.

Based on previous experience, approximately 40 hectares of suitable native vegetation may be required to achieve this offset target. This is based on a potential 20% improvement of the offset site (8 habitat hectares x 5 = 40 hectares). It should be noted that this is a highly conservative estimate, which for the most part is based on a default habitat score of 0.7 for Grassy Dry Forest EVC. This assessment therefore represents a worst case scenario but it demonstrates the scale of the required offset. Many hectares of native vegetation of the same EVC as that being removed occur within the properties in which the wind farm is to be built. These areas are considered to be more than adequate to meet the offset target.

Six small areas supporting scattered trees occur within the current infrastructure zone. Some of the trees within these areas may need to be removed and/or branches lopped for the construction of the wind farm.

Planning Scheme Overlays

Various areas within the proposed wind farm site are subject to a number of planning scheme overlays, including:

- Environmental Significance Overlay – Schedule 1 (ES01);
- Vegetation Protection Overlay - Schedule 1 (VPO1); and
- Vegetation Protection Overlay - Schedule 2 (VPO2).

The objectives and decision guidelines are discussed below in relation to the proposed Ararat wind farm. The detailed flora and fauna assessment report (BL&A 2009a) has a full list of decision guidelines for these overlays.

Environmental Significance Overlay – Schedule 1 (ES01)

The area in the north-west corner of the Ararat Wind Farm infrastructure zone is subject to ES01. Four turbines and associated access tracks occur in this area. The objectives of the overlay involve the maintenance and enhancement of the natural environment, as well as the prevention of pollution and surface runoff. A permit is required under this overlay to carry out works and/or remove destroy or lop native vegetation.

A permit would be required under ES01 for the project as works are proposed in that portion of the wind farm covered by the overlay and a small area of native vegetation is proposed to be removed in this area.

The views of the water authority and catchment management authorities have been sought by the proponent before finalising the applications for a planning permit and are contained in the Geology and Hydrology Assessment report prepared by RES Australia. No impacts are anticipated on waterways and streams or the vegetation, habitat, and fish populations in them as the works are proposed on the ridge top, well away from any waterway. Sedimentation and erosion in

waterways, or impacts on flows are not anticipated as the development footprint represents a very small proportion of the catchment of nearby waterways. Furthermore, best practice construction environmental management measures, including strict sediment and erosion control measures, and materials handling protocols, are proposed to be implemented for the project, significantly reducing possible risks of waterway impacts.

Vegetation Protection Overlay - Schedule 1 (VPO1)

Several small areas within the Ararat Wind Farm infrastructure zone are subject to VPO1. These areas have been deemed as significant as they provide habitat links with adjoining areas of native vegetation. A permit is required to remove destroy or lop any native vegetation in these areas.

A permit would be required under VPO1 for the project as a small area of native vegetation is proposed to be removed within this area.

The principles of the Victorian Native Vegetation Management Framework have guided the proposed design of the Ararat Wind Farm, through avoiding and minimising impacts to native vegetation where possible. Application of the 'avoid and minimise' principles combined with appropriate construction and environmental management measures to avoid impacts on retained vegetation will ensure that the application requirements and decision guidelines of this overlay are addressed.

Vegetation Protection Overlay - Schedule 2 (VPO2)

The road reserves along the Pyrenees Highway and Warrak Road are both subject to VPO2. Similarly to VPO1, these areas have been deemed as significant as they provide habitat links with adjoining areas of native vegetation. A permit is required to remove destroy or lop any native vegetation in these areas.

A permit would be required under VPO2 where any native vegetation is proposed to be removed from these roadsides.

Remnant native vegetation along roadsides within the Ararat Wind Farm site is recognised as significant and impacts have been avoided where possible. Impacts in these areas are thought to be minimal and only require a small amount of native vegetation removal at Site Entry 1 (Woodlands Road) and Site Entry 2 (Pyrenees Highway / Hopkins River Road). Elsewhere, gaps in native vegetation along roads have been used for site access, consistent with the 'avoid and minimise' principles of the native vegetation management framework. Combined with appropriate construction and environmental management measures to avoid impacts on retained vegetation this will ensure that the application requirements and decision guidelines in VPO2 are addressed.

3.2. Fauna Assessment

3.2.1. Habitat Assessment

The study area supports three main fauna habitat types – cleared agricultural land, remnant woodland and revegetated land. At lower elevations on most properties small farm dams exist but these were beyond the infrastructure zone that will be affected by the project.

3.2.2. Detailed Fauna Assessment

Based on the field assessment and the review of existing information, the study area is known to or likely to support 165 species of fauna, including 25 species of mammals (6 introduced), 122 species of birds (5 introduced), 15 species of reptile and 3 species of frog.

AVW records and the EPBC Act Protected Matters Search Tool indicated that within the search region 25 rare or threatened fauna species (21 birds, two mammals and two reptiles listed on the EPBC Act, FFG Act or DSE Advisory List), potentially occurred due to the presence of suitable habitat. However, none of these species were considered likely to occur or be significantly affected by the proposed wind farm.

The initial fauna survey did not locate any threatened species. The higher quality habitats likely to support threatened fauna species occur in the study area away from the infrastructure zones. Provided that access tracks and other wind farm infrastructure can be located to avoid or minimise impacts on remnant woodland habitats then significant impacts on native fauna populations are not expected to occur.

3.3. Targeted Powerful Owl Surveys

The Powerful Owl was not seen or heard during call playback surveys in 2007 or 2009 within the remnant woodlands abutting the northern section of the wind farm study area or at the survey sites chosen within Ararat Hills Regional Park.

A small number of other nocturnal birds were recorded during these call playback sessions, including the Southern Boobook and the Australian Owlet-nightjar. Arboreal mammals, including prey species of the Powerful Owl, were also seen and heard during the surveys.

Prey density and habitat assessment

Nine prey-density transect surveys were carried out, five within the private woodlands in the north and four within the Ararat Hills Regional Park. Prey density was low; only eight individuals of the owl's main prey species were seen, namely Common Brushtail Possums and Sugar Gliders, on five transects taken within remnant woodland abutting the wind farm site. Other, occasional prey species (Higgins 1999) were also observed: two sightings of a Koala *Phascolarctos cinereus*, and several roosting Sulphur-crested Cockatoos *Cacatua galerita* and Australian Magpies *Cracticus tibicen*.

The results from spotlighting transects indicated that the owl's prey species were relatively scarce in privately owned woodland abutting the northern sub-section of the wind farm site. The mammalian prey observation rate for these transects was 0.32 individuals/ha.

By contrast, a higher number of prey species (Common Brushtail Possums and Sugar Gliders), totalling 24 individuals over four transects (1.2 per hectare), was observed in transects in Ararat Hills Regional Park, where the Powerful Owl has been recorded previously.

Based on these differences, the woodland to the north of the northern section of the proposed wind farm site is less attractive to the Powerful Owl than the forests

in the Ararat Hills Regional Park. Therefore, movements between the two areas of forest are unlikely to be frequent.

Habitat assessment

Assessment of Powerful Owl habitat was based on walking transects while counting the number and size (diameter at breast height, 1.3 metres) of hollow bearing trees. Powerful Owls requires hollows, particularly those in large trees, for nesting and some of its main prey species (Common Brushtail Possum, Sugar Glider) use hollows for daytime roosts. Therefore, the number and size of hollow bearing trees is considered a reasonable indication of Powerful Owl habitat suitability.

In the privately owned woodland abutting the northern sub-section of the wind farm, hollow counts varied from 2 to 36 over five, 500 x 100 metre transects. In Ararat Hills Regional Park, counts ranged from 34 to 67 over four 500 x 100 metre transects. The number of large, hollow-bearing trees was also much greater in Ararat Hills Regional Park. Powerful Owl habitat quality was considered high in Ararat Hills Regional Park and moderate in the privately owned woodland north of the wind farm site. This again support a conclusion that movement of the owl out of the regional park to the northern woodland is likely to be infrequent.

3.4. Bird Utilisation Survey

The bird utilisation survey was considered representative since 90% of the species were observed after 45% of surveys. This suggests that the survey points collectively provided a representative picture of the diversity of bird species flying over the wind farm site during the survey.

A total of 38 bird species were recorded during the formal surveys and incidentally while moving between the survey points. Birds observed utilising the observation points and consequently most of the proposed wind farm consisted of common farmland birds.

No listed threatened bird species were observed during the surveys.

The most abundant species at the sites were:

- Australian Magpie;
- Long-billed Corella;
- Galah; and
- Raven spp, (mainly Little Raven).

Together with four additional species, the Australasian Pipit and Sulphur-crested Cockatoo, Yellow-rumped Thornbill and White-fronted Chat, these eight most common birds accounted for 90% of individual birds observed.

Birds of prey (or raptors) formed 2.6 percent of all individuals counted in the proposed wind farm and three percent of birds seen at RSA height. The species most commonly observed at RSA height was the Wedge-tailed Eagle, followed by Brown Falcon and Nankeen Kestrel. The utilisation rate of Wedge-tailed Eagles at the site is very low (0.008 birds per hectare per hour) compared with the spring utilisation rate at a number of other wind farm sites in Victoria (Brett Lane & Associates Pty Ltd, unpubl. data).

Annual bird collision mortality is likely to be between 0.1 and 4 birds per wind turbine per year, based on figures for other wind farms elsewhere in southern Australia and overseas. The birds most likely to be affected regularly are the most abundant species in the area, such as the common farmland birds. This impact is not expected to be of conservation significance.

Bird strike rate analysis from one other wind farm in the region at Challicum Hills showed that annual bird mortality per turbine was 0.73 birds (or around 25 birds per year). These are minimum estimates, because some feather spots could be from birds that had been hit by turbines although evidence was not sufficient to include them in his category (BL&A 2008).

The mortality rate of birds at Challicum Hills is lower than average compared to other wind farms nationally and internationally, where rates vary from 0.0 to 4.3 birds per turbine per year. Similarly the bat mortality rate is lower than the average Australian wind farm for which data is available (BL&A 2008).

Based on the habitat of the Challicum Hills wind farm and that of Ararat Wind Farm, the expectation is that bird strike across Ararat Wind Farm would not be significantly different from the existing wind farms in the region. These wind farms are all situated in predominantly open agricultural country with scattered trees.

For these reasons, cumulative impacts on bird populations from both projects are not considered to be of ecological significance.

3.5. Targeted Bat Survey

A total of ten species of bats were recorded during the survey period from the four recording sites over the two periods, November–December 2007 (7 nights) and February (7 nights) 2008. These were:

- Chocolate Wattle Bat *Chalinolobus morio*
- Eastern Broad-nosed Bat *Scotorepens orion*
- Gould's Wattled Bat *Chalinolobus gouldii*
- Large Forest Bat *Vespadelus darlingtoni*
- Little Forest Bat *Vespadelus vulturnus*
- Long-eared bats *Nyctophilus* spp.
- Southern Bent-wing Bat *Miniopterus orianae bassanii*
- Southern Forest Bat *Vespadelus regulus*
- Southern Freetail Bat *Mormopterus* sp. (long penis form)
- White-striped Freetail Bat *Tadarida australis*

Most of the bats that utilised the wind farm site were common and secure species; however two species of ecological significance were recorded during the spring survey, as described below.

Eastern Broad-nosed Bat: The species is considered as insufficiently known for its status to be accurately assessed in Victoria; however, Duncan *et al.* (1999) consider the species as low risk, and of least concern. It is an uncommonly recorded species restricted to the eastern highlands and east Gippsland. Records

from the current study are rather unusual since the bat has not previously been recorded that far west in Victoria.

Southern (Common) Bent-wing Bat: The species is considered as Endangered in Victoria and listed under the FFG Act (DSE 2007) and as Critically Endangered under the Commonwealth EPBC Act. The bat is included on the threatened fauna list because of its complete dependence on a few traditional breeding caves and a limited number of overwintering sites. Knowledge of this species biology and behavior is incomplete.

At sites 1 and 2 (spring survey) large numbers of calls could not be identified since they did not meet the technical requirements for clear cut identification of ultrasonic calls; these were categorised as 'unidentified bats'.

3.5.1. Bat Activity

In the summer survey, Southern Freetail Bat and White-striped Freetail Bat were recorded more often than other species and therefore could be considered to be more active on the wind farm site. During the spring survey, the same two species accounted for the most activity, however the White-striped Freetail Bat was by far the most frequently recorded.

It was considered possible that higher activity levels occurred at sites close to a variety of natural woodland habitat or planted Blue Gums, since some bat species are known to favour treed areas.

Levels of bat activity are not exceptional for predominantly agricultural sites in Victoria based on our experience at other wind farm sites with similar characteristics. Therefore, bat impacts are unlikely to be significant at a population scale.

At Challicum Hills, bat mortality was 0.37 bats per turbine per year (BL&A 2008), equating to about 12 bats per year. The similarities between the two sites in terms of bat habitat characteristics (i.e. mostly cleared but with some treed vegetation nearby) make it likely that similar mortality rates will be experienced at Ararat. The cumulative impacts of both wind farms are therefore unlikely to be significant at a population level for any bat species.

3.6. Potential Powerline Route Assessment

3.6.1. Flora and native vegetation

Based on online mapping by DSE, native vegetation types with potential to occur within the potential overhead powerline route included Heathy Dry Forest (EVC 20), Grassy Dry Forest (EVC 22), Heathy Woodland (EVC 48), Plains Grassy Woodland (EVC 55), Alluvial Terraces Herb-rich Woodland (EVC 67), Creekline Grassy Woodland (EVC 68), Hills Herb-rich Woodland (EVC 71), Alluvial Terraces Herb-rich Woodland/Plains Grassy Woodland Complex (EVC 152) and Grassy Woodland/Heathy Dry Forest Complex (EVC 896).

It is likely that the majority of the study area contains some level of native vegetation. There is potential that all non-treed vegetation may support *treeless* forms of the EVCs mapped on site. This is due to no clear evidence of cropping being present on the aerial photographs. This would need to be confirmed during a field assessment.

A small amount of the route cuts through tree plantations and/or revegetation works; clearly evident due to the presence of trees in defined rows. Planted vegetation is unlikely to be of conservation significance, although if it was planted specifically as part of a revegetation program then its removal will require offsetting.

The following threatened communities were considered to have potential to occur along the potential overhead powerline route:

- **EPBC Act:** Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia; and
- **FFG Act:** Grey Box – Buloke Grassy Woodland Community, and Creekline Grassy Woodland (Goldfields) Community.

Twelve threatened flora species listed under the EPBC act or FFG Act had the potential to occur within the alternative powerline route, including Button Wrinklewort, Clover Glycine, Curly Sedge, Grampians Bitter-pea, Langi Ghiran Grevillea, Large-headed Fireweed, River Swamp Wallaby-grass, Small Milkwort, Spiny Rice-flower, Spiral Sun-orchid, Swamp Diuris and Trailing Hop-bush.

Based on the location of vegetation within property boundaries, scope exists for reducing impacts on native vegetation through route realignment. However, definitive recommendations on changes would require on-site inspection to confirm the presence or otherwise of treeless EVCs and some threatened flora, and the practicality from a construction viewpoint of any recommended changes.

3.6.2. Fauna

Historical records within the potential, overhead powerline route indicate that 23 listed threatened fauna species have occurred in the wider search region. Of these, 12 species are considered likely to occur regularly in the study area. These species include Black-chinned Honeyeater, Black-eared Cuckoo, Brown Treecreeper, Diamond Firetail, Hooded Robin, Powerful Owl, Speckled Warbler, Square-tailed Kite, Brush-tailed Phascogale, Eastern Bearded Dragon, Lace Monitor and Brown Toadlet.

In addition the FFG Act listed threatened community Victorian Temperate-Woodland Bird Community is likely to occur in treed vegetation along the alternative powerline route

Additional threatened fauna species may occasionally occur in the study area. However, when present they are likely to be passing vagrants and impacts to these from the proposed power line are unlikely to occur.

Impacts on flora and fauna from the potential overhead powerline route would primarily occur during the construction phase. The construction footprint comprises several 16 m² plots requiring vegetation removal for the power poles and clearance of all vegetation above three metres in height underneath the powerlines (40 metres in width). The information provided in this investigation will influence the final alignment of the powerline route.

4. RESPONSE TO SUBMISSIONS

A number of concerns have been raised in submission on the project planning application regarding impacts of the Ararat Wind Farm on flora and fauna. These submissions have been summarised and responses are provided in Table 2 below.

Table 2: Response to Submission Comments

General Topic	Submission Comments	Submission	Response
Bats	Conclusions of the Bat survey. Southern Bent-wing Bat considered to be affected.	17 Hamilton Field Naturalists Club	This surveying effort for detecting bat species in the vicinity of the wind farm was deemed appropriate. A comparatively low level of activity by threatened Southern Bent-wing Bat (<i>Miniopterus orianae bassanii</i>) was recorded. The wind farm site is distant from the two known maternity sites of the species and is not on the species' migration route. Significant numbers of this species are therefore unlikely to be affected by the proposed wind farm. A Bat and Avifauna Management (BAM) Plan will be prepared to monitor impact on bats post-construction.
Birds	Wind Farm believed to be in a Wedge tailed Eagle zone including area from One Tree Hill to the Black Range – Dunneworthy Common and south east to Langi Ghiran.	12 J. Smithers-Tomkins	The bird investigations of the Ararat Wind Farm site indicate that it forms part of the home range of one pair of Wedge-tailed Eagles. The bird utilisation survey found that the site had a comparatively low utilisation rate by this species. For this reason, the construction of a wind farm at the site would be unlikely to have a significant impact on the Wedge-tailed Eagle population in the region.

General Topic	Submission Comments	Submission	Response
Birds	Survey points used in the Bird Utilisation Survey were poorly selected.	17 Hamilton Field Naturalists Club (HFNC)	The Bird Utilisation Survey systematically quantified bird activity across parts of the site where turbines are proposed to be located. These surveys showed a comparatively low level of bird activity where turbines are to be located compared with activity at sites with greater food resources and more diverse topography that we have studied. Furthermore, the dominant species are common and widespread farmland birds that are not considered to be of conservation significance. It is entirely appropriate that for the purpose of assessing bird risk, bird utilisation survey sites are placed within the infrastructure zone, not somewhere where impacts will not occur.
Birds/Bats	Turbines 32, 33, 64, 65 near Ararat Regional Park result in unacceptable avifauna risk.	14 DSE	The Bird Utilisation Survey showed that site 5, located on the ridge in question did have higher overall bird utilisation than other sites within Ararat wind farm (Table 8, p. 44 Report 7169 (2.7), September 2009). However these birds were all common and widespread species. Given the habitat at these sites, this is likely to continue to be the case. There was no evidence of regular usage of this part of the site by significant numbers of bird species moving between forested habitats, including to and from nearby conservation reserves. A Bat and Avifauna Management (BAM) Plan is to be prepared involving post construction monitoring for bird and bat collision with turbines. The recommendation to ensure greater search effort at these turbines can be included in this plan.
Native Vegetation	DSE as referral authority advise that removal of Very High conservation significance vegetation is not permitted unless exceptional circumstances apply.	14 DSE	A limited area (0.31 hectares comprising 0.16 habitat hectares) of Very High conservation significance vegetation is proposed to be removed. Other areas of Very High conservation significance vegetation have been avoided and most removal involves vegetation of lower conservation significance.

General Topic	Submission Comments	Submission	Response
Native Vegetation	The application does not adequately address the avoid and minimise principles of Victoria's Native Vegetation Management Framework.	14 DSE	<p>Based on the initial vegetation mapping, the design of the wind farm layout has, for the most part, avoided impacts on minor roads known to support significant roadside vegetation, including Hopkins River Road, Warrak Road and Big Hill Road, identified in our report and in municipal roadside vegetation mapping.</p> <p>The wind farm footprint and proposed access tracks avoid the majority of intact native vegetation on the site. A number of additional changes, namely re-routing of various access tracks to avoid mapped areas of native vegetation, have been implemented following discussions between Brett Lane & Associates Pty Ltd and RES Australia Pty Ltd (BL&A 2009a). Offsets for the removal of native vegetation have been prescribed in BL&A Report 7169 (2.7). An offset plan will be prepared detailing vegetation to be removed, prescribed net gain targets, and details of the offset site. Areas of remnant native vegetation within the properties involved in the project could provide the required offset (approx. 40 hectares) as these will meet like-for-like criteria. The proponent proposes to discuss the use of these areas with the relevant landholders.</p>
	In addition to prescribed offsets, council requests that the permit also address vegetation impacted along yet to be determined transport routes.	15 DSE	<p>We have reviewed the report by Aurecon 'Traffic Assessment Panel Report Ararat Wind Farm', which has indicated a comparatively limited requirement for vegetation removal associated with intersection upgrades to facilitate heavy vehicle access to the proposed wind farm site. Apart from a small number of trees, some ground cover component of native vegetation in road reserves may also need to be removed for intersection upgrades but this is not expected to be extensive. The removal of native vegetation along road reserves where wind farm access points are located has been included in our calculation of the area and habitat hectare value of vegetation to be removed and the associated offset target. The exact area and habitat hectare value of native vegetation removal for any intersection upgrades in the broader region has not been ascertained.</p>

General Topic	Submission Comments	Submission	Response
Native Vegetation	Impacts to native vegetation within wildlife corridor along Big Hill Road.	16, 18 P & B Woods W & L Stewien	Minimal impacts are proposed on native vegetation along the minor roads within the vicinity of the proposed wind farm. A number of access points into the proposed wind farm from these roads occur in gaps in the vegetation, including the access points on Big Hill Road (see BL&A Report 7169 (2.7) Fig 6). Any necessary lopping or pruning of the canopy along these roadsides should be undertaken by a qualified arborist to avoid damage to the health of the trees. Such lopping is not expected to compromise the habitat link function of these roadsides.
	Area around turbines 49, 50 and 67 was not surveyed.	17 HFNC	The area around turbines 49, 50 and 67 was not surveyed as part of the initial flora assessment, though this area was surveyed in detail in an additional vegetation assessment. Vegetation in this area was mapped as Grassy Dry Forest, Treeless EVC and Alluvial Terraces Herb-rich Woodland (See BL&A Report 7169 (2.7) Fig 4).
	Treeless vegetation	17 HFNC	The majority of the native vegetation recorded in the study area was remnant Grassy Dry Forest (EVC 22), with varying degrees of understorey intactness. Areas where the canopy layer was absent were defined as Treeless Grassy Dry Forest (Treeless EVC). These areas comprised a native understorey but have a lower potential habitat score given they lack the tree canopy component.

General Topic	Submission Comments	Submission	Response
Other Fauna	No survey carried out for Golden Sun Moth (GSM) by proponent. Population of Golden Sun Moth recorded in vicinity of Turbines 49, 67 and 50, in December 2009.	17 HFNC	In December 2009 a sighting of the Golden Sun Moth was made by members of the Hamilton Field Naturalists' Club on Hopkins River Road within the proposed wind farm site. Habitat up the slope away from the road is of much lower quality than habitat along this road. Should GSM occur in the area, it is unlikely that a large proportion of its population would occur within the limited area of impact defined by the wind farm development footprint. The proponent has indicated that the footprint in this area could be reduced below the 0.25 hectare removal threshold considered under the EPBC Act to represent a significant impact on the habitat of this species, if it were found in the area.
	No survey carried out for Fat-tailed Dunnart by proponent.	17 HFNC	It is not expected that Fat-tailed Dunnart, if present, would be significantly affected by the wind farm, since the area of potential habitat to be removed is minimal. Most of the wind farm infrastructure zone comprises exotic pasture of a density too great to support this species, which prefers more open ground between grass tussocks.
Other	Farming property operates under biosecurity and has been classed as 'Weed Free'. Farmer is objecting to powerline route across his property due to concerns that increased weed would enter farm through increased thoroughfare.	13 K J Wilde	Weed control measures will be outlined as part of an Environmental Management Plan for powerline construction. More specifically, the model planning permit conditions for Victorian wind farms include a requirement to prepare and implement a Pest Plant Management Plan for construction and operation of the project. These plans will aim to avoid weed outbreaks in disturbed areas and in adjacent farmland, and will include measures such as machinery and personnel wash down.
	EMP to be prepared prior to development including native vegetation management plan, pest animal management plan, pest plant management plan.	14 DSE	An Environmental Management Plan incorporating native vegetation management plan, pest animal management plan, pest plant management plan is proposed to be prepared for the project.

5. REFERENCES

- Brett Lane and Associates (2007) Proposed Ararat Wind Farm Preliminary Flora and Fauna Assessment, Report 7169 (1.3), Brett Lane and Associates Pty Ltd, Carlton North, Victoria.
- Brett Lane and Associates (2008) 'Challicum Hills Wind Farm: Bird and Bat Monitoring Program Final Report 2005 – 2007', Brett Lane and Associates Pty Ltd, Carlton North, Victoria.
- Brett Lane and Associates (2009a) Proposed Ararat Wind Farm Flora and Fauna Assessment, Report 7169 (2.7), Brett Lane and Associates Pty Ltd, Carlton North, Victoria.
- Brett Lane and Associates (2009b) Ararat Wind Farm: Targeted Powerful Owl Survey, Report 7169 (3.1), Brett Lane and Associates Pty Ltd, Hawthorn, Victoria.
- Brett Lane and Associates (2010a) Proposed Ararat Wind Farm Powerline Assessment Flora, Fauna and Habitat Hectare Assessment, Report 7169 (4.0), Brett Lane and Associates Pty Ltd, Hawthorn, Victoria.
- BL&A (2010b) Ararat Wind Farm: Desktop Flora and Fauna Assessment, Report 7169 (6.0), Brett Lane and Associates Pty Ltd, Hawthorn, Victoria.
- Department of Sustainability and Environment 2007, *Advisory List of Threatened Vertebrate Fauna in Victoria*. Department of Sustainability and Environment, East Melbourne, Victoria.
- Department of Sustainability and Environment 2010, Biodiversity Interactive Maps 3.0, <http://www.dse.vic.gov.au/>, Department of Sustainability and Environment, East Melbourne, Victoria.
- O'Dwyer, C & Attiwill, P M 1999, 'A comparative study of habitats of the Golden Sun Moth *Synemon plana* Walker (Lepidoptera: Castniidae): implications for restoration'. *Biological Conservation*, 89, 131-141.

Attachment 1: Summary of qualifications and experience of Brett Lane



CURRICULUM VITAE

BRETT ALEXANDER LANE

Summary:

Brett is an ecologist with over 30 years' experience in wildlife research and management. He established Brett Lane & Associates Pty Ltd in January 2001 and, since then, has worked on well over 1000 flora and fauna assessment and management assignments for a range of corporate, private and government clients.

Brett has experience in the evaluation of ecological values and threats, the assessment of development impacts on ecosystems and in the formulation of environment protection and management measures. In addition, he has a detailed understanding of the regulatory environment relating to environmental protection and management in Australia.

Qualifications:

Bachelor of Arts (Zoology, Physical Geography, Monash University)

Affiliations:

Victorian Planning and Environment Law Association
Birds Australia (Royal Australasian Ornithologists Union)
Australasian Wader Studies Group

Awards:

Special Commendation, Royal Australian Planning Institute 1991 for Point Cook Residential Development Environmental Planning – now Sanctuary Lakes.

Banksia Award 1990 (Secondary School Environmental Education Category) for Ashwood College Concept Plan and Design of Urban Forest and Wetland.

EMPLOYMENT HISTORY

1979:	Kinhill Planners Pty Ltd., Research Assistant (Melbourne)
1980 – 1986:	Wader Studies Co-ordinator, Royal Australasian Ornithologists' Union (Melbourne)
1987 – 1991:	Director, Brett A Lane Pty Ltd (Melbourne)
1991 – 1993:	Assistant Director (East Asia), Asian Wetland Bureau (Kuala Lumpur, Malaysia)
1993 – 1996:	Principal Terrestrial Ecologist, WBM Oceanics Australia (Brisbane)
1996 – 1998:	Senior Ecologist, Ecology Australia Pty Ltd (Melbourne)
1999 – 2000:	Natural Resource Specialist, PPK Environment & Infrastructure Pty Ltd (Melbourne)
2001 – present:	Director, Brett Lane & Associates Pty Ltd (Melbourne)