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Our Ref: Ryan_Corner_WF – Permit Amendment 20240620

25 June 2024

Mr Kerry Greenfield
Senior Planner (Renewables)
Development Approvals and Design
Department of Transport and Planning

E| kerry.greenfield@delwp.vic.gov.au

Dear Kerry,

RE: Request to amend planning permit 20060222

Global Power Generation Australia (GPG) is the proponent ofthe Ryan Corner Wind Farm (the Project), which is located approximately 12 km northwest of Port Fairy, in the Shire of Moyne, Victoria. Umwelt (Australia) Pty Ltd (Umwelt) acts on behalf of GPG in this matter.

The Minister for Planning under Planning Permit No. 20060222 (the Permit) approved Ryan Corner Wind Farm on 21 August 2008. An amendment to the Permit was most recently issued on 9 March 2022 (Planning Permit No. 20060222-2) approving a new wind farm layout (reducing the number of wind turbines, micro-siting wind turbines, realigning access tracks and cabling, and relocating the concrete batching plant, amongst other things) as well as amending conditions of the Permit and the proposed turbine model. GPG is now seeking an amendment to conditions of the Permit in order to facilitate the testing and commissioning of the Project in order to meet the requirements of AEMO and other associated legislation.

1. Background

The Project covers an area of approximately 3,388 Ha, where the current land use is primarily agricultural activities including grazing of sheep and cattle. The windfarm itself comprises 52 turbines with a total output of approximately 218.4MW. The Project has recently been connected to the electricity grid via 132kV overhead transmission circuit to the existing 500kV Tarrone Terminal Station.

As construction of the Project is now completed, GPG is required by AEMO to undertake a testing program to ensure the safety and reliability the Project's connections to the electricity grid. These tests require the operation of both individual and groups of wind turbine generators for over 24 hours at a time in order to meet Victorian and Australian safety standards.

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AEMO conducts its functions in accordance with the National Electricity Law (NEL) and the Rules. This includes rules relating to its operational and administrative functions for the NEM. GPG are required to complete compliance testing with AEMO to demonstrate the wind farms compliance with electrical performance standards. Compliance testing consists of a number of hold points. Each hold point has a maximum number of wind turbines that can be online at any one time. It is anticipated that once all stages of commissioning is complete the AEMO will determine that the Project will be considered officially under operation ('Asset Ready for Full Load Operation').

Testing shall be completed at each hold point. Once testing is completed and a test report reviewed and approved by AEMO, approval will be given to move to the next test hold point, increase the maximum number of wind turbines that can be online at any one time with each hold point. It is anticipated that hold point testing will take between 3 and 5 months to complete. At the conclusion of compliance hold point testing GPG will be approved to operate the wind farm with all wind turbines online under Full Load Operation.

2. Proposed amendments to the Permit

On 13 May 2024, Umwelt submitted a draft Bird and Avifauna Management Plan (BAM Plan) to DEECA for review, in accordance with Condition 20 of the current Permit. In particular, Condition 20 of the Permit requires GPG to have a BAM Plan submitted and approved by the Minister for Planning 'prior to the commissioning of the first turbine…'. As part of this condition, the BAM Plan is to be prepared in consultation with DELWP Environment Portfolio (now DEECA). ... GPG's interpretation of this condition is that the AEMO testing phase proposed in Section 1 above meets the definition of commissioning as defined by Condition 20. As such, Condition 20 currently operates to prevent GPG from undertaking the AEMO testing process without an approved BAM Plan.

Given that GPG has a limited period in which to complete the AEMO testing phase , it is proposed that:

- Condition 20 is amended to allow the AEMO testing process to be undertaken in a timely manner;
- Condition 20(b) is amended to reflect the amended wording of Condition 20 in order to have consistent and integrated requirements for the implementation of the BAM Plan; and
- GPG implement all measures of the draft BAMP Plan dated 13 May 2024 to ensure that the wider environmental obligations of the Permit are met.

The proposed amended wording for Condition 20 is further detailed in the attached draft amended Permit, provided as **Appendix 1** to this correspondence.

3. Implementation of the draft BAM Plan

As discussed in Section 2 above, GPG will implement the draft BAM Plan currently under consideration by DEECA. The draft BAM Plan is provided for your information as **Appendix 2** to this correspondence. The draft BAM Plan details the objectives and strategies that will be implemented to meet the requirements of the Permit and describes the actions that will be undertaken as the AEMO testing process.

The draft BAM Plan has been developed in consultation with DEECA. At the request of DEECA and DTP,GPG lodged the BAM Plan for approval after approval for GPG's Hawkesdale Wind Farm project in order for the management and mitigation measures for the Project to be aligned with the Hawkesdale BAM Plan. The measures in the draft Ryan Corner BAM Plan are consistent with those of the approved Hawkesdale BAM Plan. The implementation of the draft Bam Plan will be overseen by a qualified ecologist/ecological

consultancy with relevant tertiary degrees or experience as a minimum. This ecologist, engaged by GPG, will be responsible for overseeing and implementing the draft BAM Plan until such time as a BAM Plan is approved by the Minister for Planning.

The BAM Plan strikes a balance of meeting operational objectives and implements sound environmental practices to be deployed. The draft BAM Plan objective include:

- Measure the numbers of birds and bats, specifically in regard to the Brolga and Southern bent-wing Bat, affected by the operation of the Ryan Corner Wind Farm after operations commence (Section 5);
- Provide a context for measuring the impact of the Ryan Corner Wind Farm on the Brolga and any bird species of concern listed on state and Australian legislation (Section 4.1);
- Provide a context for measuring the impact of the Ryan Corner Wind Farm on the Southern Bentwing Bat and any bat species of concern listed on state and Australian legislation (Section 4.2); and
- Establish protocols and procedures for identifying, reporting, and mitigating any bird and bat impacts of the Ryan Corner Wind Farm, including any significant impacts (Section 7).

We trust this information meets with your current requirements. Please do not hesitate to contact me on 0400 599 803 should you require clarification or further information.

Yours sincerely

Joseph Thom
Principal Environmental Planner

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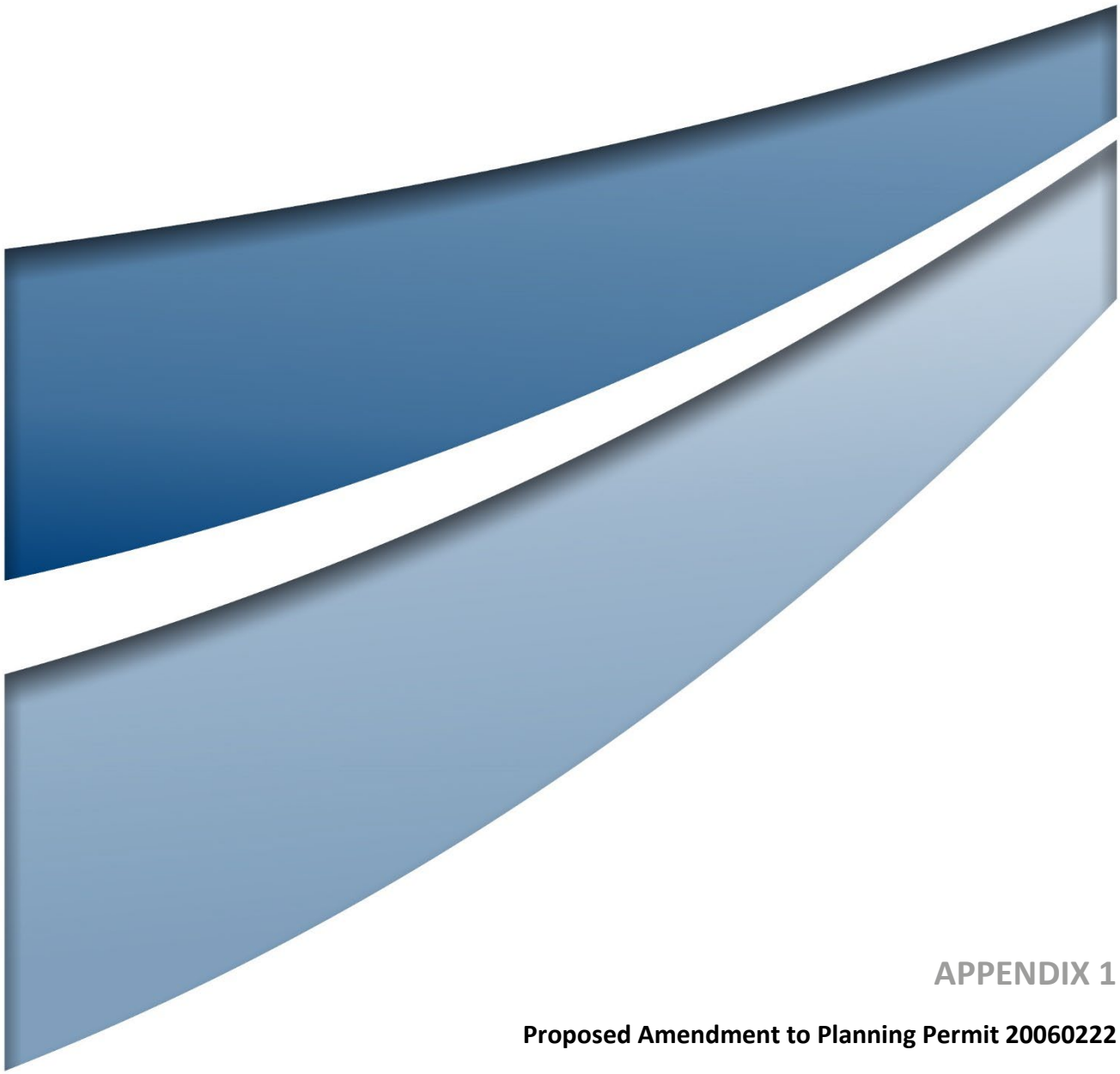


APPENDIX 1

Proposed Amendment to Planning Permit 20060222

Planning and Environment Regulations 2005 Form 11 Section 97F

PLANNING PERMIT GRANTED BY THE MINISTER UNDER SECTION 97F

OF THE PLANNING AND ENVIRONMENT ACT 1987

PLANNING PERMIT

Permit No.: 20060222-3

Planning Scheme: Moyne Planning Scheme

Responsible Authority for Administration and Enforcement of this Permit: Moyne Shire Council

ADDRESS OF THE LAND:

Land in Orford, Yambuk, St Helens and Port Fairy, generally bounded by the Hamilton - Port Fairy Road, Fingerboard Road and Shaw River, described as:

- Lot 1 PS 342920W Vol 10246 Fol 739
- Lot 3 PS 342920W Vol 10246 Fol 741
- Lot 1 TP 583778M Vol 05985 Fol 855
- Lot 2 TP 583778M Vol 05985 Fol 855
- Lot 1 TP 739708U Vol 5985 Fol 856
- Lot 4 PS 342920W Vol 10246 Fol 742
- Lot 1 PS 533111T Vol 10922 Fol 363
- Lot 2 PS 533111T Vol 10922 Fol 364
- Lot 1 TP 020873M Vol 10585 Fol 322
- Lot 2 TP 020873M Vol 10585 Fol 312
- Lot 3 TP 020873M Vol 10585 Fol 315
- Lot 4 TP 020873M Vol 10585 Fol 324
- Lot 38 PS 004537 Vol 10585 Fol 323
- Lot 57 PS 004537 Vol 10585 Fol 319
- Lot 1 TP 189288D Vol 9495 Fol 250
- Allot. 4 Sec. F Parish of Yambuk Vol 10842 Fol 693
- Allot. 15 Sec. E Parish of Yambuk Vol 10586 Fol 664
- Lot 1 TP 333255U Vol 8397 Fol 544
- Lot 2 TP 333255U Vol 8397 Fol 544
- Lot 3 TP 333255U Vol 8397 Fol 544
- Lot 1 TP 674712N Vol 08898 Fol 020
- Lot 2 TP 674712N Vol 08898 Fol 020
- Lot 3 TP 674712N Vol 08898 Fol 020
- Lot 4 TP 674712N Vol 08898 Fol 020
- Lot 5 TP 674712N Vol 08898 Fol 020
- Lot 6 TP 674712N Vol 08898 Fol 020
- Lot 7 TP 674712N Vol 08898 Fol 020
- Lot 1 PS 129285 Vol 9340 Fol 475
- Lot 2 PS 129285 Vol 9340 Fol 476
- Lot 1 PS 093264 Vol 08914 Fol 779
- Lot 2 PS 093264 Vol 08914 Fol 780
- Allot. 16 Sec. E Parish of Yambuk Lot 1 TP 404726M Vol 04599 Fol 711
- Lot 2 TP 404726M Vol 04599 Fol 711
- Lot 4 PS 093264 Vol 08914 Fol 782
- Lot 3 PS 093264 Vol 08914 Fol 781
- Lot 1 on LP 078617 Vol 05161 Fol 030
- Lot 1 on TP126647G Vol 09391 Fol 430 as part of

the Hamilton Port Fairy Road
- A small section of Riverside Road/Harris Road that is controlled Crown Land reserve
- Riverside Road and road reserve
- Youls Road (Crown land for Youls Road widening)

THE PERMIT ALLOWS: Use and development of land for a Wind Energy Facility (including permanent anemometers), removal of native vegetation and create or alter access to a road in a Transport Zone 2.

THE FOLLOWING CONDITIONS APPLY TO THIS PERMIT:

DEVELOPMENT PLANS

1. Before the development starts, development plans to the satisfaction of the Minister for Planning must be submitted to and approved by the Minister for Planning. The plans may be submitted for approval in stages or for a particular grouping of wind turbines within the site. When approved, the plans will be endorsed by the Minister for Planning and will then form part of this permit. The plans must be drawn to scale with dimensions and three copies must be provided.

   The plans must show the location, layout and dimensions of all on-site buildings and works including all wind turbines, access tracks, underground cables, overhead cables, any temporary concrete batching plant, the on-site sub-station, the off-site substation and high voltage switchyard, landscaping, any designated car parking areas, any signage, those turbines fitted with obstacle lighting for aviation safety and ancillary works, such as construction compounds ·and water tanks, as well as off-site road works.

   The plans must be generally in accordance with the amended plans submitted with the application to amend the permit (advertised in September and October 2021) and modified to include native vegetation removal, but modified to show:

   (a) any necessary adjustment to the layout to ensure that any indigenous or non-indigenous archaeological site identified by any on-site archaeological survey, and required to be protected (including those identified in Figure 9.1 of the Ryan Corner Wind Farm Environment Effects Statement and Application for Planning Permit (Gamesa Australia/TME Australia, October 2006), is avoided.

   (b) global positioning system coordinates for each turbine;

   (c) details of the model and capacity of the wind turbines to be installed;

   (d) elevations·, materials and finishes of the wind turbines and other buildings and works;

   (e) the location, size, type and intensity of any aviation safety lighting including any impact minimisation features as required by Condition 9;

   (f) details of any signage.

2. The use and development as shown on the endorsed plans must not be altered or modified without the

written consent of the Minister for Planning; except that the anemometers erected on site must feature aviation safety markings in accordance with condition 52 and except that the micro siting of wind turbines; (as defined in this condition) is permitted provided that:

(a) the developer of the wind energy facility has written advice from appropriately qualified experts that the alteration or modification will not result in a material adverse change in landscape, flora and fauna, cultural heritage, visual amenity, shadow flicker, noise fire risk or aviation impacts compared to the endorsed plans;

(b) the turbine base is not relocated so that it is within 1 km of a dwelling that existed on 1 December 2021 unless evidence has been provided to the satisfaction of the Minister for Planning that the owner of the dwelling has consented in writing to the location of the turbine;

(c) the turbine base is not relocated so that it results in the removal of any additional remnant native vegetation, unless that removal has been authorised by a planning permit; and

(d) no turbine base is located within:

(i) 100 metres from a Road Zone Category 1 or land in a Public Acquisition Overlay to be acquired for a road;

(ii) 40 metres from a Road Zone Category 2;

(iii) 20 metres from any other road;

(iv) 5 metres from the site boundary;

(v) 50 metres from a waterway, wetlands or designated flood plain; or

(vi) within an exclusion zone of any licensed communications link.

Any micro-siting of turbines in accordance with this condition will be regarded as being in accordance with the endorsed plans, and no consent under condition 2 will be required to reflect the micro-siting of turbines in compliance with this condition.

For the purpose of this condition, micro-siting of turbines means an alteration to the siting of a turbine by not more than 100 metres.

For the purposes of this condition, micro-siting of turbines includes any consequent changes to access tracks and electricity reticulation lines and the measurement of any distance between a dwelling and a turbine must be from the centre of the tower of the turbine (at ground level) to the closest point of the dwelling.

Copies of the written advice referred to in this condition must be provided to the Minister for Planning.

SPECIFICATIONS

3. Except with the written consent of the Minister for Planning, the wind energy facility must meet the following requirements to the satisfaction of the Minister for Planning:

(a) the wind energy facility must comprise no more than 52 wind turbines;

(b) the overall maximum height of the wind turbines (to the tip of the rotor blade when vertical) must not exceed 180 metres above natural ground level;

(c) wind turbines must be mounted on a tubular steel and/or concrete tower;

(d) each wind turbine is to have not more than three rotor blades and the lowest point of a sweep of the rotor blade tip must not be less than 40 metres above ground level at the turbine base for all turbines;

(e) the wind turbine towers, nacelles and rotor blades must be pale grey, off white, or other colour that blends with the landscape, and must be of a non-reflective finish;

(f) the colours and finishes of all other buildings and ancillary equipment must be such as to minimise the impact of the development on landscape;

(g) the transformer associated with each wind generator must be located beside each tower and pad mounted, or be enclosed within the tower structure;

(h) access tracks within the site are sited and designed to minimise impacts on overland flows, soil erosion, the landscape value of the site, environmentally sensitive areas, cultural heritage places, native flora and fauna and, where appropriate, the farming activities on the land;

(i) all new electricity cabling associated with the collector network within the wind energy facility must be placed under the ground;

(j) subject to condition 2(d) all wind turbines must be set back at least 50 metres from boundaries to neighbouring properties and roads which are formed roads at the date of this permit.

LANDSCAPE/VISUAL AMENITY

4. (Deleted)

5. Before any turbine is commissioned, an off-site landscaping program must be submitted to and approved by the Minister for Planning. When endorsed the program will form part of this permit.

The off-site Landscaping Program must:

(a) provide for off-site landscaping or other treatments to reduce the visual impact of the turbines from all dwellings that existed as at 1 December 2021 within four kilometres of the nearest turbine, and from dwellings 4, 5, 104 and 105 as identified in Figure 20.46 of the Ryan Corner Wind Farm Environment Effects Statement and Application for Planning Permit (Gamesa Australia/TME Australia, October 2006) and the Collins property at 800 Fingerboard Road, Yambuk.

(b) include a methodology for determining:

(i) the type of landscaping treatments to be proposed.

(ii) a timetable for establishing and maintaining the landscaping for at least two years.

(c) include a process for making offers to affected landowners to:

(i) undertake landscaping on the landowner's land; or

(ii) make a cash contribution in lieu (which must be sufficient to cover the cost of the landowner establishing and maintaining the landscaping for a period of at least two years).

(d) include a process for recording:

(i) offers that have been made to landowners.

(ii) whether or not the offers are accepted.

(iii) when and how offers are actioned following acceptance.

6. The endorsed Off-site Landscaping Program must be implemented to the satisfaction of the Minister for Planning. The endorsed Off-site Landscaping Program must not be altered or modified without the written consent of the Minister for Planning.

7. An initial progress report regarding the implementation of the endorsed Off-site Landscaping Program must be provided to the Minister for Planning within one year of the date of the endorsement of the plans. A further report must be provided upon the completion of the endorsed Off-site Landscaping Program. All access tracks associated with the wind energy facility must be constructed with local gravel and/or other surface material that will not unduly contrast with the landscape to the satisfaction of the Minister for Planning.

LIGHTING

8. Except in the case of an emergency, no external lighting of infrastructure associated with the wind energy facility, other than low level security lighting and aviation lighting in accordance with Condition 9 below, may be installed or operated without the further written consent of the Minister for Planning.

9. Any obstacle lighting for aviation safety should be generally in accordance with the the *Aeronautical Impact Assessment Ryan Corner Wind Farm* prepared by Aviation Projects dated December 2015, unless otherwise agreed with the Minister for Planning and must be to the satisfaction of the Minister for Planning. In finalising any lighting plan:

(a) The applicant must consult with CASA;

(b) Advice must be sought from a suitably qualified wildlife ecologist to ensure the lighting minimises any impact on bats or night flying birds, to the satisfaction of the Minister for Planning in consultation with DELWP Environment Portfolio;

(c) Where turbines are to be lit, individual lighting installations must be in accordance with the CASA Advisory Circular 139-18(0) and the CASA Manual of Standards, particularly

Chapter 9; and

(d) Subject to condition 9(b), the impact minimization features to be incorporated in any installation must include, but are not limited to:

(i) Treatment of the rear of the blade to avoid reflection of aviation lights; and

(ii) Shielding of the lights on top and bottom such that the maximum intensity of light is limited to a beam of 3 degrees, with only 0.5 degrees of this beam width below the horizon.

The requirements of this condition may be altered or modified with the written consent of the Minister for Planning. The Minister for Planning may also direct the wind energy facility operator to alter operation of any obstacle lighting for aviation safety installed under this condition, including switching the lighting on or off.

TRAFFIC MANAGEMENT

10. Before the installation of wind turbines, the road construction works as shown on the plan(s) endorsed under Condition 11 must be completed by the permit holder and assessed by a suitable qualified road pavement engineer in consultation with Moyne Shire Council and VicRoads to the satisfaction of the Minister for Planning.

11. Before the development stars, a traffic management plan must be prepared in consultation with Moyne Shire Council and VicRoads to the satisfaction of the Minister for Planning. When approved, the plan will be endorsed and will then form part of this permit. The plan must include:

(a) an existing conditions survey of public roads in the vicinity of the wind energy facility that may be used for access, including details of the suitability, design and construction standard of the roads;

(b) the designation of appropriate construction and transport vehicle routes to the wind energy facility site;

(c) the designation of operating hours and speed limits for trucks on routes accessing the site so as to avoid the time and routes of passage of school buses where relevant, and to provide for resident safety;

(d) protocols for identification of any areas of indigenous roadside vegetation that may require removal or pruning, the pruning practices to be followed and the planning permit requirements for removal of native vegetation;

(e) the identification and timetabling of any required pre-construction works;

(f) the designation of principal and other vehicle access points to the wind energy facility from surrounding roads. The location and detailed design of the connection between the internal access tracks and the public roads must fully consider desirable standards to ensure safe site distances, turning movements, and potential through traffic conflicts;

(g) details of any large over dimension vehicles to be used (such as those used for the transport

of the nacelles, blades and tower sections) and details of the transport route to be taken, the proposed escort arrangements and requirements for over dimensional pem1its from Vic Roads;

(h) recommendations on the need for road and intersection upgrades to accommodate any additional traffic or site access requirements, whether temporary or on-going and the timing of when these upgrades are to be undertaken;

(i) measures to be used to manage traffic impacts associated with the ongoing operation of the wind energy facility on the traffic volumes and flows on surrounding roads;

(j) engineering plans demonstrating how truck movements can be accommodated on sealed roadways and turned without encroaching onto the incorrect side of the road must be prepared for the Princess Highway/Youls Road intersection. The plan must include details of any required road construction works;

(k) a program of regular inspections to be carried out during the construction period to identify maintenance works necessary as a result of construction traffic;

(l) a program to rehabilitate roads to the condition identified by the surveys required above by condition 11(a);

(m) a protocol that bans the use of Riverside Road north of the newly constructed access track for trucks or heavy vehicles and provides that other vehicles avoid the vegetated areas by using the formed road surface and designated turning sites;

(n) consideration of road sealing, the construction of gravel shoulders and associated drainage works at:

(i) Youls Road;

(ii) depending on anticipated traffic volumes and composition of vehicles movements, any other roads required for use in the construction of the wind energy facility.

(o) Plans prepared under this condition must include cross-sections showing their formation, depth, drainage and surface levels, in consultation with the relevant road authority, to the satisfaction of the Minister for Planning.

(p) the scope of the expertise, duties and role of the nominated qualified road pavement engineer engaged under Condition 10, including inspection frequency and reporting requirements;

(q) the number and type of anticipated vehicle movements and the time of day when local roads will be used;

(r) the designation of all vehicle access points to the wind energy facility site from surrounding roads. Vehicular access points must be designed and located to ensure safe line of sight distances and turning movements, and to avoid potential through-traffic conflicts;

(s) the designation of appropriate construction and transport vehicle routes to and from the wind energy facility site;

(t) provision of designated areas for loading zones;

(u) measures to be undertaken to record traffic volumes on the nominated road network during the construction of the wind energy facility.

(v) proposed measures to ensure workers enter and exit the wind energy facility site from the designated site entrance points.

(w) proposed measures to ensure construction vehicles are easily identifiable;

(x) proposed measures to manage traffic impacts associated with the ongoing operation of the wind energy facility on the traffic volumes and flows on surrounding roads; and

(y) a program to rehabilitate existing public roads (road rehabilitation responsibilities can be assigned to the relevant road authority by way of contract or levy) within agreed timeframes to the condition identified in the surveys carried out under Condition 11(a) or to the condition to which the roads have been upgraded, whichever is relevant.

12. Moyne Shire Council may require the payment of a security deposit or bond for a maintenance period of 12 months in respect of works covered by the Traffic Management Plan, with such security deposit or bond to be released at the end of that period.

13. The applicant must submit an updated Traffic Management Plan to the Moyne Shire council and VicRoads, to the satisfaction of the Minister for Planning, within 28 days of:

(a) A significant increase in vehicle numbers, determined by a suitably qualified road pavement engineer, above the anticipated vehicle movements identified in the endorsed Traffic Management Plan; or

(b) Any change to an endorsed vehicle routed identified in the endorsed Traffic Management Plan.

14. Before the endorsement of the Traffic Management Plan, the permit holder must submit to Moyne Shire Council and VicRoads for approval, an independent qualified road pavement engineer who will undertake the duties identified in the Traffic Management Plan. Once approved, the permit holder must engage, at its cost, the approved qualified road pavement engineer to fulfil the requirements of the qualified road pavement engineer as defined in the Traffic Management Plan.

Once approved, the permit holder must engage, at its cost, the approved qualified road pavement engineer to fulfil the requirements of the qualified road pavement engineer as defined in the Traffic Management Plan.

15. The traffic management and road upgrade and maintenance works associated with the wind energy facility must be carried out in accordance with the traffic management plan and the cost of any works including maintenance are to be at the expense of the permit holder to the satisfaction of the relevant road authority.

CONDITIONS REQUIRED BY VICROADS

16. Before the commencement of construction of wind turbine footings, crane hardstand, internal access roads and substation, the intersection of the Princes Highway West and Youls Road intersection must be upgraded to a "Type B" treatment. All works associated with the design and construction of the intersection must be designed to standards specified in AUSTROADS publication "Guide to Traffic Engineering Practice, Intersection at Grade, Part 5".

ENVIRONMENTAL MANAGEMENT PLAN

17. Before the development starts, an environmental management plan must be prepared to the satisfaction of the Minister for Planning, in consultation with DELWP Environment Portfolio, Moyne Shire Council, Country Fire Authority, and other agencies as specified in this condition or as further directed by the Minister for Planning. The environmental management plan must be based on the approach outlined in Chapter 23 of the Ryan Corner Wind Farm Environment Effects Statement and Application for Planning Permit (Gamesa Australia/TME Australia, October 2006). The plan must be submitted to the Minister for Planning for approval. The environmental management plan may be prepared in sections or stages. When approved, the plan will be endorsed by the Minister for Planning and will then form part of this permit.

The environmental management plan must include the following:

(a) A **construction and work site management plan** which must include:

(i) procedures for access, noise control, dust emissions, spills and leaks from the handling of fuels and pollution management. Such procedures are to be undertaken in accordance with EPA Publication 480 Environmental Guidelines for Major Construction Sites and EPA Publication 275 Construction Techniques for Sediment Pollution Control;

(ii) the identification of all potential contaminants stored on site;

(iii) the identification of all construction and operational processes that could potentially lead to water contamination;

(iv) the identification of appropriate storage, construction and operational methods to control any identified contamination risks;

(v) the identification of waste re-use, recycling and disposal procedures;

(vi) appropriate sanitary facilities for construction and maintenance staff in accordance with the EPA Publication 891 Septic Tanks Code of Practice;

(vii) procedures for construction vehicles and equipment to use designated tracks and works areas to avoid impacts on native vegetation;

(viii) procedures to cover trenches and holes at night time and to fill trenches as soon as practical after excavation, to protect native fauna; and

(ix) procedures for the removal of works, buildings and staging area on completion

of construction of the project.

(b) A **sediment, erosion and water quality management plan**. This plan must be prepared in consultation with the Glenelg-Hopkins Catchment Management Authority and other authorities as may be directed by the Minister for Planning. The plan must include:

(i) procedure to ensure that silt from batters, cut-off drains, table drains and road works is retained on the site during and after the construction stage of the project. To this end:

- all land disturbances must be confined to a minimum practical working area and to the vicinity of the identified works areas;
- soil to be removed must be stockpiled and separate soil horizons must be retained in separate stockpiles and not mixed; and
- stockpiles must be located away from drainage lines;

(ii) arrangements for the storage of fuel and chemicals in securely bunded areas during and after construction away from waterways and vegetation;

(iii) criteria for the siting of any temporary concrete batching plant associated with the development of the wind energy facility and the procedure for its removal and reinstatement of the site once its use finishes. The establishment and operation of any such temporary concrete batching plant must be designed and operated in accordance with the Environment Protection Authority Publication 628 Environmental Guidelines for the Concrete Batching lndustry;

(iv) the installation of geo-textile silt fences (with sedimentation basins where appropriate) on all drainage lines from the site which are likely to receive run-off from disturbed areas;

(v) procedures to suppress dust from construction-related activities. Note: appropriate measures may include water spraying of roads and stockpiles, stabilising surfaces, temporary screening and/or wind fences, modifying construction activities during periods of heightened winds and revegetating exposed areas as soon as practicable;

(vi) procedures to ensure that steep batters are treated in accordance with Environmental Protection Authority Publication 275 Construction Techniques for Sediment Pollution Control;

(vii) procedures for waste water discharge management;

(viii) a process for overland flow management to prevent the concentration and diversion of waters onto steep or erosion prone slopes;

(ix) pollution management measures for stored and stockpiled materials including waste mate1ials, litter and any other potential source of water pollution;

(x) incorporation of pollution control measures outlined in EPA Publication 480 Environmental Guidelines for Major Construction Sites;

(xi) siting of concrete batching plant and any on-site wastewater and disposal and disposal treatment fields at least 100 metres from any watercourse;

(xii) appropriate capacity and an agreed program for annual inspection and regular maintenance of any on-site wastewater management system constructed to service staff, contractors or visitors; and

(xiii) immediate remediation of localised erosion with a specified response time.

(c) A **blasting plan**

This plan is only required if blasting is proposed to be undertaken at the site as part of the construction of the wind energy facility. The plan must include the following:

(i) Name and qualification of the person responsible for blasting;

(ii) A description of the location of where the explosives will be used, and the location of every licensed bore on any property with an adjoining boundary within l km of the location of the blasting;

(iii) A requirement for the identification and assessment of any potentially sensitive site within 1 km of the location of the blasting, including the procedure for pre-blast and post-blast qualitative measurement or monitoring at such site;

(iv) The procedure for site clearance and post blast reoccupation;

(v) The procedure for the storage and handling of explosives;

(vi) A requirement that blasting only occur after at least 24 hours prior notification in writing of the intention to undertake blasting has been given to all adjoining neighbours of the proposal with a property boundary within l km of the location of the proposed blasting; and

(vii) A requirement that blasting only be undertaken between the hours of 8am and 4pm.

(d) A **hydrocarbon and hazardous substances plan**. The plan must include:

(i) procedures for any on-site storage of fuels, lubricants or waste oil to be in bunded areas; and

(ii) contingency measures to ensure that any chemical or oil spi1ls are contained on-site and cleaned up in accordance with Environment Protection Authority requirements.

(e) A **bushfire prevention and emergency response plan** prepared in consultation with the Country Fire Authority and Moyne Shire to the satisfaction of the Minister for Planning. This plan must include:

(i) criteria for the provision of static water supply tanks solely for firefighting purposes, including minimum capacities, appropriate connections and signage,

(ii) criteria for access to static water supply tanks for fire fighting vehicles;

(iii) procedure s for vegetation management, fuel control and the provision of firefighting equipment during declared fire danger periods;

(iv) minimum standards for access roads and tracks to allow access for fire fighting vehicles;

(v) the facilitation by the operator, before or within 3 months after the commencement of the operation of the wind energy facility, of a familiarisation visit to the site and explanation of emergency services procedures for the Country Fire Authority, Rural Ambulance Victoria, Moyne Shire Council's Municipal Emergency Management Committee and Victoria Police;

(vi) subsequent familiarisation sessions for new personnel of those organisations on a regular basis and/or as required ; and

(vii) if requested, training of authority personnel in relation to suppression of wind energy facility fires.

(f) An **archaeological management plan**. This plan must include:

(i) procedures to ensure that before any buildings or works commence in association with the development , the identified non-Aboriginal heritage locations identified in the Archaeological/Cultural Heritage Assessment undertaken by ERM, August 2006 in Supplementary Reports, Volume 2 of the Ryan Corner Wind Farm Environment Effects Statement and Application for Planning Permit (Gamesa Australia/TME Australia, October 2006), are protected from any buildings and works in accordance with the recommendations contained in the Cultural Heritage Assessment; and

(ii) protocols for the activities of construction contractors on site, which have been identified to have potential effects on sites of cultural significance.

(g) A **pest animal management plan** to be prepared in consultation with the Department of Economic Development, Jobs, Transport and Resources. This plan must include:

(i) procedures for the control of pest animals, particularly by negating opportunities for the sheltering of pests; and

(ii) follow-up pest animal control for all areas disturbed by the wind energy facility construction works for a period of two years following the completion of the wind energy facility.

(h) A **pest plant management plan** to be prepared in consultation with the Department of Economic Development, Jobs, Transport and Resources and DELWP Planning including:

(i) procedures to prevent the spread of weeds and pathogens from earthmoving equipment and associated machinery including the cleaning of all plant and equipment before transporting to the site and the use of road making material comprising clean fill that is free of weeds;

(ii) sowing of disturbed areas with perennial grasses; and

(iii) a protocol to ensure follow-up weed control is undeliaken on all areas disturbed through construction of the wind energy facility for a mini mum period of 2 years following completion of the works.

(i) A **training program** for construction workers and permanent employees or contractors at the wind energy facility site including a site induction program relating to the range of issues addressed by the Environmental Management Plan.

(j) A **program for reporting** including a register of environmental incidents, non-conformances, complaints and corrective actions.

(k) A **timetable for implementation** of all programs and works identified in a plan referred to in Conditions 17(a)-(j) above.

18. The Environmental Management Plan must be reviewed and if necessary amended, in relation to matters pertaining to the continued operation of the wind energy facility, in consultation with the Moyne Shire Council and where relevant DELWP Environment Portfolio to the satisfaction of the Minister for Planning every 5 years to reflect operational experience and changes in environmental management standards and techniques and must be submitted to the Minister for Planning for re-endorsement.

19. The use and development must be carried out in accordance with the endorsed Environmental Management Plan.

BATS AND AVIFAUNA

20. Prior to the project being deem to be officially under operation ('Asset Ready for Full load operation') by AEMO, a Bat and Avifauna Management Plan (BAM Plan) to the satisfaction of the Minister for Planning must be prepared in consultation with DELWP Environment Portfolio, and must be submitted to and approved by the Minister for Planning. When approved the plan will be endorsed and will then form part of the permit. The BAM Plan must include:

(a) a statement of the objectives and overall strategy for detecting, managing and mitigating any significant bird and bat mortality arising from the wind energy facility operations;

(b) a monitoring program of at least 2 years duration, either commencing upon the project being deem to be officially under operation ('Asset Ready for Full load operation') by AEMO or alternatively, such other time of commencement as is to the satisfaction of the Minister for Planning. The monitoring program must include surveys during breeding and migratory seasons to ascertain:

(i) the presence, behaviour and movements of any Brolga, especially breeding pairs in the vicinity of the wind energy facility;

(ii) the presence, behaviour and movements of any Southern Bent- wing Bat in the vicinity of the wind energy facility;

(iii) the species, number, age and sex (if possible) and date of any bird or bat mortality arising from the wind energy facility operations;

(iv) procedures for the reporting of any detected threatened bird or threatened bat mortalities arising from the operation of the wind energy facility to DELWP Environment Portfolio and the responsible authority within 7 days of becoming aware of any mortality;

(v) seasonal and yearly variation in the number of bird and bat mortalities arising from the operation of the wind energy facility;

(vi) whether bird and bat mortalities were at lit or unlit turbines;

(vii) the efficacy of searches for carcasses of birds and bats and information on the rate of removal of carcases by scavengers, so that correction factors can be determined to enable calculations of the total number of mortalities;

(viii) procedures for the regular removal of carcasses likely to attract raptors to areas near turbines; and

(ix) requirements for periodic reporting, within agreed timeframes, of the findings of the monitoring to DEWLP Environment Portfolio, the responsible authority and the local community;

(c) recommendations in relation to a mortality rate for specified species which would trigger the requirement for responsive mitigation or offset measures to be undertaken by the proponent to the satisfaction of the Minister for Planning; and

(d) a strategy developed in consultation with DELWP Environment Portfolio and to the satisfaction of the Minister for Planning to mitigate or offset any impacts in relation to threatened or significantly affected native bird or bat species detected during monitoring. Measures to offset the impact may include management or improvement of habitat or breeding sites away from the wind energy facility in the region to improve breeding productivity, or other offsets to the satisfaction of the Minister for Planning .

21. Following the completion of the two-year monitoring program referred to in condition 20, a report must be prepared by the operator of the wind energy facility setting out the findings of the program and in particular assessing any cumulative impact of the wind energy facility on the defined bird and bat species, to the satisfaction of the Minister for Planning. The report should be generally in accordance with Windfarm collision risk for birds: Cumulative risks for threatened and migratory species, Department of Environment and Heritage (2006) and any general framework for cumulative impact studies if issued by the Minister for Planning at the end of the two-year monitoring program.

If, after consideration of this report, the Minister for Planning directs that further investigation of potential or actual impacts on birds and bats is to be undertaken, the extent and details of the further investigation must be prepared in consultation DELWP Environment Portfolio and to the satisfaction of the Minister for Planning, and the investigation must be carried out to the satisfaction of the Minister for Planning.

NATIVE VEGETATION REMOVAL

22. No more than 3.836 hectares of native vegetation is permitted to be approved under this permit.

23. Before any native vegetation is removed under this permit, a Native Vegetation Plan to the satisfaction of DELWP Environment Portfolio and the Minister for Planning must be submitted to and approved by the Minister for Planning. When approved the Native Vegetation Plan will be endorsed and then form part of the permit. All works constructed or carried out must be in accordance with the endorsed plan. The Native Vegetation Plan must include:

(a) a final Biodiversity Assessment Report or similar which identifies all loses being approved by this permit and the associated offset requirements, in accordance with the *Permitted clearing of native vegetation – Biodiversity assessment guidelines (DEPI 2013)*.

(b) Plans drawn to scale with dimensions that identify:

(i) native vegetation to be removed.

(ii) any current mapped wetlands as defined in the *Permitted clearing of native vegetation – Biodiversity assessment handbook (DELWP 2015),* that are present on the site.

(iii) any native vegetation to be retained that is within the permissible micro siting envelope or ancillary infrastructure.

(iv) the location of any detected threatened flora and fauna species

(c) measures to be used during construction to protect native vegetation to be retained, and to protect the function and hydrology of wetlands where native vegetation removal will occur.

(d) measures to induct and educate all construction personnel in relation to the permit conditions and statutory requirements for the protection and removal of native vegetation.

24. Except with the written consent of the Minister for Planning, within any area of native vegetation to be retained the following are prohibited:

(a) vehicular or pedestrian access

(b) trenching or soil excavation

(c) storage or dumping of any soils, materials, equipment, vehicles, machinery or waste products

(d) entry and exit pits for underground services

(e) any other actions or activities that may result in adverse impacts to retained native

vegetation.

25. To offset the removal of 3.836 hectares of native vegetation the permit holder must secure a native vegetation offset, in accordance with the *Permitted clearing of native vegetation – Biodiversity assessment guidelines* (DEPI 2013) and *Native vegetation gain scoring manual* (DEPI 2013) as specified below:

    (a) A general offset of 0.953 general habitat units:

        (i) located within the Glenelg Hopkins Catchment Management Authority boundary or Moyne municipal area

        (ii) with a minimum strategic biodiversity value of at least 0.348,

26. Before any native vegetation is removed, evidence that the required offset for the project or stage has been secured must be provided to the satisfaction of the Minister for Planning. The offset evidence can be:

    (a) a security agreement signed by both parties, to the required standard for the offset site or sites, including a 10 year offset management plan; and/or

    (b) an allocated credit extract from the Native Vegetation Credit Register.

    A copy of the offset evidence will be endorsed by the Minister for Planning and form part of this permit.

27. Within 30 days of endorsement of the offset evidence by the Minister for Planning, a copy of the endorsed offset evidence must be provided to the Department of Environment, Land, Water and Planning, Barwon South West regional office via BSW.planning@delwp.vic.gov.au. At the conclusion of the project, offset requirements can be reconciled with agreement by the Minister for Planning and the Department of Environment, Land, Water and Planning.

28. In the event that a security agreement is entered into as per condition 26, the applicant must provide the annual offset site condition report to the responsible authority by the anniversary date of the execution of the offset security agreement, for a period of 10 consecutive years. After the tenth year, the landowner must provide a report at the reasonable request of a statutory authority.

29. To prevent the spread of weeds and pathogens, all vehicles and machinery must be made free of soil, seed and plant material before being taken to the works site and again before being taken from the works site, during and on completion of the project.

30. Any pruning to the canopy or major structural branches of any tree to be retained must be undertaken in accordance with Australian Standard 4373-2007 – Pruning of Amenity Trees.

NOISE STANDARD

31. Except as provided below in this condition, the operation of the wind energy facility must comply with New Zealand Standard 6808:2010 Acoustics – Wind farm noise in relation to any dwelling

existing on land in the vicinity of the wind energy facility as at 1 December 2021, to the satisfaction of the Minister of Planning. In determining compliance with the standard, the following requirements apply:

(a) The sound level from the wind energy facility, when measured outdoors within 10 metres of a dwelling at any relevant nominated wind speed, must not exceed the background level (LA90) by more than 5 dB or a level of 40 dB LA90, whichever is the greater. If access cannot be gained to undertake testing within 10 metres of a property, consent from the Minister for Planning may be sought to test at another location.

(b) Compliance at night must be separately assessed with regard to night time data. For these purposes the night is defined as 10.00pm to 7.00am.

(c) Where special audible characteristics, including tonality, impulsive sound or excessive amplitude modulation occur, the measured noise level with the identified special audible characteristics will be modified by applying a penalty of up to +6 dB LA90 in accordance with Section 5.4 of the Standard.

The limits specified under this condition do not apply if an agreement has been entered into with the relevant landowner waiving the limits. Evidence of the agreement must be provided to the satisfaction of the Minister for Planning upon request, and be in a form that applies to the land for the life of the wind energy facility.

NOISE COMPLIANCE ASSESSMENT

32. An independent post-construction noise monitoring program must be commissioned by the proponent within 2 months from the commissioning of the first turbine and continue for 12 months after the commissioning of the last turbine, to the satisfaction of the Minister for Planning. The independent expert must have experience in acoustic measurement and analysis of wind turbine noise. The program must be carried out in accordance with New Zealand Standard 6808:2010 as varied by Condition 31 above. The operator under this permit must pay the reasonable costs of the monitoring program.

33. The results of the post-construction noise monitoring program, data and details of compliance and non-compliance with the New Zealand Standard must be forwarded to the Minister for Planning within 14 months after the commissioning of any turbine . The results must be written in plain English and formatted for ·reading by laypeople.

34. All noise compliance reports must be accompanied by a report from an environmental auditor appointed under the Environment Protection Act 2017 with their opinion on the methodology and results contained in the noise compliance testing plan. If a suitable auditor cannot be engaged, the proponent may seek the written consent of the Minister for Planning to obtain an independent peer review of the noise report instead.

COMPLAINTS

Complaint Investigation and Response Plan

35. Before development starts, a Complaint Investigation and Response Plan must be submitted to the Minister for Planning for endorsement. Once endorsed, the plan will form part of this permit.

36. The Complaint Investigation and Response Plan must:

    (a) respond to all aspects of the construction and operation of the wind energy facility;

    (b) be prepared in accordance with Australian/New Zealand Standard AS/NZS 10002:2014 – Guidelines for complaint management in organisations;

    (c) include a process to investigate and resolve complaints (different processes may be required for different types of complaints).

37. The endorsed Complaint Investigation and Response Plan must be implemented to the satisfaction of the Minister for Planning and be publicly available online. The endorsed Complaint Investigation and Response Plan must not be altered or modified without the written consent of the Minister for Planning.

Publishing information about complaints handling

38. Before the development starts the following information must be made publicly available and readily accessible from the wind energy facility project website to the satisfaction of the Minister for Planning:

    (a) a copy of the endorsed Complaints Investigation and Response Plan;

    (b) a toll free telephone number and email contact for complaints and queries to the operator of the wind energy facility.

Complaints Register

39. Before the development starts, a Complaints Register must be established which records:

    (a) the complainant's name and address (if provided), including (for noise complaints) any applicable property reference number contained in the report titled *Ryan Corner Wind Farm NZS 6808:2010 Noise Assessment* (Marshall Day Acoustics, 21 April 2017);

    (b) a receipt number for each complaint, which must be communicated to the complainant;

    (c) the time and date of the incident, and the prevailing weather and operational conditions at the time of the incident;

    (d) a description of the complainant's concerns, including (for a noise complaint) the potential occurrence of special audible characteristics;

    (e) the process for investigating the complaint, and the outcome of the investigation, including:

        (i) the actions taken to resolve the complaint;

(ii) for noise complaints, the findings and recommendations of an investigation report undertaken in accordance with the endorsed Noise Management Plan.

40. All complaints received must be recorded in the Complaints Register.

41. The complete copy of the Complaints Register must be provided, along with a reference map of complaint locations, to the Minister for Planning on each anniversary of the date of this permit and at other times on request.

BLADE SHADOW FLICKER

42. Shadow flicker from the wind energy facility must not exceed 30 hours per annum at any dwelling existing at 21 December 2021.

43. This condition does not apply if the operator of the wind energy facility has entered into an agreement with a landowner under which the landowner acknowledges and accepts that show flicker may exceed 30 hours per annum at the landowner's dwelling. Evidence of the agreement must be provided to the satisfaction of the Minister for Planning upon request, and must be in a form that applies to the land for the life of the wind energy facility.

TELEVISION AND RADIO RECEPTION AND INTERFERENCE

44. A pre-construction survey must be carried out to the satisfaction of the Minister for Planning to determine television and radio reception strength at selected locations up to 5 kms from all wind turbines. The location of such monitoring is to be detem1ined by an independent television and radio monitoring specialist appointed by the operator under this permit.

45. If, following commencement of the operation of the wind energy facility, a complaint is received regarding the wind energy facility having an adverse effect on television or radio reception at the any dwelling in the area which existed at the date of the pre-construction survey, a post-construction survey must be carried out at the dwelling.

46. If the post-construction survey establishes any increase in interference to reception as a result of the wind energy facility operations, the wind energy facility operator must unde1iake reasonable and feasible measures to mitigate the interference and return the affected reception to pre-construction quality at the cost of the wind energy facility operator and to the satisfaction of the Minister for Planning.

SECURITY

47. All site and wind turbine access points and electrical equipment must be locked and made inaccessible to the general public to the satisfaction of the Minister for Planning. Public safety warning signs must be located on all towers and all spare parts and other equipment and materials associated with the wind energy facility must be located in screened, locked storage areas that are inaccessible to the public to the satisfaction of the Minister for Planning.

AVIATION CLEARANCE

48. Before development starts, confirmation of the surveyed location and height of turbines must be

provided to Airservices Australia, to enable details of the facility to be shown on aeronautical charts of the area.

49. If there are any subsequent changes to turbine location or height during construction, Airservices Australia must be advised, to enable details of any changes to the facility to be shown on aeronautical charts of the area.

DECOMMISSIONING

50. The wind energy facility operator must, without delay, notify the Minister for Planning in writing as soon as all of the wind turbines have permanently ceased to generate electricity. Within 12 months of this date, the wind energy facility operator must undertake the following to the satisfaction of the Minister for Planning within such timeframe as may be specified by the Minister:

(a) remove all above ground non-operational equipment;

(b) remove and clean up any residual spills;

(c) clean up and restore all storage, construction and other areas associated with the use, development and decommissioning of the wind energy facility, if not otherwise useful to the on-going management of the land;

(d) restore all access tracks and other areas affected by the project closure or decommissioning, if not otherwise useful to the on-going management of the land;

(e) submit a decommissioning traffic management plan to the Minister for Planning and, when approved by the Minister for Planning, implement that plan; and

(f) f) submit a post-decommissioning revegetation management plan to the Minister for Planning and, when approved by the Minister for Planning, implement that plan.

STAGING

51. The use and development authorised by this permit may be completed in stages as shown on the endorsed development plan(s) to the satisfaction of the Minister for Planning, and any corresponding obligation arising under this permit (including the preparation and approval of plans) may be similarly completed in stages or parts.

MARKING OF ANEMOMETERS

52. All anemometers/meteorological masts permitted by this permit must be conspicuously marked in the interests of aviation safety in accordance with Guideline D of the *National Airports Safeguarding Framework* (NASF) (Commonwealth Department of Infrastructure, Transport, Regional Development and Communications, July 2012).

SPATIAL INFORMATION AND EMERGENCY RESPONDERS

53. Before development starts, the permit holder must provide spatial information data to Land Use Victoria via email Vicmap.help@delwp.vic.gov.au to be used to direct emergency services to and within the site. This information must be in the ESRI Shapefile or Geodatabase .gdb format, GDA94

or GDA2020 datum and include:

(a) The location and boundaries of the wind farm extents polygon(s)

(b) Tower location and name/number

(c) All access entry points onto private property

(d) All Internal roads that lead to the individual towers

(e) The locations of site compound, substations, maintenance facilities, and anemometers.

54. If there are any subsequent changes to turbine location, internal roads or access points during construction, or after completion of construction, updated data must be provided to Land Use Victoria via email Vicmap.help@delwp.vic.gov.au within 30 days of the change, to enable details of any changes to the wind energy facility to be known to emergency services dispatchers.

PRELIMINARY INVESTIGATIVE WORKS

55. For the purposes of this permit, the carrying out of preliminary investigative works, including geotechnical investigations, for the purposes of gathering data or making other assessments necessary or desirable in order to prepare the development plan or other plans specified in this permit, is not considered to be commencement of the development.

EXPIRY

56. This permit will expire if one of the following circumstances applies:

(a) the development is not started within 3 years of the date of this permit:

(b) the development is not completed within 6 years of the date of this permit.

The Minister for Planning as responsible authority may extend the periods referred to if a request is made in writing before the permit expires, or within 12 months afterwards.

THIS PERMIT HAS BEEN AMENDED AS FOLLOWS:

Date of amendment	Brief description of amendment
15 November 2011	Pursuant to Section 69 of the Planning and Environment Act 1987 this permit was extended so that development must start no later than 15 March 2012.
31 October 2013	Pursuant to Section 69 of the Planning and Environment Act 1987 this permit was extended so that the permit will expire if the development is not completed by February 2016.
09 April 2015	Pursuant to Section 69 of the Planning and Environment Act 1987 this permit was extended so that the permit will expire if works are not completed by 29 August 2019.
21 December 2017 20060222-A	Pursuant to Section 97J of the Planning and Environment Act 1987 this permit was amended to increase the height of turbines, reduce the number of turbines, and to modify conditions under the permit. Pursuant to Section 69 of the Planning and Environment Act 1987 this permit was extended so that the permit will expire if works are not completed by 29 August 2020.
9 March 2022 20060222-2	Pursuant to Section 97J of the Planning and Environment Act 1987 this permit was amended to: • Reconfigure the facility layout to remove four 160m high turbines and relocate 14 of the remaining 52 turbines, amend the turbine model and add two permanent anemometers • Amend the preamble of the Planning Permit to include permission to create or alter access to a road in a Transport Zone 2 and the use and development of permanent anemometers. • Amend the address of the land to reflect changes in formal land descriptions since the approval of the Planning Permit. • Amend Condition 1 to refer to the most recent set of advertised development plans • Amend Conditions 3(a) and (d) to reflect the removal of four Type A (160 m high) turbines. • Amend Condition 3(i) to specify that all new electricity cabling associated with the collector network within the wind energy facility is to be underground. • Remove Condition 4 to no longer require landscaping for the on-site substation • Amend Condition 11 (d) relating to the Traffic Management Plan (TMP) to require protocols for the identification of roadside native vegetation. • Amend the permitted amount of native vegetation for removal included within Condition 22 from 3.637 ha to 3.836 ha. • Amend native vegetation removal permit conditions to contemporary standardised conditions.

	• Amend conditions 2, 5, 31 and 42 to refer to 1 December 2021 as the date dwellings must have existed to benefit from the noise and shadow flicker protections afforded by the permit. • Amend condition 34 reference to the *Environment Protection Act 2017.* • Add conditions requiring aviation safety marking of anemometers, and the provision of spatial information to emergency responders. • Renumber decommissioning and permit expiry conditions.
9 March 2022 20060222-3	Pursuant to Section 97J of the Planning and Environment Act 1987 this permit was amended to: • amend Condition 20 to enable the efficient and timely testing of Project infrastructure in accordance with AEMO requirements and National Electricity Law (NEL) and the Rules

IMPORTANT INFORMATION ABOUT THIS PERMIT

WHAT HAS BEEN DECIDED?

The Minister has granted and issued a permit under Division 6 of Part 4 of the Planning and Environment Act 1987.

WHEN DOES A PERMIT BEGIN?

A permit operates -

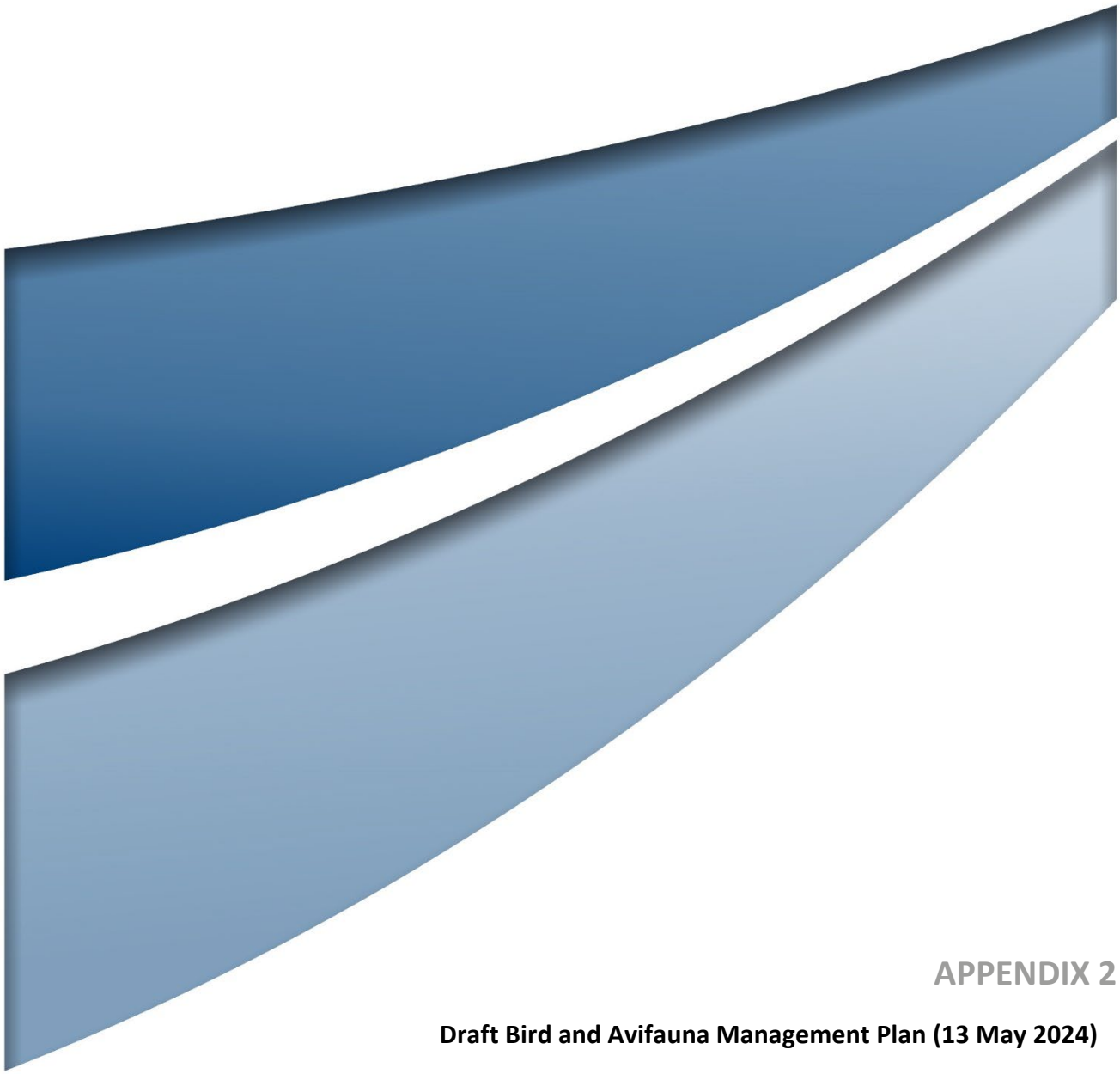
- from the date specified in the permit; or
- if no date is specified, from the date on which it was issued.

WHEN DOES A PERMIT EXPIRE?

1. A permit for the development of land expires if -
   - the development or any stage of it does not start within the time specified in the permit; or
   - the development requires the certification of a plan of subdivision or consolidation under the Subdivision Act 1988 and the plan is not certified within two years of the issue of the permit, unless the permit contains a different provision; or
   - the development or any stage is not completed within the time specified in the permit, or, if no time is specified, within two years after the issue of the permit or in the case of a subdivision or consolidation within 5 years of the certification of the plan of subdivision or consolidation under the Subdivision Act 1988.
2. A permit for the use of land expires if -
   - the use does not start within the time specified in the permit, or if no time is specified, within two years after the issue of the permit; or
   - the use is discontinued for a period of two years.
3. A permit for the development and use of land expires if
   - the development or any stage of it does not start within the time specified in the permit; or
   - the development or any stage of it is not completed within the time specified in the permit, or, if no time is specified, within two years after the issue of the permit; or
   - the use does not start within the time specified in the permit, or, if no time is specified, within two years after the completion of the development; or
   - the use is discontinued for a period of two years.
4. If a permit for the use of land or the development and use of land or relating to any of the circumstances mentioned in section 6A(2) of the Planning and Environment Act 1987, or to any combination of use, development or any of those circumstances requires the certification of a plan under the Subdivision Act 1988, unless the permit contains a different provision -
   - the use or development of any stage is to be taken to have started when the plan is certified; and
   - the permit expires if the plan is not certified within two years of the issue of the permit.
5. The expiry of a permit does not affect the validity of anything done under that permit before the expiry.
6. In accordance with section 97H of the Planning and Environment Act 1987, the responsible authority specified in the planning scheme is the responsible authority for the administration and enforcement of the Planning and Environment Act 1987 and the relevant planning scheme in respect of this permit (whether or not the permit is amended) except that the Minister remains the responsible authority in respect of—
   - any matters which the permit specifies to be done by, approved by or done to the satisfaction of the Minister; and
   - any extension of time under section 69 in relation to the permit; and
   - the correction of the permit under section 71(1); and
   - the amendment of the permit under section 97J

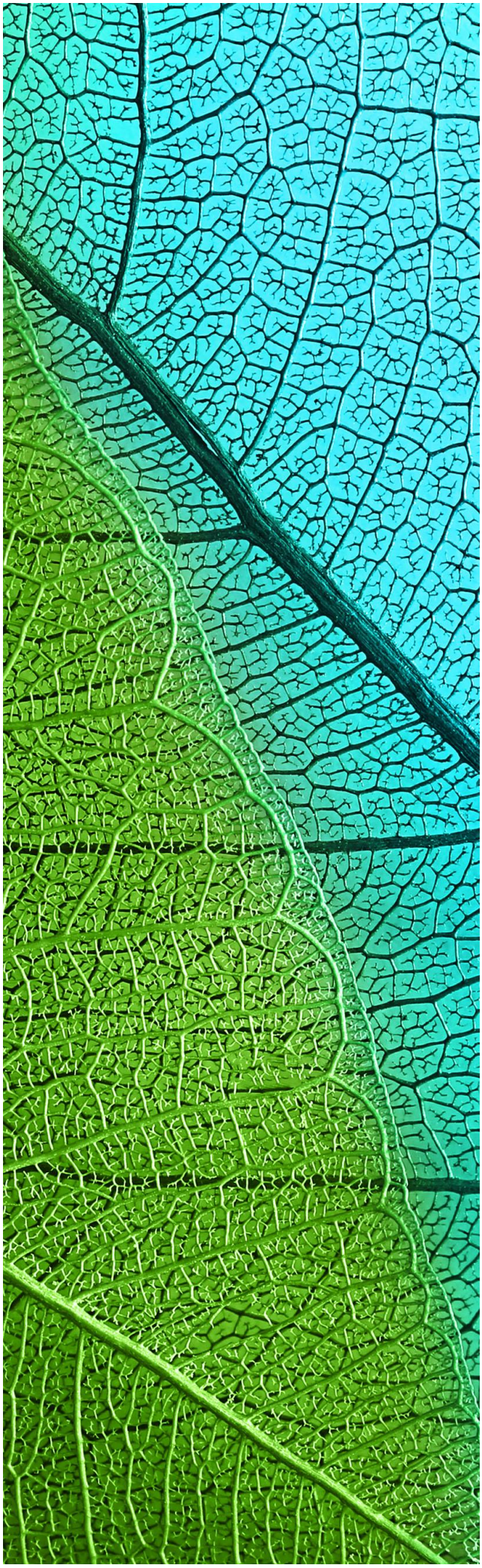
WHAT ABOUT REVIEWS?

In accordance with section 97M of the Planning and Environment Act 1987 , the applicant may not apply to the Victorian Civil and Administrative Tribunal for a review of any condition in this permit.



APPENDIX 2

Draft Bird and Avifauna Management Plan (13 May 2024)



Ryan Corner Wind Farm

Bat and Avifauna Management Plan

Ryan Corner Development Pty Ltd

May 2024
Report No. 14144B (18.4)

Nature Advisory
(Formerly Brett Lane & Associates Pty Ltd)
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1. Introduction

Nature Advisory Pty Ltd (formerly Brett Lane and Associates Pty. Ltd. (BL&A)) and Symbolix Pty. Ltd. were engaged by Union Fenosa Wind Australia Pty. Ltd. (project now Ryan Corner Development Pty Ltd) to develop a Bat and Avifauna Management Plan (hereafter BAMP) in accordance with Condition 20 in the Ryan Corner Wind Farm Permit No.: 20060222 for the construction of a wind farm at Ryan Corner. This BAMP was prepared, submitted to the satisfaction of the Minister of Planning and endorsed by the Department of Energy, Environment and Climate Action (DEECA, formerly DELWP) to form part of the original wind farm permit. This permit has since been amended and a new permit number issued: Permit No.: 20060222-2 amended 9 March 2022. As such Ryan Corner Development Pty Ltd, the client, has engaged Nature Advisory to amend the Ryan Corner BAMP in accordance with the new permit.

The site lies in south-western Victoria, approximately 15 kilometres north-west of Port Fairy and extends for about six kilometres along the western side of the Hamilton-Port Fairy Road. The wind farm area is approximately 3000 hectares. The wind farm would include a total of 52 4.2-megawatt wind turbines. The land is presently used for sheep and cattle grazing and has a long history of agricultural use and activity. The entire site is cleared grazing land with a limited number of small remnant areas of native vegetation (shrubland and grassland).

The Minister for Planning issued an amended planning permit for the construction of a Wind Farm (Moyne Planning Scheme, Permit No.: 20060222-2). Under condition 20 of this permit, a BAMP must be prepared. This condition states that:

20. *Prior to the commissioning of the first turbine, and based on the findings of the targeted assessment, a Bat and Avifauna Management Plan (BAMP) to the satisfaction of the Minister for Planning must be prepared in consultation with the DELWP Environmental Portfolio (now DEECA) and must be submitted to and approved by the Minister for Planning. When approved the plan will be endorsed and will then form part of the permit. The BAMP must include:*

    (a) *a statement of the objectives and overall strategy for managing and mitigating any significant bird and bat strike arising from the wind energy facility operations;*

    (b) *a monitoring program of at least 2 years duration, either commencing upon the commissioning of the last turbine of the first stage of the approved development and use (if any) or alternatively, such other time of commencement as is to the satisfaction of the Minister for Planning. The monitoring program must include surveys during the breeding and migratory seasons to ascertain:*

        (i) *the presence, behaviour and movements of any Brolga, especially breeding pairs in the vicinity of the wind energy facility;*

        (ii) *the presence, behaviour and movements of the Southern Bent-wing bat in the vicinity of the wind energy facility;*

        (iii) *the species, number, age and sex (if possible) and date of any bird or bat mortality arising from the wind energy facility operations;*

        (iv) *procedures for the reporting of any detected threatened bird or threatened bat mortality arising from the operation of the wind energy facility to DELWP Environmental Portfolio and the responsible authority within 7 days of becoming aware of any mortality;*

        (v) *seasonal and yearly variation in the number of bird and bat mortalities arising from the operation of the wind energy facility;*

(vi) whether bird and bat mortalities were at lit or unlit turbines;

(vii) the efficacy of searches for carcasses of birds and bats and information on the rate of removal of carcasses by scavengers, so that correction factors can be determined to enable calculations of the total number of mortalities;

(viii) procedures for regular removal of carcasses likely to attract raptors to areas near turbines; and

(ix) requirements for periodic reporting, within agreed timeframe of the findings of the monitoring to the DELWP Environmental Portfolio, the responsible authority and the local community;

(c) recommendations in relation to a mortality rate for specified species which would trigger the requirement for responsive mitigation or offset measures to be undertaken by the proponent to the satisfaction of the Minister for Planning; and

(d) a strategy developed in consultation with DELWP Environmental Portfolio and to the satisfaction of the Minister for Planning to mitigate or offset any impacts in relation to the threatened or significantly affected native bird or bat species detected during monitoring. Measures to offset the impact may include management or improvement of habitat or breeding sites away from the wind energy facility in the region to improve breeding productivity, or other offsets to the satisfaction of the Minister for Planning."

21. Following the completion of the two-year monitoring program in condition 20, a report must be prepared by the operator of the wind energy facility setting out the findings of the program and in particular assessing any cumulative impact of the wind energy facility on bird and bat species, to the satisfaction of the Minister for Planning. The report should be generally in accordance with Windfarm collision risk for birds: Cumulative risks for threatened and migratory species, Department of Environment and Heritage (2006) and any general framework for cumulative impact studies if issued by the minister for planning at the end of the two-year monitoring program.

If, after consideration of this report, the Minister for Planning directs that further investigation of potential or actual impacts on birds and bats is to be undertaken, the extent and details of the further investigation must be prepared in consultation with DELWP Environmental Portfolio and to the satisfaction of the Minister for Planning, and the investigation must be carried out to the satisfaction of the Minister for Planning.

This BAMP is based on a previous version of the BAMP developed in consultation with DEECA (formerly Department of Environment, Land, Water and Planning (DELWP)) over the last 10 years. Versions of the BAMP were provided to the then Department of Sustainability and Environment (DSE) (now DEECA) in 2012 and agreement reached on content. DEECA provided comments on the plan in 2019 which this current version of the BAMP addresses.

This BAMP details objectives and strategies that meet the requirements of these approval conditions. Commissioning will be undertaken in stages. The actions of this BAMP will be triggered as each turbine chain is completed, rather than on completion of the entire wind farm. The implementation of the plan must be overseen by a qualified ecologist/ecological consultancy with relevant tertiary degrees or experience as a minimum. This ecologist, employed by the wind farm operator, will be responsible for overseeing and implementing the BAMP according to the provisions stipulated in this document. This Plan is divided into three main sections: Compliance; DEECA specified assessments; and Compliance mitigation and summary. These are further subdivided as follows and written in-text:

Compliance (see Section 8 below for a summary table on compliance)

Section 2 details the pre-construction bird and bat monitoring programs;

Section 3 specifies the routine reporting and review meetings;

Section 4 provides an outline of the aims and methodology of the post-construction utilisation surveys for the two species of concern;

Section 5 details the aims and methodology of the post-construction mortality surveys for the two species of concern.

DEECA specified assessments

Section 6 outlines intensive Southern Bent-wing Bat mortality surveying and details post-construction mortality estimate calculation prioritizing the two species of concern;

Compliance mitigation and summary

Section 7 discusses raptor risk reduction measures and describes what is considered to be an ecological significant impact and outlines a general procedure for implementing species-specific mitigation and offset measures;

Section 8 & 9 provide a compliance summary and an approximate timeline of the work.

This plan was prepared by a team from Nature Advisory comprising Khalid Al-Dabbagh (Zoologist), Megan Price (Zoologist), Jackson Clerke (Zoologist), Sergio Nolazco Plasier (Zoologist) and Brett Lane (Principal Consultant), and Stuart Muir from Symbolix Pty Ltd (Statistician).

1.1. BAMP Objectives

The overall aim of this BAMP is:

> *"To confirm and ensure that operation of the Ryan Corner Wind Farm will not prejudice the survival of populations of bat and bird species of concern, including:*

- *Southern Bent-wing Bat;*
- *Brolga; and*
- *Any species of bat or bird listed on the Australian* Environment Protection and Biodiversity Conservation Act 1999*, the Victorian* Flora and Fauna Guarantee Act 1988, or the *Advisory list of Threatened Vertebrate Fauna in Victoria - 2013."*

The objectives will be achieved by establishing monitoring and management protocols, consistent with the methods provided in Australian Wind Energy Association (2005), adapted, where appropriate, based on more up to date knowledge.

- Measure the numbers of birds and bats, specifically in regard to the Brolga and Southern bent-wing Bat, affected by the operation of the Ryan Corner Wind Farm after operations commence (Section 5);
- Provide a context for measuring the impact of the Ryan Corner Wind Farm on the Brolga and any bird species of concern listed on state and Australian legislation (Section 4.1);
- Provide a context for measuring the impact of the Ryan Corner Wind Farm on the Southern Bent-wing Bat and any bat species of concern listed on state and Australian legislation (Section 4.2); and
- Establish protocols and procedures for identifying, reporting and mitigating any bird and bat impacts of the Ryan Corner Wind Farm, including any significant impacts (Section 7).

1.2. Site description

The site is north-west of Port Fairy (approx. centre 38° 17' S, 142° 7' E) and extends for about 6 kilometres along the western side of the Hamilton-Port Fairy Road. The wind farm site is approximately 3000 hectares, nearly triangular in shape, with the narrower end to the north. The wind farm would include a total of up to 52 4.2 megawatt wind turbines with a maximum turbine blade tip height of 180 metres, depending on the turbine model ultimately chosen.

The land is presently used for sheep and cattle grazing and has a long history of agricultural use and activity. The entire site is cleared grazing land with a limited number of small remnant areas of native vegetation (shrubland and grassland). The site is regularly grazed by livestock.

The site comprises a combination of flat areas and low, undulating ridges of basalt rocks and is predominantly between 30 and 40 metres above sea level. The flat areas consist mainly of grazing paddocks covered with various exotic grasses and they are therefore highly disturbed. The ridges usually have extensive surface rock and are covered by exotic grasses and some native vegetation, particularly bracken.

The wind farm site is traversed by an unsealed road that runs from north to south (Riverside / Harris Road). This is fenced on both sides, isolating it from the paddocks and forming a small nature reserve. The road is open to the public but experiences very low traffic volumes. The fenced area contains patches of remnant native grassland and scattered Black Wattles. The roadside was the only area within the wind farm site where trees were observed, apart from scattered patches of planted pine trees used as windbreaks.

Wetlands on the wind farm site occur in depressions between the ridges. Most of these are temporary, shallow, freshwater marshes formed from surface water runoff, and are concentrated in the south-eastern section of the wind farm site. Two of these wetlands are particularly extensive. These include Island Swamp (southeast corner), the largest water body on the site when inundated. The other wetland is the semi-permanent Duck Hole wetland, situated just south of Island Swamp.

The layout of the turbines has been carefully designed in a way that avoids the wetland areas of the site. This design aims to minimise the collision rate of waterbirds at the site.

A review of Southern Bent-wing Bat roosting locations in south-west Victoria indicated that 14 caves were of significant value to the species (Table 1). Ten of the 14 caves reside within a 70km radius of the site (the known SWBW dispersal range in one night; Bush *et al*. 2022, van Harten *et al*. 2022) and therefore bats from these caves may forage in the surrounding area of the wind farm but unlikely (in large numbers) on the actual site due to very low vegetation cover and associated food resources. The

low numbers of this species likely to utilise the site were confirmed in Anabat studies undertaken by Greg Richards & Associates Pty Ltd (2007), the results of which showed:

> *"The highest level of activity for any species averaged 2.2 calls per night and again indicates that the wind farm habitat is largely unsuitable for bats. In comparison, at the Blue Gum plantation* [northeast of the wind farm site]*, the average number of calls per night was more than 55. The average number of Southern Bentwing Bat calls per night was significantly lower at wind farm sites (0.5 – 1.1) compared with the better habitat at the Blue Gum plantation (8.9)."*

Table 1: Location and distance of Southern Bent-wing Bat roosting and maternity caves in relation to the Ryan Corner site (Table adapted from ACCIONA Energy (2009))

Region (ranked distance from site)	Location name	Coordinates		Approx. distance from site (km)	2009 status
		South	East		
Yambuk	Yambuk Cave	38°19	142°04	5	Still used as an important roost
Mt Eccles National Park	Un-named	38°04	141°55	30	Still used as an important roost
Grasmere	Grasmere Cave	38°16	142°32	35	Large numbers - high conservation value
Byaduk	Church Cave	37°55	142°00	40	A few bats, many at other times
Warrnambool	Starlight Cave	38°25	142°35	45	Now is the only maternity colony known from Victoria, one of only two maternity sites known for this species
Portland	Cashmore Cave	38°20	141°30	50	Indicated as roost cave by DEECA
Bats Ridge National Park	Tom-the-Cheap Cave	38°20	141°30	50	Usually lots of bats
Cape Volney	Panmure Cave	38°19	142°44	55	Large numbers - high conservation value
Portland	Cape Bridgewater Sea Cave	38°24	141°25	60	Still used as an important roost
Portland	Portland Maternity Cave	38°24	141°25	60	Indicated as roost cave by DEECA
Lower Glenelg National Park	Un-named (McLennan's Punt?)	38°00	141°10	90	Reasonable numbers
Porndon	Porndon Arch	38°18	143°17	100	Still used as an important roost
Cape Volney	Un-named	38°46	143°16	115	Still used as an important roost
Cape Patton	Un-named	38°42	143°50	150	Still used as an important roost
Lorne	Cumberland River Cave	38°45	144°00	170	Still used as an important roost

2. PRE-CONSTRUCTION MONITORING PROGRAM

2.1. Previous studies

Several investigations were undertaken between 2005 and 2007 to document the pre-construction usage of the wind farm site by birds and bats. Information gathered during these surveys has provided a baseline measure with which to compare the potential impacts of the wind farm after construction. These existing monitoring activities are described here.

Pre-construction monitoring activities included:

- Ryan Corner Wind Farm Ecological Assessment, Environmental Resources Management Australia (2006)
- Ryan Corner Wind Farm: Peer review of the ERM Ecological Assessment, BL&A, Report 6114 (1.0), July 2006
- Bird Utilisation surveys undertaken in spring (6–16 September 2006) and in summer (8–13 January 2007), at 8 on-site (impact) and 2 off-site (reference) survey points. A report by BL&A, Report No. 6114 (3.0), May 2007
- A Brolga Survey undertaken in September 2006. A report by BL&A, Report No. 6114 (3.0), May 2007
- Waterbirds survey undertaken in September 2006. A report by BL&A, Report No. 6114 (3.0), May 2007
- Ecology and conservation of the Southern Bent-wing Bat in relation to the proposed Ryan Corner Wind Farm, Victoria. A report prepared by Greg Richards & Associates for Gamesa Energy, Australia Pty. Ltd., October 2006
- An Assessment of the bat fauna and patterns of regional migration in relation to the Ryan Corner Wind farm site, Victoria. A report prepared by Greg Richards & Associates for TME Australia Pty. Ltd., May 2007

The findings from these works are summarised below.

2.1.1. Ecological assessment

The initial ecological study was undertaken by Environmental Resource Management (ERM) Australia Pty. Ltd. for Gamesa Energy Australia/TMEA between July 2005 and June 2006.

The first stage of the assessment comprised a desktop study in 2005, during which species and communities likely to occur in and near the wind farm were identified. Results were then corroborated following four field assessments, including targeted surveys. Fauna results are summarised below:

***Birds*:** A total of 54 bird species were recorded during the field assessments. Fifty were native and four were exotic. Eight identified species are regarded as rare or threatened within Victoria. Fixed point bird counts were undertaken near wetlands and in remnant vegetation, however the majority of census points were in pasture grass habitats (reflecting the relative amount of habitat types on the site).

Waterbirds primarily foraged in wetlands and rarely moved across the wind farm. Similarly, woodland bird activity was restricted to the woodlands. As such, these species groups were poorly represented during the census and species utilizing pasture grass habitat were dominant. In descending order, the five most common sighted species were Australian Raven, Australian Magpie, Common Starling, Willie Wagtail and Skylark.

No birds of prey were recorded during the fixed-point bird counts. The five following birds of prey were recorded incidentally: Swamp Harrier, Black-shouldered Kite, Nankeen Kestrel, Wedge-tailed Eagle and

Brown Falcon. Brown Falcon was regularly observed in the wind farm boundary, suggesting high numbers of this species foraging at the site. Wedge-tailed Eagle was recorded only once during the assessments, soaring significantly above turbine height, approximately two kilometres south-west of the wind farm.

No waterbird nests were observed in the wind farm boundary. Wetlands supported little emergent vegetation. Large numbers of White-faced Heron, Australian White Ibis, Straw-necked Ibis, Black Swan and Masked Lapwing were regularly observed at wetlands, with abundant numbers at Island Swamp and Duck Hole wetland. Other species recorded regularly included Royal Spoonbill, Yellow-billed Spoonbill, and one Eastern Great Egret.

A Brolga pair was regularly observed moving between the water bodies and surrounding grasslands in the south-eastern portion of the wind farm. Observed flights were low and were below turbine height (i.e. less than 30 metres above the ground).

Other threatened species which were infrequently observed at the site included Little Egret, Intermediate Egret, Glossy Ibis and Hardhead, all of which were identified in the vicinity of the ephemeral wetlands in the south-eastern portion of the wind farm boundary. Latham Snipes were identified in the northern parts of the wind farm and ducks, shelducks and teals were observed less frequently. However, habitats in the wind farm are likely to provide habitat for these species.

Mammals: The Red Fox, European Rabbit and Hare were observed throughout the wind farm. No evidence of any other ground-dwelling mammal was recorded. However, the site may provide habitat for ground-dwelling mammals not encountered during the assessment, due to the structural variability of the site associated with the basalt rocks, crevices and cracking soils (and in some areas vegetation cover). In particular, the site may contain habitat for the Fat-tailed Dunnart, a species listed as threatened on the DSE Advisory list.

Bats: Five species of bats were identified using the wind farm site, including Gould's Wattled Bat, Chocolate Wattled Bat, Southern Bent-wing Bat, Freetail Bat and Long-eared Bat sp. Bat records demonstrated that Large Forest Bat and Southern Forest Bat were also possibly utilizing the site although this could not be confirmed. The site predominantly does not support shrubs or trees, and is therefore not expected to support significant large bat populations.

Reptiles and Amphibians: Five species of frog and six reptiles were recorded during the field assessments. The stony ridges and scattered rocks contained a high abundance of indigenous herpetofauna. Frogs, including Striped Marsh Frog, Ewing's Tree Frog and Common Eastern Froglet, were regularly recorded under rocks in the vicinity of the ephemeral wetlands. Snakes and skinks were more widely recorded, with White's Skink, Lowland Copperhead and White-lipped Snake regularly recorded throughout the ridges and rocky knolls.

Other herpetofauna recorded in the wind farm boundary included Spotted Marsh Frog, and one Southern Smooth Froglet, located in a pasture immediately south of the Duck Hole wetland. It is likely that these frog species breed within the Duck Hole, the only permanent waterbody in the wind farm boundary. These species are likely to then disperse to other waterbodies over winter and spring. In some cases frogs may breed over this period, however, frogs are unlikely to persist in these areas of grazed pasture once the waterbodies dry out over summer.

Other reptiles found to occur on the site included Eastern Three-lined Skink, Grass Skink and Southern Grass Skink. These species are likely to occur throughout the site in areas containing scattered rocks, such as the ridges, knolls, low quality grassland, high quality grassland and stone walls. The Growling Grass Frog, Brown Toadlet and Southern Toadlet were not recorded in the wind farm boundary.

Threatened Fauna: The desktop assessment revealed that 21 birds, six mammals, two fishes, three reptiles and three frogs classified as rare or threatened may occur on, or in the vicinity of the site. Of the 35 threatened species, 17 are listed under the EPBC Act and 20 are listed under Schedule 2 of the FFG Act. Eight of these species, all birds, were recorded on the site during the field assessments. Twenty-two of the 35 species identified have a 'moderate', 'high' or 'present' likelihood of occurrence on the site. These include: fourteen birds, two mammals, three reptiles, and three frogs (see original report for species names).

Orange-bellied Parrots are unlikely to occur at the site due to the absence or close proximity of suitable habitat.

The ecological assessment report discussed above was fully reviewed by BL&A (July 2006).

2.1.2. Bird utilisation surveys

Bird utilisation surveys were undertaken in accordance with the methods described below.

The field study involved fixed point censuses of birds. Eight impact site points and two reference site points were surveyed (Figure 1). At each point, a 15-minute count of all birds was undertaken, with all species identified and their flight height recorded within a 200-metre radius of the central point.

Flight height was recorded in three categories: below Rotor Swept Area (RSA) height (<35m); at RSA height (35 – 120m); and above RSA height (>120m). Heights were estimated against nearby fence posts of known spacing.

Each point was surveyed ten times during varying periods of the day over a six-day survey period (covering all 10 sites). Two surveys were undertaken; first in spring 2006 and the second in summer 2007. In this way, some seasonal differences in bird activity and presence of species (due to migration) were accounted for in the data collection.

The results of the bird utilisation surveys are summarised below. Note that bird utilisation rates are not distance-corrected.

Spring 2006: Data from the survey showed that bird utilisation rate from the eight impact sites averaged 0.84 (0.60–1.00) birds per hectare per hour, and that on the reference sites averaged 0.58 (0.54–0.63).

A total of 42 species was observed at all heights during the bird survey. Of these, 11 species (*c.* 26%) were observed flying at RSA. The two most frequent species (totalling more than half of all observations) at this height were the European Skylark (introduced species) and ravens (mostly Little Raven). These were followed by Long-billed Corella and Australian Magpie. Together with the first two species, they accounted for more than 80 percent of all birds observed at RSA height. The remaining seven species accounted to between 1.3 – 3.8 percent of birds at RSA heights, and including four raptors; birds usually considered as more susceptible to collision with operating turbines.

Birds observed at RSA height accounted for 3.7 percent of all bird observations at the impact sites, with no birds observed flying above RSA height.

Five species of raptors were observed utilizing the wind farm site; there was noticeably more raptor activity at impact sites than at reference sites. The two most frequently observed raptors at the impact sites were Brown Falcon and Nankeen Kestrel. No Wedge-tailed Eagles were observed on the wind farm during the spring observations.

Nine species of waterbirds were recorded patchily during the survey. The most common species were White-faced Heron and Straw-necked Ibis. Most waterbirds occurred in very small numbers, with total number observed constituted 3.7 percent of all birds observed during the spring survey.

Summer 2007: Data from the survey showed that bird utilisation rate from the eight impact sites averaged 0.50 (0.38–0.72) birds per hectare per hour, and that on the reference sites averaged 0.74 (0.40–1.08).

A total of 24 species was observed at all heights during the bird survey. Of these, nine species (*c.* 37%) were observed flying at RSA. The two most frequent species (totalling more than 75 percent of all observations) at this height were the European Skylark (introduced species) and ravens (mostly Little Raven). These were followed by Straw-necked Ibis and Brown Songlark. Together with the first two species, they accounted for more than 90 percent of all birds observed at RSA height. The remaining five species were raptors and accounted for *c.* nine percent of birds at RSA heights; raptors are usually considered as more susceptible to collision with operating turbines.

Birds observed at RSA height accounted for 5.2 percent of all bird observations at the impact sites, with no birds observed flying above RSA height.

Five species of raptors were observed utilising the wind farm site; there was noticeably more raptor activity at impact sites than at reference sites. The two most frequently observed raptors at the impact sites were Brown Falcon and Wedge-tailed Eagle. It is likely that the wind farm area is part of the foraging range of one pair of eagles.

The waterbird abundance and diversity were very low during the summer bird utilisation survey. Only two species were recorded. The waterbirds formed only 0.7 percent of all individual records on the farm compared with 3.7 percent during the spring survey.

Comparisons between spring and summer surveys: Habitats for birds and other fauna on the Ryan Corner wind farm site are considered to be of low quality. The quality of the habitat deteriorated further during the summer with severe drought conditions and an extensive grass fire. Due to the severe drought all wetlands on the site were dry from October 2006 onwards.

Bird species richness and abundance in the summer survey were almost half those of the spring survey. A total of 42 species were recorded during the formal spring bird utilisation survey and 24 species during the formal summer survey. Species richness in summer was almost half that of spring. This difference was due to a lack in summer of common waterbirds, and some of the common farmland birds, such as cockatoos and corellas. The only addition to the bird list in summer is the Brown Songlark, a common summer visitor to most of south-eastern Australia's grasslands.

Bird abundance also declined in summer compared with spring; with almost half the numbers present in summer than in spring. Most of the common species, such as skylarks, ravens, goldfinches, and starlings declined significantly in numbers. On the other hand, resident birds, such as magpies, fairy-wrens and Willie Wagtails, did not show a pronounced decline in numbers.

The order of abundance of the most common species was almost the same in both surveys. The five most abundant species were exactly the same between seasons, while the next five most abundant species differed slightly.

The numbers of birds seen flying at RSA height was almost the same between the two seasonal surveys. However, observations suggested a higher proportion of birds flying at RSA height in summer than in spring. The two most abundant species were the same in both seasons.

The number of birds of prey seen flying at RSA height was similar between seasons. Four species were seen in spring and five species in summer. Their numbers were generally low (11% of RSA birds in spring and 9% in summer). While the Wedge-tailed Eagle was not recorded during the formal counts in spring, it was recorded in summer. The birds seen in both seasons probably belong to one pair or family, for which the wind farm site forms part of a territory.

Waterbirds did not feature in the counts in summer, except for a small number of White-faced Herons found around water troughs, and Straw-necked Ibis found mostly flying across the wind farm site. More waterbirds were seen in spring before all the wetlands dried; however, their numbers were low compared with other wind farms in similar settings.

2.1.3. Brolga survey

A spring Brolga survey, which was designed to coincide with the breeding season, was undertaken during September 2007 and covered the wind farm site and a 20-kilometre radius from the wind farm.

Brolgas were found at three locations within the region. Eight individual Brolga records were obtained during the survey. Two of the records were considered to be the same individuals previously sighted from a nearby area. Six individual birds were therefore identified in the current survey of the region. No immature birds were observed during the breeding season survey.

A pair was observed foraging on the south-eastern side of the wind farm site in a paddock. They were disturbed and flew into the Duck Hole wetland, where they continued foraging. There have been previous records of Brolga breeding at this site. It was unclear where this pair was roosting.

The other two pairs were observed foraging in grasslands ten and 20 kilometres from the edge of the wind farm site. Both pairs were in the north-western section of the search area. One of the pairs was seen on two occasions in close proximately to each other on separate days at a site that was previously used for breeding. The other pair was sighted where there were no historical breeding records.

In summary, during the breeding season survey, three pairs of Brolga (6 birds) were recorded within the search area (20-kilometre radius of the Ryan Corner Wind Farm). None of these pairs was breeding.

2.1.4. Waterbird survey

The waterbird usage of wetlands and possible movement paths across the Ryan Corner Wind Farm site were surveyed over several days in September 2006.

As far as possible, all wetlands within a designated search area (20 kilometres) were visited and surveyed. Counts and observations were undertaken at wetlands that held water and populations of waterbirds at the time of the survey. The wetlands within the wind farm were visited on a daily basis. The larger wetlands in the search area were surveyed twice during the September survey. All waterbirds were identified and counted at each wetland visited.

Dawn and dusk surveys were undertaken within the wind farm site to determine any kind of movements across the wind farm. Notes were recorded of any other waterbird movements observed from the major wetlands from the surrounding search area.

The wind farm site supported very few waterbird numbers. The most abundant species was Straw-necked Ibis and White-faced Heron. The Straw-necked Ibis was seen in the largest numbers, although they were only seen during one evening survey. Waterbirds were considered to be resident at the time of the survey and were not observed flying to roosting sites away from the site.

Dawn and dusk surveys were made from different vantage points around the wind farm to record waterbird movements on two mornings and two evenings during September. Only two movements were observed. These findings indicate that most of the waterbirds from within the wind farm stayed in the area for much of the period of the survey, rather than commuting on a daily basis to other wetlands to forage or roost.

The lack of waterbirds on the site away from wetlands is consistent with findings of the bird utilisation surveys discussed above.

2.1.5. Bat investigations

Greg Richards and Associates Pty. Ltd. was commissioned to conduct two assessments of the bat fauna at the site of the Ryan Corner Wind Farm.

The first study involved a review of the ecology and conservation of the Southern Bent-wing Bat (*Miniopterus schreibersii bassanii*) in relation to the Ryan Corner Wind Farm project. The review discussed the ecology, taxonomy, biology, population and distribution and movement of the threatened bat in relation to the maternity and overwintering caves in south-west Victoria. The review also provided an assessment of the potential impacts and mitigation strategies to reduce risk to the threatened bat.

In addition, the review suggested a research program that identified some of this species' ecological patterns within the site and its environs. This information could then be used to determine whether impacts could occur to the local population. Should significant impacts be identified, mitigation measures would be identified. The research would be conducted in three stages to satisfy the following aims:

- Stage 1: Document distribution patterns within and away from the site and obtain information on bat flight height; Timing: November – December 2006;
- Stage 2: Establish whether the site is part of a migration path by monitoring the site and presence/absence at the maternity colony at Starlight Cave, Warrnambool and other caves used during winter; Timing: January – February 2007; and
- Stage 3: Review mitigation strategies that would be pertinent to the project per se would be reviewed in an individual report in collaboration with the client (Gamesa Energy Australia), once the site utilisation by the Southern Bent-wing Bat has been assessed and its migration pattern and timing has been estimated.

The second study included two phases: Phase 1 investigated the utilisation of the site by the local bat fauna, particularly targeting the Southern Bent-wing Bat, which is listed in the Victorian FFG Act and Australian EPBC Act. Phase 2 addressed issues that had been raised about the migration patterns of the Southern Bent-wing Bat at a regional scale, and in particular, whether or not this species was likely to move in abundant numbers across the site during its seasonal movements.

For the Phase 1 study in November 2006, automated bat call detectors that record the species-specific echolocation calls of free-flying bats were used at a series of five sampling points that were stratified across the habitats present on the wind farm site, and a sixth at a 43 hectare Blue Gum plantation just over the north-west boundary, which was selected so that a maximal species inventory could be obtained. A sampling point was also established on a meteorological tower where two automated detectors operated concurrently, one at ground level and the other at an approximate height of 40 metres.

For the Phase 2 study in 2007, six sampling points were installed at relevant locations to determine whether Southern Bent-wing Bats utilised the Ryan Corner wind farm site during their dispersal to wintering caves.

A total of 86,874 ultrasound files were recorded by the automated detectors during both phases of the study, a small proportion of which were identifiable bat calls. At least nine species were recorded during the assessment, including the Southern Bent-wing Bat.

The data from Phase 1 survey sites showed that bat fauna diversity and abundance was very low. The highest level of activity for any species averaged 2.2 calls per night. This suggests that the habitats present in the wind farm boundary were limited. Conversely, the Blue Gum plantation, situated outside the wind farm boundary, provided habitat to bat species, indicated by the high level of activity with an overall average of 55 calls per night.

Similarly, the average number of Southern Bent-wing Bat calls recorded per night was significantly lower at wind farm sites (0.5 – 1.1) compared with the better habitat at the Blue Gum plantation (8.9).

Issues addressed in the Phase 2 (migration) study of the Southern Bent-wing Bat included:

a) Whether or not this species increase its utilisation of wind farms when it migrates between its breeding cave and over-wintering caves; and

b) When it migrates, does it leave the breeding cave *en masse* and fly in high numbers, or do individuals or groups pass through in low numbers.

The landscape-scale study commenced in late January 2007. During this period, bat calls were recorded over 70 nights at the only Victorian breeding site (Starlight Cave), a known wintering cave (Byaduk), a suspected "stopover" area at Mount Eccles National Park, two sites at the Ryan Corner wind farm and the Blue Gum plantation mentioned previously.

Almost 10,000 calls attributable to Southern Bent-wing Bats were recorded during the study, over a period of 333 detector nights, which equates to over 3000 hours of recording. The average number of calls recorded during the survey varied from 124.4 per night at Starlight Cave, 25.2 and 23.8 respectively at Byaduk Cave and the Blue Gum plantation outside the boundary of the Ryan Corner Wind Farm, to 1.2 and 0.6 per night at the two sites in the wind farm itself. In the good habitat (Manna Gum forest) at Mount Eccles National Park, there was an average of 7.4 calls per night.

Southern Bent-wing Bat activity at the Blue Gum plantation was high. In particular, activity rose when the bats were from Starlight Cave and commencing occupation of Byaduk Cave. Within the wind farm, activity also rose, though only marginally.

The pattern of dispersal was gradual, as opposed to the theory that Southern Bent-wing Bats may migrate in high numbers. Dispersal was over a much longer period than previously described (considered to be mid to late summer) and appeared to still be continuing when the study ended on April 9th 2007.

The number of calls recorded in the wind farm when Byaduk Cave was occupied in greatest numbers did not increase sharply. This suggests that Southern Bent-wing Bats favour woodland habitats over open pasture, which is the dominant habitat in the wind farm. Therefore, impacts on this species from the operation of the wind farm are unlikely to be significant

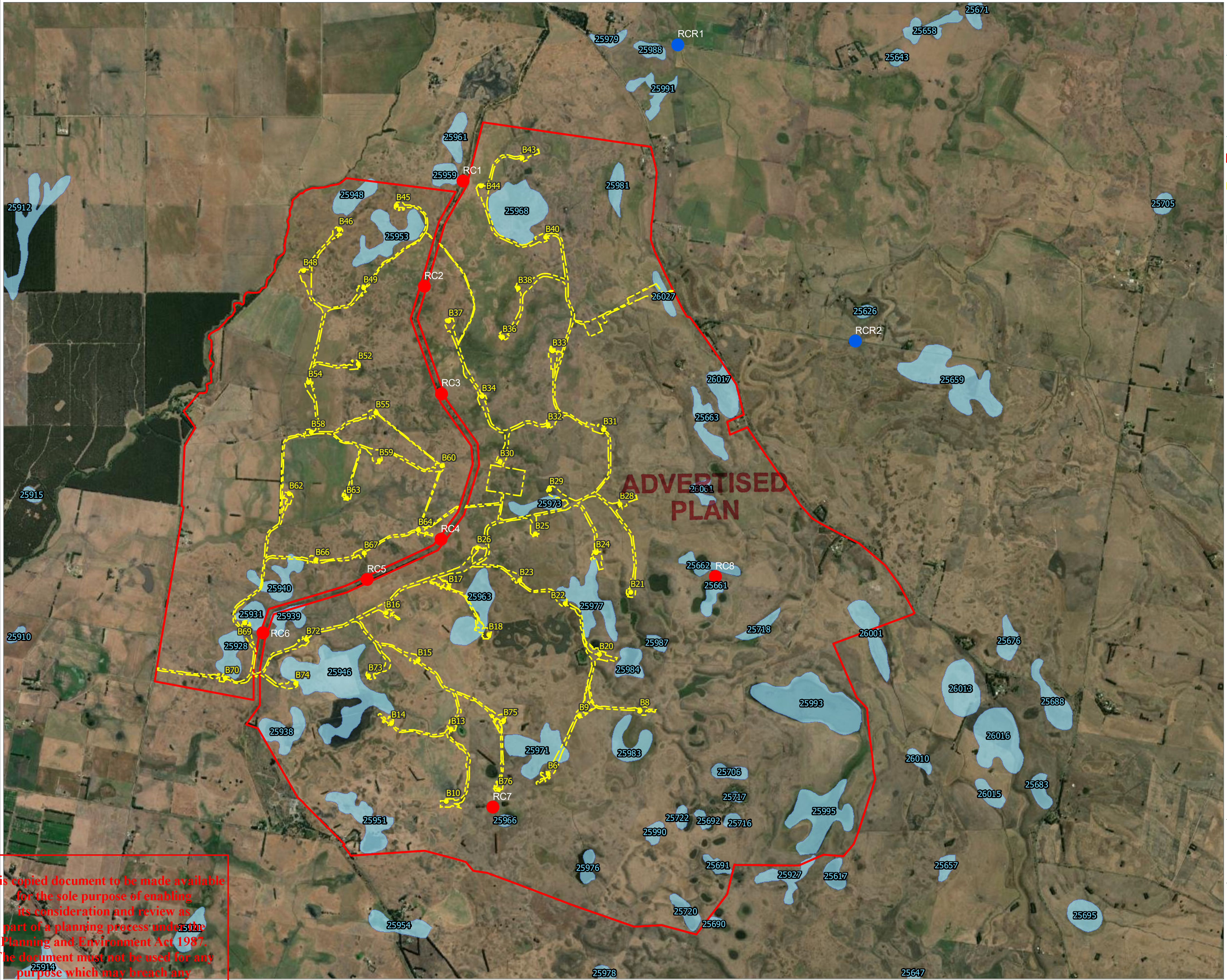

Figure 1: Approximate location of bird utilisation survey points

Project: Ryan Corner Wind Farm
Client: Global Power Generation Australia
Date: 11/06/2021

- Ryan Corner WF boundary
- Development footprint
- Proposed turbine locations
- DELWP wetlands -not identified as breeding wetland

Location of bird utilisation survey points

- Inside WF boundary
- Outside WF boundary

N

Metres
0 400

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3. ROUTINE REPORTING, REVIEW MEETINGS, DATA ACQUISITION AND PERSONNEL

3.1. Routine reporting and review meetings

This section of the plan outlines the reporting arrangements for the BAMP. Specific reporting guidelines may also be discussed in their respective sections (e.g., Brolga reports in that section), and therefore further clarification should be sought in those sections if sufficient detail is not provided below. Review meetings may be required after reports are submitted and therefore the actual date of these meetings will be determined in the future.

Brolga activity reports will be prepared in January (for the preceding breeding season) and July (flocking season) each year, summarising the findings from the targeted Brolga investigations. The aim of the report is to understand Brolga population, movements and habitat usage within the vicinity of the wind farm and whether the wind farm is having a significant impact on any of these aspects. This will further inform risks to the species and the requirement for adaptive management of the wind farm and further mitigation measures that may be required. This will include but not be limited to information on:

- The results of monitoring of Brolga occurrence in wetlands on the wind farm and within the area of concern around it;
- The results of any behavioural monitoring of breeding or flocking birds;
- The results of any home range mapping;
- Identification of any risk behaviour that may put birds at risk of colliding with turbines (defined based on observed movement directions, flight speeds and heights, and distances from turbines);
- An assessment of the likely risk to breeding or flocking Brolgas from the wind farm; and
- Discussion of feasible mitigation measures, if required.

A **first-year report** will be prepared after twelve months of monitoring. The purpose of the report is to present the results from the first year of monitoring, identifying any significant impacts arising from the operation of the wind farm that may require mitigation, and reviewing the monitoring methods and recommending refinements, if necessary, for the second year. Matters to be addressed in the first report include but will not be limited to:

- Summary of post-construction survey and carcass search results, including scavenger and searcher efficiency trials, total survey days and comparison of lit and unlit sites (if applicable);
- Changes to, and final protocol of, the experimental methodology, for example, alterations to duration and frequency and areas sampled;
- A summary of observations of any threatened species monitoring, including the results of the targeted Brolga and Southern Bent-wing Bat monitoring and a summary of any significant impacts according to the protocol later in this section of the plan;
- Once available, this report will be presented to a review meeting with the Regional Manager, Barwon South West Region, DEECA (or their delegate) and the Responsible Authority. The results of the carcass searches (including the scavenger and observer efficiency trials) will be reviewed and refinements to the monitoring program will be agreed;
- The first-year report will be presented to DEECA and the Responsible Authority within two months of completion of 12 months of mortality monitoring. Reports will be supplied in both digital and hard copy.

The **two-year report** will comprehensively outline *two years* of monitoring and provide a conclusion on the impacts of avifauna and provide recommendations for mitigation measures and additional monitoring requirements, and will include the following:

- Detailed survey methods (including list of observers, dates and times of observations);
- Results of the Brolga breeding and flocking surveys;
- Results of the bat survey in general and of the threatened Southern Bent-wing Bat in particular;
- Estimates of Brolga and bat mortality rates (birds and bats per turbine per year), and detected numbers for all other species recorded during the carcass searches;
- Any other mortality recorded on site but not during designated carcass searches (i.e., incidental records by site personnel, etc.);
- A discussion of the results, including:
    - Whether indirect impacts on bird use of the site are of significance at a regional, state or national level, or if listed species were affected;
    - Whether the level of mortality was ecologically significant or affected listed species of birds (including the Brolga) or bats;
    - Any differences between years that may have arisen due to wet and dry conditions;
    - Whether continuation of the monitoring program after two years is warranted and, if so, in what form;
    - Any discernible differences in collision rates between lit and unlit turbines, where relevant; and
    - Any recommendations for reducing mortality, if necessary.

If a significant impact on birds or bats is detected before scheduled reporting is due then Ryan Corner Development Pty. Ltd. DEECA and the Responsible Authority via email: bsw.planning@delwp.vic.gov.au.

Following completion of the two years of monitoring, results will be reviewed by DEECA and the Responsible Authority to determine whether further monitoring and reporting is required.

3.2. Data acquisition/submission and personnel involved

This section of the plan outlines the acquisition/submission of data and personnel involved in the field work, report writing and background research for the BAMP. Data for all work conducted for the BAMP will be available to DEECA and other relevant authorities in both electronic and hard-copy format. Electronic submission of relevant data will coincide with the reports however, it must be understood that some data will be in a very raw format and mid-collection. The submission of the data does not replace the summary of information and data outlined in the individual reports but is in addition to and is in accordance with DEECA requests. This data acquisition and submission applies to all following sections and therefore unless otherwise stated the procedure for inclusion of data follows the above guidelines.

Any data or report submissions to DEECA should be made through email at bsw.planning@delwp.vic.gov.au.

All personnel who have worked in the field and office to contribute to this management plan thus far are experienced and qualified ecologists or statisticians (i.e., min. Bachelor degree with Honours, many with PhD). Qualifications and training of all personnel involved are readily available. Training is very thorough and involves background theoretical training, knowledge of policies and other administrative matters (e.g., OHSE) and technical/field training (e.g. equipment, species identification).

Ecologists assigned to conducting carcass searches will be degree qualified and should have experience with carcass searches in Australia, including the identification of the Southern Bent-wing Bat and Brolga. If unqualified personnel are involved in carcass searches this will be stated within the relevant section of this plan, and training to these individuals will be given by such qualified personnel outlined above.

Unqualified individuals who have been adequately trained in the methods outlined in Section 5 may only be used in carcass searches, only qualified and experienced ecologists may be used in any other monitoring activities.

All carcass monitoring search tracks recorded via GPS (Section 5.1.3) will be provided in shapefile with annual reports.

4. Post construction utilisation survey program

This section of the plan describes the objectives and methods of the post construction utilisation surveys to be undertaken once operations commence at Ryan Corner Wind Farm. The main objectives are to:

1. Determine the population and general activity of the two species of concern (i.e., Brolga and Southern Bent-wing Bat) on and around the wind farm site, with reference to the regional population and activity/movements of individuals.
2. Determine if either of these two species of concern has altered their activity or population numbers have changed post construction.

Each of the two species of concern has different survey requirements and therefore there is a section dedicated to firstly, the Brolga and secondly, the Southern Bent-wing Bat. All personnel involved in Brolga and Bat utilisation surveys will be trained and qualified ecologists with strong field experience. Qualifications and training details will be available, on request, by any interested party.

4.1. Brolga risk assessment surveys

The aim of the Brolga risk assessment surveys is to document the occurrence of breeding and flocking Brolgas on and near the wind farm site to ascertain if any urgent mitigation or offset measures are required. In particular, the surveys will aim to ascertain the likelihood of regular occurrence of Brolga in areas where they may collide with wind turbines. As there are no known Brolga flocking sites within five kilometres and wetlands in the area are ephemeral and as such there is no need to undertake Brolga flocking surveys as Brolga are not present in the area during the flocking season (January – June). The Brolga breeding season is from July – December and this is the time when surveys will be undertaken.

The Brolga risk assessment survey will commence during the first month the wind farm becomes operational (defined as being the first chain of turbines is operational) if during the breeding season. If the wind farm becomes operational outside the breeding season it will commence in the following July and will cover two breeding seasons over two years in accordance with condition 20.b)(i) Brolga surveys will be conducted for a minimum of two years at which point their continuation will be assessed by the Minister for Planning, based on the results presented in the final monitoring report. The methodology for any continuation of sampling must be developed in consultation with DEECA.

The surveys will involve a targeted breeding season survey within the wind farm site and out to a minimum 3.2 kilometres from the wind farm boundary.

The DEECA (South West Region) will be immediately notified by email, bsw.planning@delwp.vic.gov.au, within three business days of the surveys completion if Brolga are observed during the targeted surveys. If one or more Brolgas is detected on the wind farm site during operation, this will be *immediately* (within three business days) reported to the relevant authorities, together with sighting details, such as behaviour, foraging behaviour and use of the site, where relevant.

Brolga surveys will be undertaken by a suitably qualified ecologist.

4.1.1. Breeding season Brolga monitoring

The breeding season monitoring program (July to December inclusive) will be undertaken monthly and include the components described below:

Wetland assessment:

- All DEECA listed wetlands within 3.2 kilometres of the wind farm site will be assessed (Figure 2) subject to private land access arrangements (trespassing is illegal), for Brolga breeding suitability. Access to wetlands on private land will be sought and the use of drones discussed, however if access is denied the potential viability of wetland's potential to form habitat may remain unknown. Satellite imagery or viewing from public roads using telescopes will be attempted but detailed assessment may be impossible beyond this. This will be noted as a limitation and taken into consideration in annual reporting when reviewing the results of the monitoring program. Wetlands not suitable will be ruled out from further surveys. Any wetlands observed or noted from aerial photography that are not included in the DEECA wetland layer will be mapped and assessed accordingly;
- An assessment of wetlands for their potential to be used as breeding sites by Brolga on and within 3.2 kilometres of the wind farm site will preferably be done after winter-spring rainfall (August–September) had been sufficient to fill wetlands and promote the growth of aquatic vegetation; and
- DEECA wetland mapping will be reviewed to identify potential Brolga breeding habitats within the survey area. This will allow for unsuitable wetlands to be ruled out of the survey regime. Unsuitable wetlands may meet one or more of the following criteria (DSE 2011):
    - Permanently drained; and/or,
    - Planted with trees.

Potential breeding sites:

- All potential breeding sites identified through the wetland assessment will be surveyed by observers on foot or from a vehicle (to avoid disturbance), where feasible (i.e., accessibility permitting) while remaining beyond brolga flight initiation distance (FID: distance that a bird will flee an oncoming predator), estimated to about 200 metres, to avoid interrupting normal behaviour;
- Observers will use binoculars and telescopes to obtain sufficient data quality. Sites will be surveyed as comprehensively as possible (i.e., roaming surveys AusWEA 2005) due to the wide dispersal of individual Brolgas in a given area;
- Sites will include all wetlands on and within 3.2 kilometres of the wind farm site and paddocks surrounding these wetlands;
- These sites will be surveyed fortnightly from July to December; and
- Any nest building, courtship behaviour and other reproductive activities will be noted. These behaviours are quite obvious and do not require close inspection to verify.

Detailed behavioural observations:

- Where confirmed breeding is identified at any wetland on the wind farm site or within 3.2 kilometres of a turbine, more detailed observations will be triggered. If breeding activity is recorded, this triggers the requirement to complete a two-day monitoring event on a fortnightly basis until the end of breeding (i.e., fledging or failure);
- The behaviour of individual Brolgas found breeding in the search area will be recorded and information collected on active movement, that is; if they take flight, are in flight or are travelling on foot between areas (i.e., not foraging, resting, vigilant). The start and finish times of all observations will be recorded;

- Variables to be recorded will include distance (m) and direction (bearing) travelled (i.e. absolute and in relation to turbines, plotted on a map), flight height (m), number of Brolgas and their origin and destination, as well as the habitat at the destination (e.g. wetland, pasture, cropland);
- If possible, the number of juveniles and/or adults within the group will be noted, otherwise the number of individuals will be estimated and recorded; and
- Other information that will be recorded will include location (GPS), weather and condition and water level of the breeding wetland. The aim will be to provide an overall picture of the individuals' home range around a breeding site over the course of the breeding season.

Analysis and assessment:

- Flight information (e.g., distance, bearing) will be plotted on maps to determine whether any Brolgas regularly use flight paths close to the turbines (this will aid in identifying any collision risk);
- General location and wetland quality information will provide information for home range mapping;
- As Brolgas have high site fidelity (i.e., return to favourite breeding sites frequently), a daily maximum population estimate can be calculated (also mean, standard error and range) for the area of concern; and
- Breeding sites and movement data can provide information regarding possible disturbance to Brolgas.

4.1.2. Brolga reporting

At the completion of each breeding season survey, a report will be prepared and submitted to DEECA and the Minister for Planning analysing the data gathered and describing the behaviour of flocking and breeding Brolgas and the range of their movements in relation to operating wind turbines. This report will provide a review of Brolga behaviour, including breeding and flocking activities, habitat use and home range mapping in the immediate and adjacent area and will outline whether there are any gaps in the knowledge or in the survey methodology (i.e., possibly warranting an increase in the duration or frequency of surveys). The prepared report must be submitted within one month of completion of the surveys.

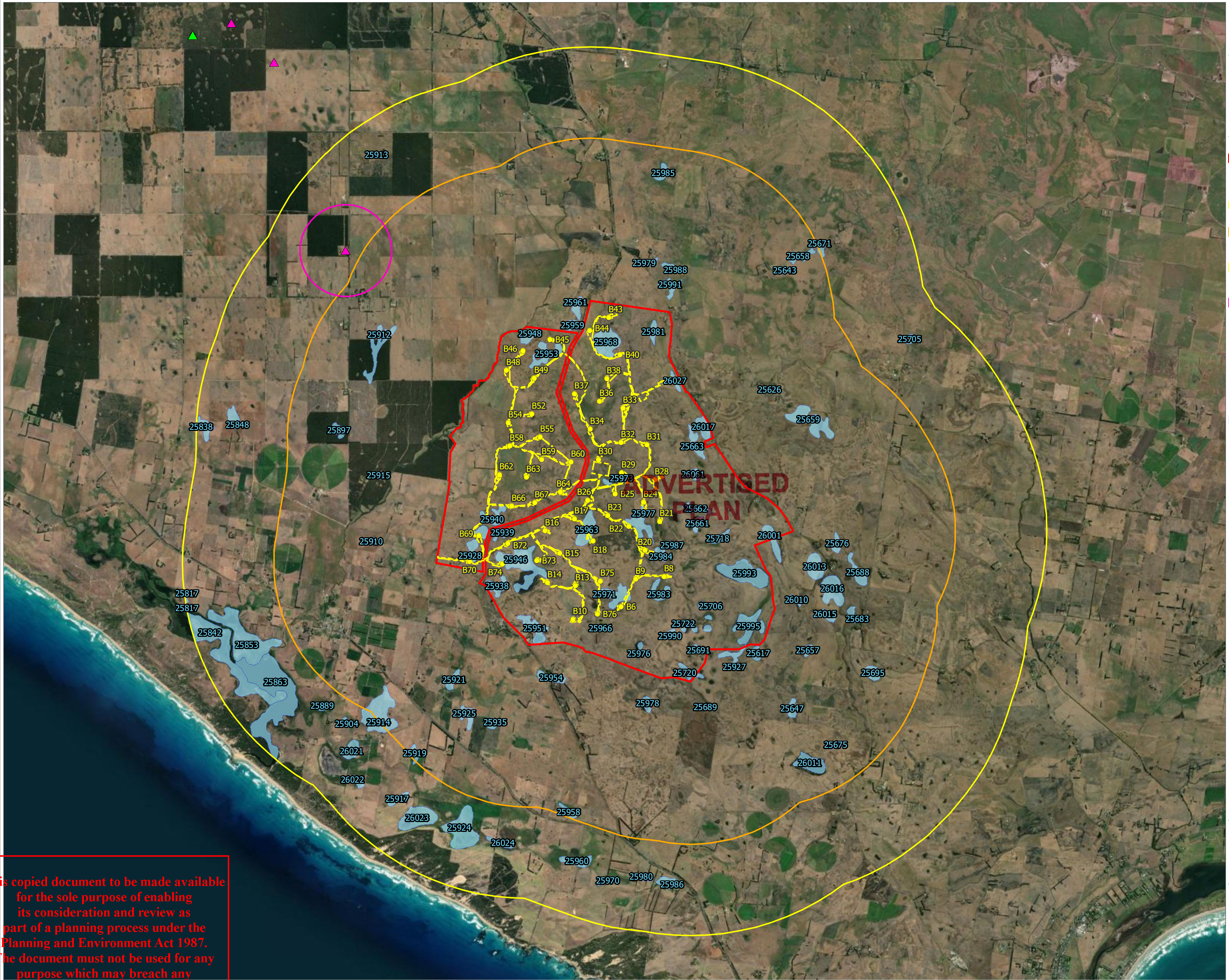


Figure 2: Brolga breeding wetlands within 5km radius of Ryan Corner Wind Farm

Project: Ryan Corner Wind Farm

Client: Global Power Generation Australia

Date: 11/06/2021

- Ryan Corner WF boundary
- Turbines
- Development footprint
- Ryan Corner WF buffer - 3200m
- Ryan Corner WF buffer - 5000m
- Breeding record accuracy buffer - 900m

VBA Brolga breeding records

- Breeding site
- Flocking site
- DELWP wetlands -not identified as breeding wetland

Nature Advisory
PO Box 337, Camberwell, VIC 3124, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au

4.2. Southern Bent-wing Bat risk assessment surveys

A bat survey, with emphasis on the Southern Bent-wing Bat will be undertaken at Ryan Corner Wind Farm site after wind farm operations commence. The timing of the surveys is designed to coincide with periods when the Southern Bent-wing Bat is likely to be present and utilising the wind farm site. The aim of the survey is to gain a better understanding of the species usage of the site, particularly in regard to flight heights and activity levels around operational turbines. This will inform further risk assessment on the species and determine the need for any adaptive mitigation measures required after operations have commenced. Surveys will be conducted for a minimum of two years at which point the Minister for Planning will determine if further surveys are required. Such timing includes two individual seven-week survey periods as follows:

- Late summer survey (February to March inclusive) to coincide with the period of increased inter-cave movement from the maternity caves to non-maternity caves; and
- Spring survey (October to November inclusive) to coincide with increased foraging activity of bats with warming conditions and increased inter-cave movements as the bats return to the maternity caves to breed.

4.2.1. Methodology

Survey periods will cover two seven-week surveys during the key periods outlined above when Southern Bent-wing Bats are most actively moving across the landscape between non-maternity and maternity caves. Ultrasonic bat records (e.g., Wildlife Acoustics Song Meter) will be deployed to cover all habitat stratification present within the wind farm (i.e., in or adjacent pasture, waterbodies, woodland).

Bat detectors will be deployed to simultaneously record bat calls at height and at ground level. In order to achieve this, paired bat detectors will be installed (i) at ground-level at the base of operating turbines (or in adjacent habitat) and (ii) at nacelle height. Nacelle height installation must be undertaken by qualified turbine technicians, with the bat detector microphone installed outside (on the underside) of the nacelle pointing down and away from the blades. Nature Advisory will instruct the qualified turbine technician in the appropriate placement and operation of the bat detectors prior to installation to ensure consistent and accurate data collection. This methodology has been successfully implemented in targeted bat detector surveys conducted at operational turbines at Salt Creek Wind Farm in Victoria (Nature Advisory unpublished data).

This methodology —paired bat detectors installed at ground level and at nacelle height— will be employed at five turbines in representative habitat of the wind farm; totalling 10 bat detector units.

4.2.2. Analysis and assessment

Echolocation calls recorded during the bat detector surveys will be used to investigate the presence and relative activity of all bat species listed under the FFG Act and EPBC Act, as well as non-listed species that are known to collide with operational turbines (e.g., White-striped Free-tailed Bat). During the call analysis, a particular focus will be placed on the Southern Bent-wing Bat. Calls produced by common, widespread bat species may be filtered out during the data analysis process.

The information from each bat detector provides information on the locations across the study area where activity is occurring (e.g., calls produced by a certain species are only recorded from one location at any one time, or at multiple locations across different nights). However, the actual number of individual bats of any species moving through the site cannot be calculated, because multiple calls could be produced by one individual bat passing by a single detector multiple times, or by multiple individuals passing the detector once.

Echolocation call data will be sent to a qualified and experienced expert for analysis.

4.2.3. Reporting

Southern Bent-wing Bat survey results will be incorporated in the annual mortality monitoring report. Methods of call analysis and the assessor must be included in the reporting. Bat detector survey data will be provided to DEECA within eight weeks of conclusion of seasonal surveys, and survey results will be incorporated in the annual mortality monitoring report. Methods used for call analysis and the expert conducting the analyses must be included in the reporting. All Southern Bent-wing Bat calls must include time of recording and include example call sequences. Weather conditions during the survey periods must also be documented.

Results will be prepared at the end of both the first and second year of monitoring. Results will be peer reviewed in consultation with DEECA. As per DEECA's instructions, reporting will include the number of calls identified per species per night at each site, number and percentage of calls that were unidentifiable, number and percentage of calls that were identified to species complex level, reference calls used, and reporting of any significant timing patterns of calls throughout the night. identified to Southern Bent-wing Bat species complex level (i.e., calls may have been produced by either Southern Bent-wing Bat or other species with similar call characteristics, namely Little Forest Bat, Southern Forest Bat, Large Forest Bat, Chocolate Wattled Bat), reference calls used, and reporting of any significant timing in the pattern of when calls are recorded throughout the night. This information may provide useful background that informs mitigation measures, if required.

5. POST CONSTRUCTION MORTALITY DETECTION PROGRAM

This section of the plan describes the objectives and methods of the post construction mortality detection program to be undertaken once operations commence at Ryan Corner Wind Farm. The program will be conducted for a minimum of two years at which point their continuation will be assessed by the Minister for Planning, based on the results presented in the final monitoring report. The methodology for any continuation of sampling must be developed in consultation with DEECA. This program aims to comply with conditions of the planning permit.

5.1. Mortality detection

The purpose of detecting mortality is to determine the actual impact of the wind farm on the regional avifauna (e.g., number of deaths per year). Mortality is defined as any dead bird or bat detected beneath a wind turbine. Collision by birds and bats with wind turbines will be monitored through a rigorous carcass-search program for a minimum period of two years after operations commence. It is assumed that any dead bird or bat detected beneath a turbine and within the "search zone" has died as a result of collision or interaction with a turbine.

The fatality monitoring also aims to detect patterns (e.g., peak times) as a basis for determining significant impacts and informing adaptive mitigation. In addition, there are only two species of concern, Brolga and Southern Bent-wing Bat. Therefore, the search protocol has been limited to these two species and although other carcasses/species will be recorded, these species have not been considered while designing the protocol.

To provide accurate mortality rates it is essential that the program is scientifically and statistically robust. Multiple factors can affect mortality rates and therefore if they are not controlled for within the methodology, they will be incorporated into later statistical modelling as covariables or random factors. A scavenged carcass may increase the variability in mortality rates and thus carcasses will be assessed for possible scavenging and rates will be estimated from experimental trials. In case humans are used for carcass searches at any point during the monitoring in replacement of dogs, it is acknowledged that human detectability of carcasses is also a potential confounding variable and protocols have been developed to control or incorporate this error. Before all searching begins the turbines selected for searching will be surveyed for existing carcasses. If carcasses are found, they may be retained for use in later scavenger/detectability trials.

The following sections outline:

- **Trained personnel:** The minimum requirements for person/s involved in conducting post-construction monitoring;
- **Turbine selection:** how the wind turbines will be selected for a search;
- **Search protocol:** the size of area beneath turbines to be searched and how this will be done;
- **Scavenger rates and trials:** definition of scavenging and how experimental trials will be conducted;
- **Detectability:** definition of detectability and the experimental trial methodology;
- **Analysis:** general outline of how the data will be analysed.

5.1.1. Trained personnel

Personnel involved in implementing the post construction mortality detection program must either be an experienced and suitably qualified ecologist or be adequately trained by a suitably qualified ecologist according to the methods outlined in the following sections.

If personnel are to be trained, then training must be provided by a qualified ecologist experienced in implementing mortality monitoring at other wind farms. Searchers would be trained in the methods below and supervised on site for the first month of searches to the satisfaction of the attending ecologist.

The qualified ecologist will conduct an audit of trained searches after three months of monitoring to ensure a professional standard. If searches or results are unsatisfactory then retraining may be required or training of new personnel.

The ecologist will be retained to identify or verify the species of all bird and bat carcasses found by trained searches remotely or on site if required to ensure correct identification.

Only a qualified ecologist will conduct scavenger and efficiency trials (Section 5.1.5 & 5.1.6). That person will have a degree qualification and considerable and relevant experience in bird or bat work.

Relevant reporting on the mortality monitoring program will be undertaken by a qualified ecologist.

The qualifications and training records of all personnel involved in monitoring will be provided to DEECA prior to the commencement of monitoring.

Any scent detection dog and dog handler will be trained by an experienced trainer.

5.1.2. Turbine selection

The target population are the turbines themselves and the sample population will be one-third of the entire turbine number (52 turbines). It is the turbines that proxy for the wind farm, and not the search area nor the carcass detections.

Turbines will be selected at random and all turbines will have an equal chance of being selected. Preselected turbines may be subject to change upon the first site survey if conditions at a preselected turbine are considered unsafe to survey the majority of the search radius. Once turbines have been selected, these will not be changed.

A minimum of 19 turbines will be selected for searches, this number has been calculated based on what will provide the most accurate mortality rate given high variability shown on other wind farms. Each turbine that is selected for the searches will have the following meta-information recorded:

- location (easting northing),
- location in chain,
- curvature of chain,
- distance to nearest neighbour,
- identification of nearest neighbour,
- local vegetation,
- distance to any relevant ecological interface.

5.1.3. Search protocol

The search area beneath each turbine has been determined to best detect Brolga and Southern Bent-wing Bat carcasses based on the turbine dimensions (Hull & Muir 2010).

Based on the Hull and Muir (2010) model, 95% of bat carcasses are found within 65 metres of the turbine, and carcasses of medium to large birds are reasonably evenly distributed out to 100 metres. Carcasses of very large birds (Wedge-tailed Eagle or Brolga) may be found a little further out, but 95% are within 115 metres of the turbine.

Given this evidence, inner and outer circular search zones have been designated. The inner zone will cover a radius of 60 metres from the base of the turbine to target the detection of carcasses of bats and small to medium and large sized birds. The outer zone will comprise the zone between the 60-metre and 120-metre radius circles. Although they are still recorded in the inner zone, the outer zone will ensure the adequate detection of carcasses of medium to larger sized birds, which can fall further away from turbines.

Scent detection dog team protocol

It is recommended that searches be undertaken by a scent detection dog team. Paula *et al*. (2011) found that dogs trained to find bird and bat carcasses under turbines were far more accurate when compared with humans in controlled trials (92% vs 9%) while Mathews et. al. (2013) found that dogs found up to 53% more bats on the ground when compared with humans, and completed surveys over the same area in 25% less time.

Turbines will be searched once a month out to 120 metres; however, no inner and outer zone designation is required for scent dog method.

A scent dog does not 'look' for carcasses but finds them via scent. Therefore, it does not need to cover as much ground as if it were looking with its eyes but only needs to cover enough ground to encounter all possible 'scent cones' within the search area. The scent cone is the area downwind of the target, in this case a carcass, in which the scent will drift with the wind. So, if the wind is strong; the scent will drift further but in a narrower scent cone, and if the wind is light; the scent cone will be wider but will not drift as far. In the case of strong wind, then transects will need to be narrow to ensure scent cone areas will be encountered. Transects of approximately 20 metres wide will be adequate to cover an area in moderate wind conditions. This could be reduced to 10-15 metres in strong wind (Figure 3).

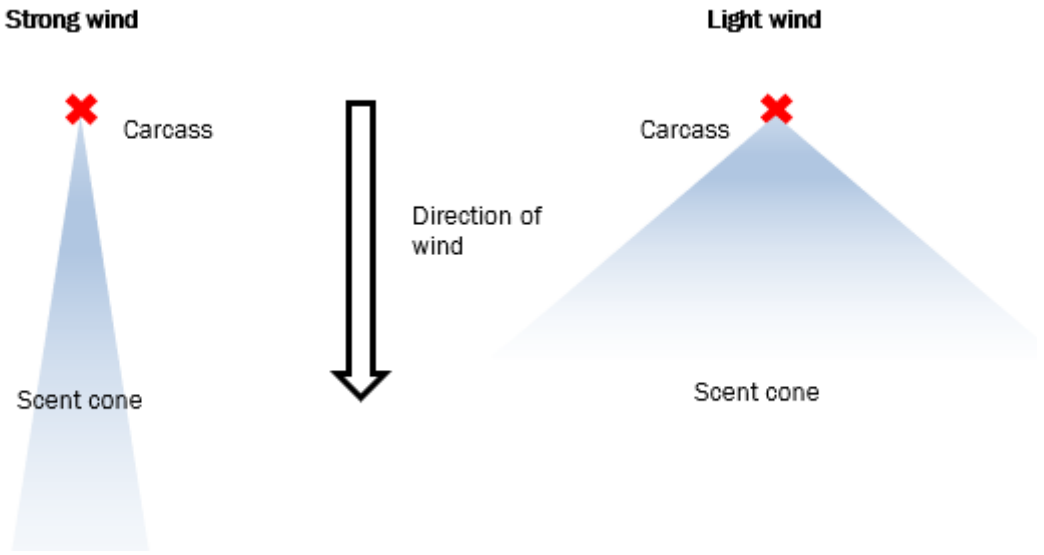


Figure 3: Visual representation of 'scent cones'

The handler will start down wind of the turbine and walk into the wind allowing the dog to freely zig zag across the searcher's transects, using commands to control how far the dog moves to each side of the transect (i.e., 20 metres). Then repeat this at a slower pace when walking the return transect that would be with the wind. The searcher does not need to reach the edge of the radius upwind of the area as any carcass scent there would drift down into the transects.

All search transects conducted (by human and/or scent dog) will be recorded via GPS and tracks to be made available on request and submitted to DEECA as required.

Search regime

All turbines will be searched out to 120 metres once per month. The order of turbines searched will be randomized between searches.

To ensure accurate detection of bats in particular, a secondary 'pulse' search will be undertaken every month of the monitoring program. A recent study of Southern Bent-wing Bat ecology found that, although the species' activity is reduced in the winter months, significant activity is still detected in winter, including intercave movements, suggesting some level of foraging activity continues throughout the year (van Harten *et al*. 2022). After the initial 12-month pulse search period, the requirement for another 12 months of pulse searches will be reviewed in the first annual report depending on the species and numbers of bats being found as mortalities.

Pulse searches entail searching the 'inner zone' (out to 60 metres) again two to three days after the initial search. This ensures bats are unlikely to be missed and can also provide insight into the frequency of bats flying into turbines.

Search methods will follow those outlined above.

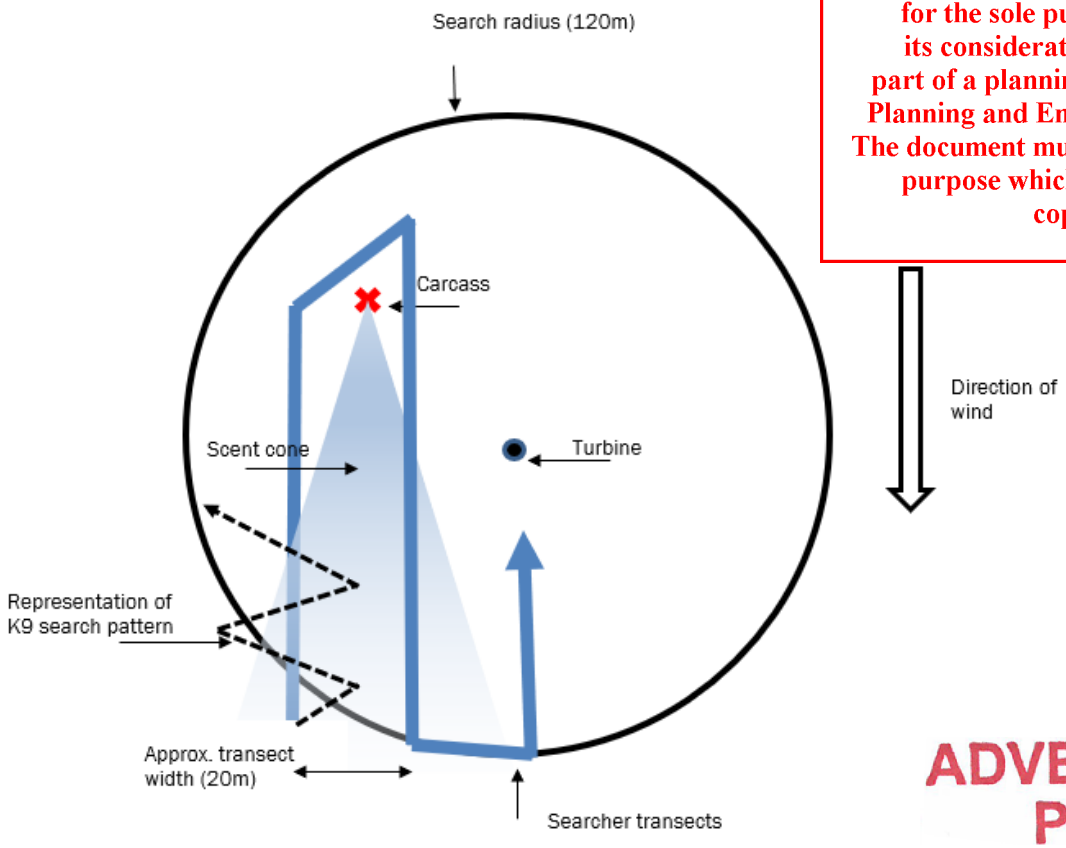


Figure 4: Scent detection dog search pattern

5.1.4. Carcass detection protocol

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

- GPS position, distance in metres and compass bearing of the carcass from the base of the wind turbine tower;
- Substrate and vegetation, particularly if it was found on a track or hard-stand area without vegetation as this may assist in quantifying the number of carcasses not found in areas where ground cover makes carcasses less visible;
- Species, age, number, sex (if possible) signs of injury and estimated date of strike;
- Weather (including recent extreme weather events, if any), visibility, maintenance to the turbine and any other factors that may affect carcass discovery; and
- If the species is not able to be immediately identified as there is not a qualified ecologist on-site (i.e., an incidental find), photographs will be provided to the qualified ecologist within two business days of the find for identification and the ecologist must reply within five business days for the possible reporting of an impact on a threatened species within two business days of confirmation.

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

- The carcass will be removed from the site to avoid re-counting;
- The carcass will be handled by personnel wearing rubber gloves, packed into a plastic bag, then wrapped in a sheet of newspaper then in a second plastic bag;

- The carcass will be clearly labelled by including a copy of its completed carcass search data sheet in the second plastic bag to ensure that its origin can be traced at a later date, if required; and
- The double-bagged and wrapped carcass will be transferred to a freezer at the site office for storage so a second opinion on the species identity may be sought, if necessary, and for use in later scavenger and detectability trials.

DEECA, South-West Region, will be provided with a copy of the completed carcass search data-sheet for all recorded carcasses of threatened species within seven days. It will be necessary for the wind farm operator to obtain from DEECA a permit under the state *Wildlife Act 1975* to handle and keep native wildlife (even dead wildlife) as part of the monitoring program. An application for this permit will be submitted in a timely manner to ensure approval has been obtained prior to commissioning of the turbines.

5.1.5. Scavenger rates and trials

It will be important to ascertain the rate at which carcasses are removed by scavengers. This can be used to develop a 'correction factor' that informs the estimate of wind farm impacts on birds and bats (mortality rate). Scavengers can include ground-based animals, such as foxes and rats (more likely to detect carcasses by scent), as well as aerial scavengers such as birds of prey and ravens (more likely to detect them visually). The scavenger trial described below is designed to ascertain the scavenging rate, usually expressed as average carcass duration in the field.

An intact carcass will be defined as a carcass that does not appear to have been scavenged by a vertebrate scavenger. A partially eaten carcass will be any skeletal or flesh remains found. Feather spots will be defined by their presence and the absence of any other remains (a feather spot being a cluster of five or more feathers). Intact or partial carcasses and feather spots will all be recorded as a 'find'. However, the scavenger correction factor will not be applied to feather spots as these are most likely to represent the remains of carcasses after they have been scavenged.

Scavenger trials will be undertaken twice per year for the first two years of operational phase monitoring. The objective of having two trials per year is to account for different seasonal vegetation conditions, so one will be held when the grass is long and one when the grass is short. The two periods for scavenger trials are shown in Table 2 below.

Table 2: Timing for scavenger trials

Vegetation condition	Likely time period	Weather	Stocking
Short grass	Winter (July)	Cold weather	Heavy stock levels
Long grass	Late Spring (November)	Follow rain and higher temperatures	Light stock levels

Scavenger Trials

Scavenger Trials will be undertaken by a trained person (Section 5.1.1) to determine the rate of loss by scavengers, and the nature of removal by scavengers (e.g., an early peak in scavenging a peak after carcasses have been in place for a period of time). The search area for scavenger trials will be 120m from the base of the turbine under the turbines selected for carcass monitoring. Large birds can fall anywhere within the 120-metre radius and therefore, birds will be placed anywhere within the search radius. Bats on the other hand, typically only fall out to about 60 metres and will therefore only be placed within the 60-metre radius (Section 5.1.3).

To identify potentially different scavenging rates, three categories of carcass will be used (Table 3). Based on current mortality estimation software requirements, every endeavour will be made to find all carcasses of each category. Improvements on this method would require an impractical and unlikely availability of required carcass numbers, and do not lead to a commensurate improvement in the statistical power of estimates. See Appendix 2, Symbolix letter 17 November 2020.

Brolga equivalent carcasses have not been provided as a category of carcass for scavenger trial purposes for several valid reasons. Firstly, it is unknown what would constitute a viable substitute carcass for such a large bird. For example, Wedge-tailed Eagles on average are not scavenged at all, instead decomposing in situ, whereas other large birds (i.e., a Raven or Falcon) might be scavenged quite quickly, so it is unclear if either would be appropriate. Next, it is not permitted to source uncleaned poultry (i.e., plucked, gutted etc) in Victoria, and cleaned poultry is not a statistically viable substitute for deceased birds (Symbolix 2020).

As such, it is proposed that the category 'Large Birds' in general be used instead. Symbolix letter (Appendix 2) supports this approach.

Table 3: Number of replicates for each scavenger trial

Vegetation condition	Micro-bat	Medium sized birds	Large birds (large raptor size)
Short grass	10	10	10
Long grass	10	10	10

Thirty carcasses in total will be randomly placed under different selected turbines for each season. This can be done by generating random numbers in Microsoft Excel. For example, a number 0 and 30 can represent how many steps a person takes around the base of the turbine, starting at the turbine entrance, and then another number between 0 and 120 can represent how many metres the person then walks away from the turbine. Thus, providing a random location within the search radius.

Scavenger trials will be undertaken via motion sensor camera traps. Cameras can be mounted on vegetation, nearby objects such as fence posts, or mounted on steel pickets away from farm tracks or areas likely to be ploughed during farming activities. Carcasses will be placed three to five metres from the camera and the camera set to record any images of scavengers removing the prey. This will ensure greater accuracy in determining how long a carcass remains in the field. Additionally, it will remove the added bias issue of humans constantly checking carcasses, which may deter scavengers such as foxes which are naturally cautious of humans. This will also incidentally provide additional information on what scavengers are taking the carcasses.

Additional information on scavenger trials is provided below.

- A mix of small and medium to large carcasses (if available) will be obtained for use in the scavenger trial. Where carcasses of the species of concern cannot be found, a similar-sized and coloured substitute will be used to reduce bias by visual predators.
- Latex gloves will be worn at all times while handling carcasses to minimise contact with human scent, which may alter predator responses around carrion and to minimise disease risk to the handler.
- At each trial site, one carcass (or more) will be placed randomly within the 60-metre search area. Carcasses will be thrown in the air and allowed to land on the ground to simulate at least some of the fall and allow for ruffling of fur or feathers.

- Carcasses used in the trial will have their coordinates recorded to ensure that they are not confused with an actual fatality found under a turbine during the trial searches.
- Notes will be taken on evidence remaining at sites where carcasses have been scavenged (e.g. scavenger scats, bones, feathers, animal parts and type of scavenging) if visible, such as tearing, pecking, complete removal of carcass, partial removal of carcass, bird or mammal predator evidence).
- Notes will be taken on the state of remaining carcasses in each search.

Conduct of two scavenger trials at seasonally different times is designed to account for occasional winter/spring increase in carrion use by some scavenger species. Previous studies have found that Red Foxes are reliant on rabbits and carrion in agricultural and forested areas (e.g. Brunner *et al*. 1975, Catling 1988, Molsher *et al.* 2000). Feral cats show little but uniform use of carrion throughout the year, whereas fox prey type is dependent on availability (Catling 1988). Catling (1988) found that foxes ate more carrion in winter/spring compared with summer/autumn, when they fed on adult rabbits. However, Molsher *et al*. (2000) found that there was no overall significant difference between seasons for carrion use. Seasonal differences only occurred in other prey types (not carrion), such as lambs, invertebrates and reptiles, as these are only available at certain times of the year.

Scavenger trials for large raptors will only be conducted once per year due to lack of availability of suitable carcasses for a technically sound trial. Experience from other wind farms indicates a low level of scavenging of these carcases and a high level of detectability that is consistent across the year (Nature Advisory, unpublished data).

The number of carcasses per animal and size category is based on obtaining a reasonable level of statistical confidence in the estimate of average carcass duration, as reflected in software requirements for current mortality estimation processes, whilst seeking to minimise the number of carcasses used, as they can be difficult to source. Large numbers of carcasses (e.g., on-site, road-kill) are difficult to obtain and it may be very complicated to find alternative sources (e.g. farmed and culled animals). It is also possible that large numbers of carcasses, more size categories and more replicates may attract more scavengers to the area. Previous studies (e.g., Molsher *et al*. 2000) have shown that fox prey use is related to availability and therefore more foxes may be attracted to the area if more carcasses are used, thereby biasing the resulting correction factor. In addition, raptors are potentially more susceptible to collision when preying on carrion beneath turbines. However, it is necessary to conduct these trials under turbines as some scavengers may alter their behaviour in response to the turbines. The final scavenger trial design is therefore a necessary compromise between high numbers of trials and practicality whilst ensuring a statistically-valid trial design without altering either the behaviour of scavengers or the number of birds that may collide with turbines.

5.1.6. Detectability trials

Detectability trials are conducted to test the rate at which the trained searchers detect carcasses under wind turbines. This enables a correction factor to be applied in calculating the rate at which turbines strike birds and bats.

To account for observer variability in detecting carcasses, only personnel who have carried out monthly searches at Ryan Corner Wind Farm will be involved in the detectability trials. Detection efficiency (percentage of carcasses detected) will then be incorporated into later analyses that derive mortality estimates. The number of carcasses to be employed in each trial is detailed in Table 4 and explained below. The carcass controller (a person not involved in monthly carcass searches) will throw each carcass into the air and allow it to land on the ground to simulate at least some of the fall and the potential ruffling of fur and feathers. The carcass controller will note the placement of carcasses (via

GPS) and is free to decide where and how many are deployed under each turbine, however all bats should be located within the inner, 60 metre search zone.

Table 4: Number of replicates per season for detectability trials, given two factors of size and visibility

Vegetation condition	Micro-bat	Medium sized birds	Large birds (large raptor size)
Long grass / vegetated	10	10	10
Short grass	10	10	10

Analysis indicates that there is a large confidence interval on the estimate of searcher efficiency, even for a high number of trials (plus or minus ten percent even with 50 replicates). This means that only relatively large seasonal changes in detection (~20 – 30% or more) will be resolvable from normal background variation. Sampling will be undertaken during the two periods that represent the greatest change in vegetation cover (therefore visibility), using several carcasses that is logistically manageable and aligned with the number and timing of scavenger trials. Statistical confidence analysis indicates that this will result in a reasonably precise detectability estimate after one year, and optimal precision after two.

Any substitute carcasses for these trials will be of both similar size, colour and form to the species being represented or species of concern (i.e., brown mice rather than birds should be substituted for bats as birds do not have the same body shape, colour and appearance).

Ecologists will notify DEECA, five days prior of the actual timeline of all experimental trials (scavenger and detectability) so that DEECA have the opportunity to observe the trials.

The review provided by Symbolix (Appendix 2) considered a previous BAMP version which has since been superseded, in which the number of microbats proposed for trials was 20. The review outlines that 10 carcasses per size class is the minimum amount required for a statistically sound correction factor in regard to scavenger rates. As such, this number is proposed in the current BAMP version for both correction factors.

5.1.7. Analysis and data limitations

The results of the carcass searches will be analysed in order to provide information on:

- The species, number, age and sex (if possible) of birds and bats being struck by the turbines;
- Separate estimated annual mortality rates for all birds and all bats (and for particular species, if required) including an estimate of the number of carcasses per turbine per year; and
- Any detected spatial or temporal variation in the number of bird and bat strikes.

The search results will be detailed in the first annual report and the detailed analysis and estimates in the second annual report. The latter will identify if further detailed investigations or mitigation measures are required.

Statistically robust projections of bird and bat mortality for the entire wind farm site will be presented, based on the data collected from mortality searches. It is acknowledged that this is a current and dynamic aspect of research and that the outcomes from such programs may be equally dynamic. The current program is designed to provide an acceptably accurate and precise estimate of wind farm related bird and bat mortality within two years, so the full analysis and estimate will be provided in the second annual report, together with recommendations on the scope of future monitoring, if required.

All data will be analysed to provide the average estimated mortality of birds and bats, their standard error (variability) and ranges for the Ryan Corner Wind Farm. The mortality rate of each species (if estimates for individual species are possible) and size class detected will be calculated after two years. If possible, the standard error and range of these estimates will be reported. Note that it may not be possible practically to provide this due to the likely low number of carcasses detected. Where this is an issue, it will be reported. Mortality estimates will also take into consideration the actual operational time of the turbines (obtained from the project operator).

The estimated mortality rate will be generated by modelling the scavenger losses and results of the human detectability trials, and using sampling inference to account for the periods between turbine searches. The data from the scavenger and detectability trials will be analysed using relevant techniques based on Generalised Linear Modelling (GLM) and (censored) Survival Analysis. Censored measurements are only partially known, such as the exact time of mortality or the exact time to scavenge loss (see, for example, Kaplan & Meier (1958)). In addition to providing mortality estimates, this analysis will determine if any of the factors (i.e., size class or habitat stratification of turbine sites) are significant, where possible.

5.2. Incidental Carcass Protocol

Personnel operating the Ryan Corner Wind Farm may from time to time find carcasses within the wind farm site. In this case, the person concerned will respond in the way described below.

- The site manager will immediately be informed and, for each carcass, will arrange that it:
  - GPS position recorded;
  - Have the distance and compass bearing of the carcass from the wind turbine tower based measured and recorded;
  - Be removed from the site to avoid re-counting;
  - Be handled by trained personnel wearing rubber gloves, packed into a plastic bag, wrapped in newspaper, then put into a second plastic bag; and
  - Be transferred to a freezer at the site office for storage so the carcass or partial remains will be identified by a suitably qualified and experienced ecologist and used in observer efficiency and scavenger trials, if suitable.
  - If the find is made within five days prior to a scheduled carcass search, the carcass will be left *in situ* but photographed and position recorded (GPS).

A carcass search data sheet (Appendix 1) will be completed for each incidental carcass found. All bird and bat carcasses (not used for experimental trials) found beneath turbines during searches and incidental finds will be retained (frozen) for at least 12 months and offered to DEECA or as per wildlife permit permissions. Any unclaimed carcasses will be offered to DEECA prior to disposal.

5.3. Injured Bird and Bat Protocol

All onsite staff and monitoring personnel will be advised of the correct procedure for assisting injured wildlife. All ecologists are very familiar with the correct and ethical treatment of injured wildlife and are often able to provide necessary care to aid in quick release (e.g., dehydration, shock). Contact details of local veterinary staff and wildlife carers will be provided to ensure that if injured wildlife are found and cannot readily be released back to the wild, they are treated accordingly and in a timely manner.

Wind farm personnel who find injured wildlife will be required to report the find to the wind farm site manager, who will require a trained person to place the animal immediately into a dark place (e.g. box or cloth bag) for transfer to the nearest veterinarian (list to be maintained at the wind farm office).

6. POST CONSTRUCTION INTENSIVE MONITORING AND MORTALITY ESTIMATES PROGRAM

The following section outlines targeted monitoring for priority species as requested by DEECA, in addition to Planning Permit requirements.

6.1. Intensive Southern Bent-wing Bat monitoring program

This section outlines a protocol for targeted carcass searches for the Southern Bent-wing Bat as per instructions from DEECA and Dr Lindy Lumsden (DECCA's Arthur Rylah Research Institute). The data collected from this program cannot be incorporated with the above mortality surveys or mortality estimates as it can only provide information about the particular turbines selected for the program and for the two intense survey periods. Additionally, the data cannot be generalized to the entire farm or any other wind farms.

The intensive monitoring periods will be from February to March (inclusive) and again in October to November (inclusive). The surveys can be run in conjunction with the above mortality surveys and if a turbine is selected for both purposes the data can be replicated and used for both. Dr Lumsden has requested that 17 of the turbines be selected within the Ryan Corner Wind Farm site. These will be located on the western side of the wind farm, given their proximity to the nearest forested area and the Shaw River. Turbines will include B45, 46, 48, 49, 52, 54, 55, 58, 59, 60, 62, 63, 64, 66, 67, 69 & 70.

The intensive monitoring will only survey the 60-metre inner search zone with four-meter transect spacings, as per the pulse searches, as this encompasses the impact detection zone of microbats (Arnett et al 2005, Hull and Muir 2010). These searches will be undertaken weekly (four searches a month) for seven weeks during each period respectively and can incorporate the initial standard monthly search and pulse search.

The intensive survey will follow search protocols outlined in Section255.1.3.

The data will be available to DEECA and Dr Lumsden in hard-copy or electronic form and the information incorporated as a separate data appendix in the annual reports.

6.2. Mortality estimation

A priority specified by DEECA, is to report modern, statistically robust mortality projections for the entire site. It is acknowledged that this is a current and dynamic aspect of research and that the outcomes from such programs may be equally dynamic and so offer little potential for compliance monitoring at this stage.

Due to the rapidly advancing techniques, the adherence to meta-data collections (data about the underlying data) is paramount, as are correct, statistically valid selection processes. There are two species of concern, and mortality estimates are targeted to these species.

To be a statistically robust estimate, all protocols must be unbiased and controlled. If these conditions are met, then the results could be potentially generalised to other sites within Victoria and any information gained may be applicable (possibly with some caveats that can be determined from the process itself) to other developments.

Current mortality estimates require the following:

- Sampling protocol (to enable generality and scaling up to site-wide estimate): Section 5.1.2 & 5.1.3;
- Modelling protocol (to account for losses): Section 5.1 & 5.1.2 and statistical modelling; and

- Search protocol (to collect the raw data in a consistent fashion compatible with the two protocols above): Section 5.1.3.

The projected mortality rate will be generated through modeling the scavenger losses and detectability, and using sampling inference to account for the selection and stratification. Currently, the most appropriate model is that of Huso (2010).

It is unnecessary for the purposes of the BAMP to detail the analysis process, which should be flexible and respond to specifics of the data collected. However, the basic premise of these approaches is to calculate the expected counts of carcasses, accounting for modeled losses (both scavenger and detection) and to account for sampling fraction, stratification and density proportioned areas to produce an estimate of "arrivals"," or true mortality.

Due to the intensive data load required, this will be done for the two species of interest (if possible) and those other species detected (i.e., carcasses) that fall into the large bird and micro-bat categories. Finally, as the analysis process needs to be flexible and respond to the data collected, we are unable to predict the format of the results (e.g., estimated fatality/turbine/year).

7. IMPACT TRIGGERS, MITIGATION AND OFF-SETS

Mitigating and offsetting significant impacts on birds and bats is an important requirement of the planning permit and one of the key aims of this Bat and Avifauna Management Plan.

Planning permit condition 20 (d) called for a procedure for managing and mitigating any significant impacts from bird and bat strikes. It is also proposed to report these, if and when they occurred, to DEECA within the appropriate timeframe at the email address: bsw.planning@delwp.vic.gov.au.

7.1. Raptor risk reduction measures

The planning permit condition calls for carcass removal to reduce the attractiveness of the site to birds of prey and, therefore reduce the chances of fatal collisions by this group of birds. A procedure for carrion removal is provided below.

To provide for the regular removal of carcasses likely to attract raptors to areas near turbines the procedures below will be adopted.

- Weekly inspections of the entire wind farm site by onsite personnel will be undertaken to search for any stock, introduced or native mammal and bird carcasses that may attract raptors (e.g., kangaroos, foxes, rabbits) within 250 metres of turbines;
- Any incidental finds of birds and bats will follow the *Incidental Carcass Protocol* (depending on carcass location);
- Any carcasses and/or remains found will be immediately (within hours) collected and quickly disposed of in a manner that will avoid attracting raptors close to turbines (e.g. burying them in a designated location, burning provided correct permits/laws are met). All disposal efforts will be carried out far from turbines;
- Carcass occurrence and removal will be recorded in a "management log book" maintained by Ryan Corner Development Pty. Ltd.;
- Rates at which carrion are found will be reviewed, in consultation with DEECA, after three months of wind farm operations commencing to ascertain if the carrion removal schedule needs to be refined; and
- An annual summary of carcass removal, based on the 'management log' will be provided in the first year and final year monitoring program reports to the Regional Manager, South West region, DEECA, and the Responsible Authority.
- The need for continuation of the carcass removal program will be assessed after two years of operation. In general, the criteria for continuation will be based on the frequency of carcass finds. For example, if carcass frequency is particularly low (e.g. one or two per quarter) outside of turbine search zones (i.e., not beneath) the intense program may be discontinued or reduced considerably subject to agreement fromDEECA.
- Rabbit control will be considered in the event of high numbers of Wedge-tailed Eagle strikes. This will limit the prey availability of this species. This can include, baiting, shooting and warren ripping.

7.2. Definition of impact trigger

An impact trigger is where there is evidence of death or injury to native birds and/or bats by collision or other interaction (e.g., barotrauma) with turbines. A significant impact on native birds and/or bats, for the purposes of non-scheduled reporting is defined as circumstances where:

- In any two successive monthly carcass searches, a total of four or more native bird or bat carcasses (or parts thereof) of non-threatened species (excluding introduced species) are found at the same turbine; and/or
- A threatened bird/bat species (or recognisable parts thereof) listed under the EPBC Act, FFG Act or Advisory List of Threatened Vertebrate Fauna in Victoria – 2013, is found dead or injured within the wind farm site during any mortality search or incidentally by wind farm personnel.

All on-site wind farm staff will be familiarised with the identifying features of a Brolga (e.g., posted photos and descriptions) and with protocols for immediate reporting of such incidences. Reporting arrangements for significant impacts are described in the next section of this plan.

7.3. Mitigating significant and general impacts

Mitigation involves the prevention, avoidance and/or reduction of the risk of a significant impact. Generally, the aim is to take actions in advance to avoid a significant impact. The following provides a framework for assessing and mitigating significant bird and bat impacts of the Ryan Corner Wind Farm. The relationship between these activities is shown in Figure 6. The activities include:

Immediate reporting (two business days) of an impact trigger to wind farm management and to the Regional Manager, South-West Region, DEECA (via email) followed by discussions of requirements and aims of investigations;

- An Investigation within 10 business days by an appropriately qualified ecologist of the occurrence on site of the affected bird or bat species to identify the particular risk behaviours that could lead to collisions. This must include consultation with a relevant species ecology expert and DEECA. A site field assessment of suitable habitat on and near the site should be undertaken, unless not relevant (i.e., some aerial species which would not utilise habitat on or near site). An investigation is necessary to determine the actual cause of death/injury (in the unlikely event that the animal was, for example, shot). The very rapid investigation will assess the most effective mitigation and will ensure that the mitigation is implemented correctly and quickly (within 10 days), subject to a clear understanding of the cause of the impact trigger. This process will involve a meeting between the ecologist concerned, the wind farm operator, and DEECA to discuss species-specific requirements;
- Responsive mitigation and if this is not possible, offsetting measures will be implemented; however mitigation (and also offsetting) cannot replace the loss of one individual of a species of concern; and
- The investigation and following activities will also focus on the evaluation of likelihood of further occurrences and impacts and may indicate a requirement for further targeted surveying.

The intent is for mitigation requirements to be resolved within four weeks of the investigation.

Additional general mitigation measures must be implemented from the commencement of operations at the wind farm and include:

- Farmers would be requested to not spread grain supplement feed for stock within 250 metres of turbines. This attracts foraging birds which may collide with the above turbines. This agreement should be established ahead of operations commencing.
- Any lighting of turbines in general must be baffled as to limit attracting insects at night, which in turn will attract bats.

Subject to an assessment of the level of risk of impacts of significance continuing, mitigation will be implemented, in consultation with DEECA, which may include but not be limited to:

- Habitat assessment, modification, vegetation planting/removal;
- Changes in land use practices (including stock management) near turbines;
- No or reduced cropping/sowing around or near turbines;
- Bird deterrence;
- Increasing turbine and powerline conspicuousness by rotor patterns, marking and/or audible signals/echolocation;
- Changes to lighting of turbines; and/or
- Temporary turbine shutdown for high risk periods/locations;
- Technology activated temporary shutdown (e.g., sensors detect approaching individuals of the species of concern, subject to validation).

An impact trigger of a Southern Bent-wing Bat will result in the implementation of an appropriate mitigation method in consultation with DEECA (Figure 5). As an immediate precautionary action, low wind-speed curtailment (i.e., increasing turbine cut-in speed) will be applied to any turbine associated with a mortality event. Low wind-speed curtailment has been shown to be an effective approach to mitigate bat mortality at wind farms around the world (Arnett *et al*. 2016, Wellig *et al*. 2018, Whitby *et al*. 2021, Lloyd *et al*. 2023), including Australia (Bennett *et al*. 2022). In case of an additional mortality event occurring at a same turbine where low wind-speed curtailment has already been implemented, an increase in cut-in speed will be applied. This hierarchical and precautionary approach of immediate response was developed by Nature Advisory following feedback from DEECA to address specific triggers actions for Southern Bent-wing Bat, and is detailed in Section 7.4.

Up-to-date information on mortalities of Southern Bent-winged Bats at four operational wind farms in Victoria was provided to Nature Advisory during discussions with DTP and DEECA (held on 12th of October 2023). Most (three) of these wind farms have a minimum Rotor Swept Area (RSA) that is lower than the minimum RSA planned for Ryan Corner Wind Farm (i.e., 35 metres). Unpublished analyses of carcass search results from operational wind farms carried out by Nature Advisory shows that mortality of bats decreases with increasing height of the lower minimum RSA. It is also known that there are fewer records of Southern Bent-wing Bat calls recorded when bat detectors are placed at RSA heights. Thus, it is anticipated that the potential impact on the Southern Bent-winged Bat is likely to be relatively low based on the average lower minimum RSA heights from previous wind farms in which mortalities have been recorded. The minimum RSA of these wind farms in comparison with the minimum RSA of the Ryan Corner WF is detailed as follows.

- Macarthur Wind Farm – min RSA of 23 meters (12 meters lower than Ryan Corner WF);
- Cape Nelson North Wind Farm – min RSA of 33.5 meters (1.5 meters lower than Ryan Corner WF);
- Salt Creek Wind Farm – min RSA of 24 meters (11 metres lower than Ryan Corner WF); and
- Dundonnell Wind Farm – min RSA of 39 meters (4 meters higher than Ryan Corner WF)

Depending on the outcomes of the investigations (see Figure 5), further mitigation actions could include increasing cut-in speed or shutdowns during periods of higher bat activity, if required. Additionally, should three mortalities be identified at separate turbines within the duration of this plan, Ryan Corner Development Pty. Ltd. will commit to consult with DEECA to review the BAMP. The purpose of these consultations will be to reassess the BAMP and explore the testing of alternative mitigation measures,

such as acoustic deterrents, including consultation on the implementation and empirical assessment of the effectiveness of any proposed mitigation program.

Immediate mitigation (e.g., above techniques) may be required if Brolgas are significantly impacted and will be implemented under the supervision of a qualified ecologist in consultation with DEECA and in a prompt manner (Figure 5). Significant impacts may be one-off or cluster events and therefore the mitigation procedure should follow steps outlined in Figure 5. It is difficult to anticipate how a significant impact may arise and therefore what mitigation would be required. However, if a significant impact is detected, the cause may be evident immediately (e.g., particular land-use practice) in which case immediate mitigation must be implemented, as described. Where a solution is not immediately evident, it will be the subject of investigation and subsequent response.

A significant impact (as defined in Section 7) will represent an 'incident' within the Ryan Corner Development Pty. Ltd. EH&S system and the appropriate internal incident reporting procedures will be used. This will be followed within two business days by reporting as described in Figure 5 to DEECA. Additionally, all actions will be developed and implemented in consultation with and agreement from DEECA.

7.4. Impact triggers for Southern Bent-wing Bat

Background

The Southern Bent-wing Bat (SBWB) is listed as "critically engendered" in Victoria under the FFG Act and Federally under the EPBC Act (TSSC 2021). The SBWB is small (~15 g), insectivorous bat that roosts in a network of ~70 roost caves located across a restricted distribution (19,452 km^2) from southwestern Victoria to southeastern South Australia (DELWP 2020). SBWBs gather in late spring and early summer at maternity caves to give birth and raise their young, and then disperse in autumn to use non-breeding caves throughout the cooler parts of the year (Churchill 2008). The three known maternity caves are located near Naracoorte in South Australia, Warrnambool and Portland in Victoria (Southern Bent-wing Bat National Recovery Team 2022).

Mortality has been documented at three monitored wind farms in SW Victoria as follows (Table 5).

Table 5: Mortality of Southern Bent-wing Bat at wind farms in Victoria (known till January 2024)

Wind Farm	Completed	No of turbines	Hub (m)	Min RSA (m)	Blade (m)	Mortality (raw numbers)	Notes
Cape Nelson North/Sir William Grant wind farm	2015	23	80	=80-46.5= 33.5	46.5	6	This wind farm is adjacent to a known roosting cave for SBWB
Macarthur WF	2013 (mortality recorded 2014-2015	140	85	23	56	2	Drawn for the annual reports n monitoring
Wind farm east of Starlight Cave	(mortality recorded in autumn 2020)			24		1	Information provided by pers comm
TOTAL						**9**	

Impact Trigger Level 1

A single or a number of Southern Bent-winged Bats are recorded dead within 60 metres of a turbine within a single event (for the purposes of the trigger this may be over a search period of up to five days (the length of the search period)

Actions in response to Impact Trigger Level 1

In the event of each individual SWBW mortality identified:

- Additional carcass searches to determine extent of the *impact*
  - Search all turbines within 1 km of the turbine where each carcass was recorded, that have not already been searched on the same day, to a radius of 60 metres from the base of the turbine.
  - If a subsequent carcass is recorded during that search, all turbines within 1 km of that find, that have not already been searched on the same day, will be searched to a radius of 60 metres.
  - The findings of the searches will be recorded and reported upon as detailed below.
- Adaptive mitigations - Assignment of risk
  - Any turbine where a carcass of the SBWS is recorded will be labelled as a "high risk" turbine.
  - The assignment of "high risk will be for a period of two years from the date of assigning "high risk".
  - If there are no further mortalities at the turbine for two years the risk will be re-assigned to "low" risk.
- High risk turbines
  - Any "high risk" turbine will be included in all subsequent turbine searches for two years from the date of assigning "high-risk".
  - Any turbine assessed as high risk will be operated with a "nighttime low wind speed cut-in of 4.5 metres / second" for the period of January – April.
  - Will be included in the intensive monitoring program of the BAMP.
- Incident Investigation
  - Upon the morality event, an investigation will commence with five days and the report submitted to the Responsible Authority within 28 days.
  - The investigation will seek to assess any relevant attributes associated with the SBWB mortality/event.
  - The report will identify factors including:
    - Date and time of mortality,
    - Identify, if possible, wind direction and speed when bat was struck,
    - Weather conditions,
    - Description of the season,
    - Location of mortality in relation to habitat, vegetation and water sources,
    - Proximity of nearest known SBWB roost caves, and
    - Analysis of any other mortality on the site.
  - Overall, the report will compile all relevant information and provide report on:
    - Conclusions of investigation in regard to risk to SBWB and likelihood of occurrence on site,
    - Recommendations for future actions to mitigate impacts on the SBWB, and
    - Options for other mitigation including deterrents.

Impact Trigger Level 2

A single or a number of Southern Bent-winged Bats are recorded dead within 100 metres of a turbine within a single event (for the purposes of the trigger this may be over a search period of up to five days (the length of the search period) of a turbine assigned as "high risk" under Trigger 1.

Actions for Impact Trigger Level 2

- **Additional carcass searches to determine extent of the impact**
  - Search all turbines within 1 km of the turbine where each carcass was recorded, that have not already been searched on the same day, to a radius of 60 metres from the base of the turbine.
  - If a subsequent carcass is recorded during that search, all turbines within 1 km of that find, that have not already been searched on the same day, will be searched to a radius of 60 metres.
  - The findings of the searches will be recorded and reported upon as detailed below.
- **Adaptive mitigations - Assignment of risk**
  - Any turbine where a carcass of the SBWS is recorded will be labelled as a "high risk – Trigger 2" turbine.
  - The assignment of "high risk will be for a period of two years from the date of assigning "high risk- T2".
  - If there are no further mortalities at the turbine for two years the risk will be re-assigned to "low risk" risk.
- **High risk turbines - T2**
  - Any "high risk-T2" turbine will be included in all subsequent turbine searches for two years from the date of assigning "high-risk-T2".
  - Any turbine assessed as high risk will be operated with a "nighttime low wind speed cut-in of 4.5 metres / second + 1.5 m/s (an increase low wind cut in speed of 1.5 m/s in additional to the Trigger 1)" for the period of January – April.
  - Will be included in the intensive monitoring program of the BAMP.
- **Incident Investigation**
  - Upon the morality event, an investigation will commence with five days and the report submitted to the Responsible Authority within 28 days.
  - The investigation will seek to assess any relevant attributes associated with the SBWB mortality/event.
  - The report will identify factors including:
    - Date and time of mortality,
    - Identify, if possible, wind direction and speed when bat was struck,
    - Weather conditions,
    - Description of the season,
    - Location of mortality in relation to habitat, vegetation and water sources,
    - Proximity of nearest known SBWB roost caves, and
    - Analysis of any other mortality on the site.
  - Overall, the report will compile all relevant information and provide report on:
    - Conclusions of investigation in regard to risk to SBWB and likelihood of occurrence on site,
    - Recommendations for future actions to mitigate impacts on the SBWB, and
    - Options for other mitigation including deterrents.

Impact Trigger Level 3

Where a third strike has been recorded of Southern Bent-winged Bats within 100 metres of a turbine within a single event (for the purposes of the trigger this may be over a search period of up to five days (the length of the search period), RCWF will revisit the efficacy of this plan in consultation with DEECA.

Actions for Impact Trigger Level 3

- Additional carcass searches to determine extent of the impact
  - Search all turbines within 1 km of the turbine where each carcass was recorded, that have not already been searched on the same day, to a radius of 60 metres from the base of the turbine.
  - If a subsequent carcass is recorded during that search, all turbines within 1 km of that find, that have not already been searched on the same day, will be searched to a radius of 60 metres.
  - The findings of the searches will be recorded and reported upon as detailed below.
- Adaptive mitigations - Assignment of risk
  - Once there has been a third strike, any turbine where a carcass of the SBWS is recorded will be labelled as a "high risk – Trigger 3" turbine.
  - Any turbine within 600 metres of the turbine where Tigger Level 3 was recorded will have turbines operating with a 4.5 m/s cut in speed applied while the T3 impact turbine is considered as "high risk" (see Table 6 for a description of proximity).
  - The assignment of "high risk will be for the period of time RCWF revisits the efficacy of the plan with DEECA, or period of two years from the date of assigning "high risk-T3"(whichever date is shorter).
  - If there are no further mortalities at the turbine for two years the risk will be re-assigned to "low" risk.
- High risk turbines – T3
  - Any "high risk-T3" turbine will be included in all subsequent turbine searches for two years from the date of assigning "high-risk-T3".
  - Any turbine assessed as high risk will be operated with a night time low wind speed cut-in of 6.0 m/ for the period of January – April.
  - Will be included in the intensive monitoring program as detailed in Section 6.1 of the BAM Plan.
- Incident Investigation
  - Upon the morality event, an investigation will commence with five days and the report submitted to the Responsible Authority within 28 days.
  - The investigation will seek to assess any relevant attributes associated with the SBWB mortality/event.
  - The report will identify factors including:
    - Date and time of mortality,
    - Identify, if possible, wind direction and speed when bat was struck,
    - Weather conditions,
    - Description of the season,
    - Location of mortality in relation to habitat, vegetation and water sources,
    - Proximity of nearest known SBWB roost caves, and
    - Analysis of any other mortality on the site.
  - Overall the report will compile all relevant information and provide report on:
    - Conclusions of investigation in regards to risk to SBWB and likelihood of occurrence on site,

- Recommendations for future actions to mitigate impacts on the SBWB, and
- Options for other mitigation including deterrents.

- Overall, these turbines will continue to implement cut-in speed for the durations indicated above or may be reduced in future consultation with DEECA in a review and amendment of the plan.

Table 6: Turbines within 600 metres of each individual turbine (See Appendix 3)

Collision with	600m. - Affected WTGs
WTG06	09, 75, 76
WTG08	09, 20
WTG09	06, 08, 20
WTG10	76
WTG13	14, 75, 76
WTG14	13, 15, 73
WTG15	14, 16, 73
WTG16	15, 17, 67, 73
WTG17	16, 18, 23, 26, 64
WTG18	17, 23
WTG20	08, 09, 21, 22
WTG21	20, 22, 24
WTG22	20, 21, 23, 24
WTG23	17, 18, 22, 25, 26
WTG24	21, 22, 25, 28
WTG25	23, 24, 26, 29
WTG26	17, 23, 25, 64
WTG28	24, 29
WTG29	25, 28, 30, 32
WTG30	29, 32, 34, 60
WTG31	32
WTG32	29, 30, 31, 34
WTG33	36, 38
WTG34	30, 32, 36
WTG36	33, 34, 37, 38
WTG37	36
WTG38	33, 36, 40
WTG40	38
WTG43	44
WTG44	43
WTG45	46
WTG46	45, 48, 49
WTG48	46, 49
WTG49	46, 48
WTG52	54, 55
WTG54	52, 58
WTG55	52, 58, 59
WTG58	54, 55, 62
WTG59	55, 60, 63
WTG60	30, 59, 64
WTG62	58, 63, 66
WTG63	59, 62, 66, 67
WTG64	17, 26, 60, 67
WTG66	62, 63, 67
WTG67	16, 63, 64, 66
WTG69	70, 72
WTG70	69, 74
WTG72	69, 73, 74
WTG73	14, 15, 16, 72
WTG74	70, 72
WTG75	06, 13, 76
WTG76	06, 10, 13, 75

7.5. Offsetting significant impacts

It is difficult to predict what form a significant impact might take and what species it may involve and hence, the type of offsetting which may be required. Potential offset options for the two species of concern would be markedly different. A few possible offsets include:

- Habitat/wetland rehabilitation (Brolga);
- Roosting and maternity cave rehabilitation (bat);
- Increasing food availability away from wind farm site (Brolga);
- Increasing diurnal structure conspicuousness, rotor patterns (Brolga);
- Using acoustics to deter bats and other nocturnal fauna at night (bats);
- Implementation of trials using new technological mitigation measures, in collaboration with universities or other research institutions; and
- Allocation of funding towards research and conservation of impacted species.

In the event of the first Trigger Level 1, the project will allocate an anticipated $50,000 (AUD) toward a Southern Bent-wing Bat offset research fund or the National Southern Bent-wing Bat recovery program. This amount is a one-off payment and will be made within three months of the first reported impact trigger. Evidence of this contribution will be provided to the Department of Transport and Planning (DTP) and DEECA. Additional offset options will be researched and discussed with DEECA as required.

A generalised framework is described below to ensure that if significant impacts cannot be completely mitigated, then off-setting arrangements can be discussed and agreed with the relevant authorities.

Arrangements for agreeing on offsetting measures are summarised below.

- Should a significant impact not be mitigated through on-site management then offsetting off-site would be triggered.
- A meeting would be organised between Ryan Corner Development Pty. Ltd. and the relevant authorities and government (e.g., DEECA) experts to discuss and agree offset options.
- Offsetting would be commensurate with the level of impact (to be determined after the investigations undertaken as part of the mitigation protocol; Section 7.3).
- Offsets must be initiated within 12 months of the detection of a significant impact and continued for as long as a significant impact continues that cannot be mitigated through on-site management. Offsets will be monitored and evaluated for their effectiveness and any alterations will be made accordingly to achieve the desired outcomes (in consultation with the relevant authorities).

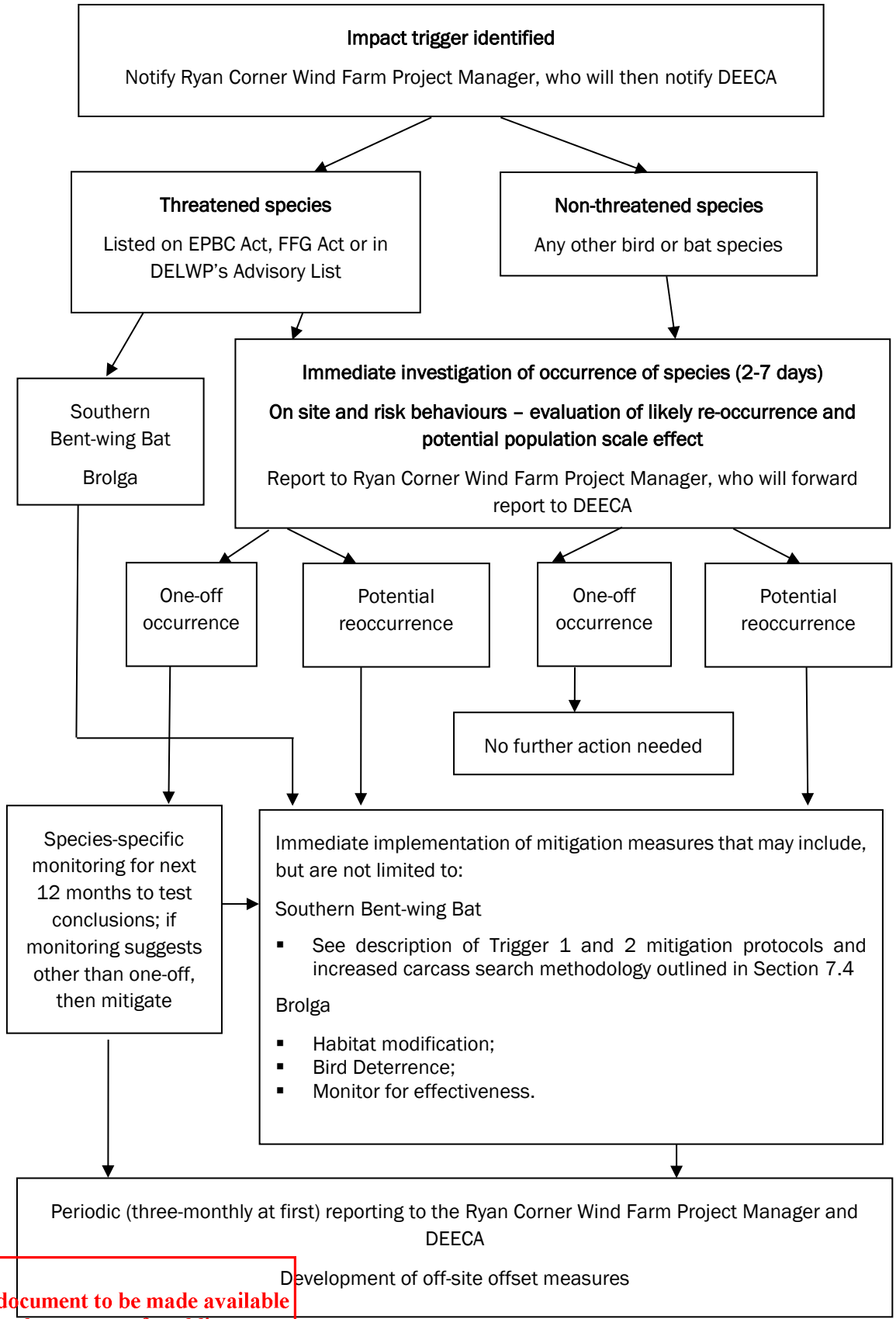
In the case of the Brolga, the regional framework for impact assessment established by DEECA provides an excellent basis for agreeing offset measures (DSE 2011). This framework is based on a Population Viability Assessment (PVA) that can model the dynamics of population impacts of wind farm effects, as well as the population impacts of mitigation and offsetting.

Impacts on Brolga from the operation of Ryan Corner Wind Farm must be net zero. If impacts are detected (i.e., one Brolga mortality), mitigation measures must be put in place in consultation with DEECA to ensure that this impact can be offset, including a management plan which stipulates for objectives, timeframes, actions (such as those suggested above), monitoring and regular reporting, with provisions for amendments and adaptation where necessary.

A similar approach will be considered for Southern Bent-wing Bat. As this species is known to be present at the Ryan Corner Wind Farm site, it is considered that any mortality cannot be defined as a “once off” when considered over the life of the wind farm. Upon a trigger occurring, immediate mitigation measures are required to be developed and implemented in consultation with DEECA to mitigate

impacts to the species. Mitigation measures such as turbine curtailment and ultrasonic acoustic deterrents will also be considered in addition to the suggestion above, in areas where turbines have been identified as having a heightened risk of collisions or where impact triggers have been met. However, these measures would also require further investigation in consultation with DEECA to provide the most effective implementation. Suitable curtailment protocol to increase the cut-in speed at which turbines operate during higher risk periods has been effectively used to mitigate microbat mortality (Bennett *et al*. 2022).

Figure 5: Operational procedure for investigating impact triggers



8. COMPLIANCE SUMMARY

The following Table 7 indicates the sections of the Bat and Avifauna Management Plan that comply with the specific conditions outlined in the Planning Permit (no. 20060222-2). The conditions of the permit have been abbreviated but their full and correct wording can be found in the introduction.

Table 7: Sections within the BAMP that comply with the conditions of the Planning Permit for Ryan Corner Wind Farm

Condition number	Abbreviated condition details	BAMP Section/s
20a	Statement of aims and strategies for managing and mitigating significant bird and bat strike	4, 7
20b (i)	Presence, behaviour and movement of Brolga, especially breeding pairs	4.1
20b (ii)	Presence and activity of Southern Bent-wing Bats in the vicinity	4.2
20b (iii)	Species and number of bird and bat strikes	5
20b (iv)	Procedures for reporting of threatened bird/bat mortalities to the DEECA within 7 days	5, 7
20b (v)	Seasonal and yearly variation in the number of bird/bat strikes	5
20b (vi)	Bird/bat strikes at lit or unlit turbines	5
20b (vii)	Efficacy of searches for carcasses and *where practicable*, information on scavenger rates, so that the total number of mortalities can be corrected for	5
20b (viii)	Procedures for regular removal of carcasses likely to attract raptors	7.1
20b (ix)	Periodic reporting, within agreed timeframes, of monitoring to DEECA and the local community	3.1
20c	Recommendations in relation to a mortality rate which would trigger mitigation measures to be undertaken to the satisfaction of the Minister for Planning	7
20d	Strategy to offset impacts detected during monitoring to the satisfaction of the Minister for Planning	7
21	Reporting and reviewing procedures, where the Minister for Planning will then determine whether further investigations are to be undertaken	3.1

9. TIMEFRAMES AND RESPONSIBLE PERSONEL

This table outlines a general and approximate timeline for the post-construction monitoring surveys and reporting (Table 8).

Table 8: Approximate timeline for surveys and reporting after commissioning of turbines on the Ryan Corner Wind Farm.

Process	Details	Start	Finish	Report timing	
Implementation of this BAMP	Oversee the full and complete implementation of all post construction monitoring activities according to the provisions outlined in this document	Commencement of turbine operation	24 months post operation	As per relevant monitoring activity below	Qualified ecologist/ ecological consultancy contracted by the wind farm operator
Brolga breeding surveys	The first monthly breeding surveys will commence on the first day of July after turbines are operational. The second will commence the following year.	July	December	One month after completion of surveys	Qualified ecologist
Brolga flocking surveys	The first monthly flocking surveys will commence on the first day of December after turbines are operational. The second will commence the following year.	December	June	One month after completion of surveys	Qualified ecologist
Southern Bent-wing Bat surveys	Surveys will begin in whichever month (Feb/Oct) follows turbine operation	February	March	Incorporated into annual reports	Qualified ecologist
		October	November		
Mortality surveys	Approximately one-third of turbines surveyed within one week per month every month for two years			Incorporated into annual reports	Qualified ecologist or specially trained searcher
Scavenger trials	Experimental trial designed to determine scavenging rate	Post-operation of turbines	-	Incorporated into annual reports	Qualified ecologist
Detectability trials	Experimental trial designed to determine detectability rate	Post slab laying	Operation of turbines	Incorporated into annual reports	Qualified ecologist

Targeted Southern Bent-wing Bat mortality surveys	Migratory intensive surveying (two periods included on right): 17 turbines to be determined by Dr Lumsden. Each turbine core area searched twice (within two days) per month	February	March	Incorporated into annual reports	Qualified ecologist or specially trained searcher
		October	November		
First year report	Comprehensive report of surveying methods and results (given mid-collection). Possible review of methodology. Discussion may include recommendations			Two months after 12 months of surveying	Qualified ecologist
Second year report	Comprehensive report of 24 months of surveying methods and results. Discussion will include (but not limited to) any significant impacts that may influence review proceedings.			Two months after 24 months of surveying	Qualified ecologist
Incidental reports	Any significant impacts outlined in section 7 may require immediate (email within three business days reporting) (and action) to DEECA and relevant authorities.			2-7 days of impact	Qualified ecologist

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11. GLOSSARY

Bias (statistical)	there are several forms of bias that can be introduced to scientific studies, namely, selector bias, in which the replicates (turbines) are chosen where their probability of selection is not equal
Confounding variable	a variable that may influence the data to such an extent that it would alter outcomes; it is crucial to control its effects in design or analysis
Corvid	a species belonging to the Corvidae family; e.g., ravens, crows
Covariable	a variable that may influence the data, that is not relevant to the objectives of the investigation but which must be controlled for in design or analysis
Detectability	the probability that a searcher will detect an existing carcass
Ephemeral	lasting for short periods; the river does not flow for most of the year
Factor	a categorical independent variable; categories of interesting levels, e.g. a factor may be size and its levels are small, medium and large
GPS	Global Positioning Satellite
Power analysis	a statistical procedure to determine the number of required subjects (replicates) in a study to show a significant difference at a predetermined level of significance and size of effect
Raptor	a bird of prey; e.g. eagles, falcons and owls
Replicates	the number of subjects in a study or per level, the number cannot be too few as you cannot make any definite conclusions
Searcher	an ecologist that will search for carcasses in the mortality programs
Significant difference	a statistical term referring to a difference between two or more variables or groups; it is based on the assumption that the two or more variables are the same and therefore if you find there is a pre-determined level of difference you can accept they are statistically different. This is a very simple definition, for more information, there are many online dictionaries
Significant impact	generally a reduction in the number of individuals in a population; a more refined definition is impossible here as they are species-specific
Species of concern	the Brolga and the Southern Bent-wing Bat
Sample/study population	as it is impossible to gather information from an entire population (i.e., like sampling all human height >6 billion people), this is reduced to a sample of the entire population and as long as assumptions and random sampling (etc.) are adhered to conclusions can be made about the study population and related to the entire population
Variable	a parameter that varies, there are different types of variables, but generally it is a parameter you are interested in (also called the dependent or response variable: as it responds to a factor or independent variable)
Variation	many values calculate an average, therefore the actual data varies; the variation is a general term to refer to the calculated variation of the data (also sometimes called error, but error is also a more complex phenomenon)

Appendix 1: Carcass data-sheet; to be used for any carcass searches, scavenger and detectability trials and incidental finds

RYAN CORNER WIND FARM – MORTALITY MONITORING PROGRAM: CARCASS DATA-SHEET*				
Details above the heavy line will be collected for each site searched. All details below the line are required if a carcass is found.				
Collector:		**Date:**	**Start Time:**	**Finish Time:**
Turbine identifier (incl. lit/unlit):				
Vegetation	**Description (inc. vege type):**			
	Ave. height:	**Density:** Very Dense / **Dense** / Moderate / Sparse / Very Sparse		
Temperature:		**Wind direction/speed:**	**Humidity:**	
Search purpose (e.g. scavenger trial):		**If scheduled search; search completed: Yes / No**		
Onsite works in last 5 days:				
Weather conditions in last 5 days:				
Comments:				
Carcass details	**Time:**	**Coordinates:**	**Substrate:**	
Distance from Tower(m):		**Bearing from Tower (deg):**		
Species common name: **Scientific name:**			**Sex/age?:**	
Photo Taken**	Yes / No			
Carcass condition:				
Signs of injury:				
How old is carcass estimated to be	<24 hrs	1-3 days	> 3 days	Other:
Other Notes: (incl. presence of stock)				

Please note: detailed information about each turbine (e.g. distance from water bodies) will be collected once; therefore the "turbine identifier" refers back to the information stored.

Post Find Actions:

1. Place carcass in sealable plastic bag then wrap it in newspaper and take to freezer at site office.
2. A copy of this completed form will be sent to the Regional Director, South West Region, Department of Sustainability and Environment, within seven days of the date of the carcass find.
3. One form should be completed for each carcass found
4. **Please attach photo to this form

Appendix 2: Symbolix Letter November 2020

symbolix

making your data work harder

To: Jackson Clerke
Nature Advisory
Via email

Ref #: BLARCAH20201117a
Date: 24 November 2020
CC:

Re: Ryan Corner Wind Farm - Mortality Program Review

To whom it may concern:

Thank you for requesting our review of the proposed Post Construction Mortality Detection Program at Ryan Corner Wind Farm, in south-western Victoria. This letter outlines the scope of the review, our appraisal of the study, and final comments.

Scope of works

We were engaged by Nature Advisory, on behalf of Global Power Generation Australia Pty Ltd, to:

- Review the proposed design of the Post Construction Mortality Detection Program (including carcass searches, scavenger loss and searcher efficiency trials) for Ryan Corner Wind Farm, VIC.
- Prepare a letter of advice regarding the efficacy of the proposed design, referencing statistical adequacy.
- Comment on the intensive Southern Bent-wing Bat survey program
- Comment on the use of brolga carcass equivalents in the scavenger trials

In reviewing the documentation, we refer specifically to the following documents:

- Ryan Corner Wind Farm Bat and Avifauna Management Plan (Brett Lane & Associates 2018) (hereafter *BAM Plan*)
- We specifically refer to:
  - Section 5.1 *Mortality detection* and subsections;
  - Section 6.1 *Intensive Southern Bent-wing Bat monitoring program*

  - Other sections only as relevant to the sections under review.

- "Ryan Corner BAM Plan DELWP comments.docx" - word document from DELWP to Nature Advisory (undated)

Appraisal of the mortality study program

What are the required objectives for the Mortality Program?

Under condition 20 of the permit for the wind farm, the BAM Plan's Mortality Program must deliver:

- *a monitoring program of at least 2 years duration, either commencing upon the commissioning of the last turbine of the first stage of the approved development and use (if any) or alternatively, such other time of commencement as is to the satisfaction of the Minister for Planning. The monitoring program must include surveys during the breeding and migratory seasons to ascertain:*
  - [. . .]
  - *seasonal and yearly variation in the number of bird and bat mortalities arising from the operation of the wind energy facility;*
  - *the efficacy of searches for carcasses of birds and bats and information on the rate of removal of carcasses by scavengers, so that correction factors can be determined to enable calculations of the total number of mortalities;*

In addition, targeted carcass searches for the Southern Bent-wing Bat are required as per requested from DELWP and Dr Lindy Lumsden (ARI).

In the BAM Plan the response to this requirement is to propose:

- A structured survey program designed to estimate the total mortality of birds and bats (and species/size groups if sufficient carcasses found).
- An intensive survey program at specific times of year and turbines, targeting the Southern Bent-wing bats

This letter will assess the design based on current understanding of best practice for estimating mortality from carcass search programs.

Appraisal of the design

We briefly assess the design of the various component surveys designed to quantify searcher efficiency, scavenger rate, and mortality for the main component of the mortality survey design.

Statistical adequacy - searcher efficiency

We refer to Section 5.1.5 *Detectability trials* of the BAM Plan.

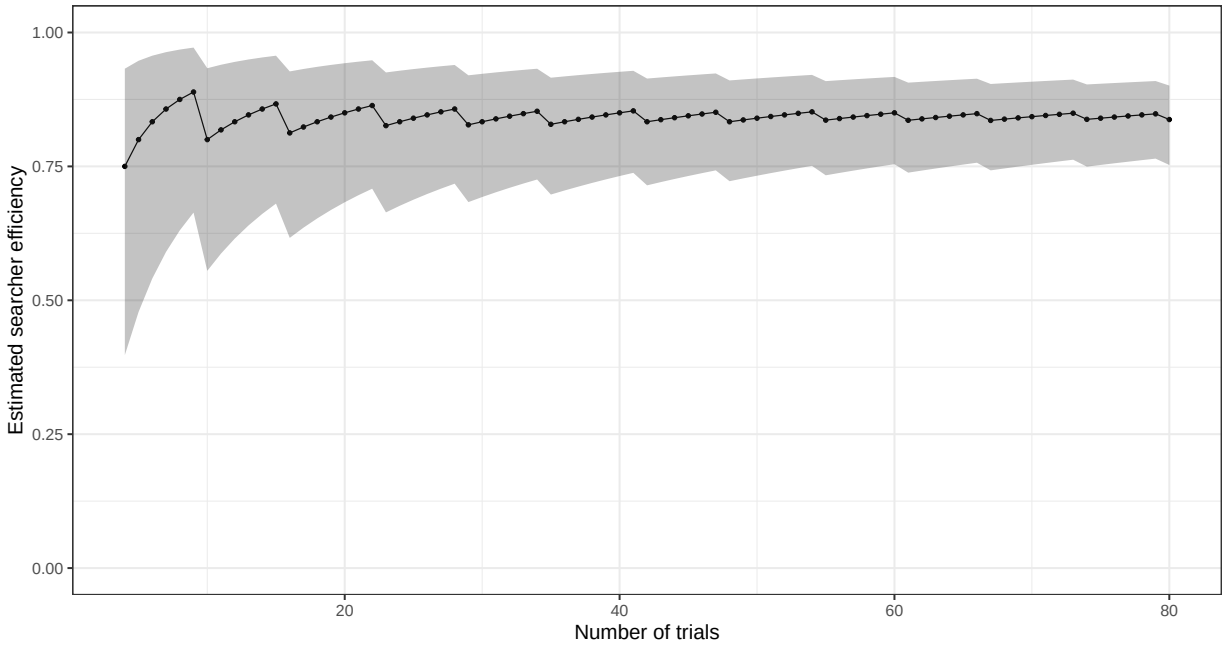

Figure 1: Estimated searcher efficiency (proportion of carcasses found) with 95% confidence bound for a given number of trials. Assumes an overall efficiency of 84.3%.

The above chart (Figure 1) has been calculated (Clopper 1934) as a scenario to highlight the issues with detectability trials. We have assumed that the "true" observer efficiency is 84.3%.

The coarse black line shows us the estimated efficiency, given a field trial of known sample size, and some number of detections. The 95% confidence window is shown by the grey shaded area. The jaggedness of all curves is a known effect, due to the nature of a dichotomous variable (i.e. "I found it/I did not find it").

There is little precision gain for adding more than 15-20 replicates for a given species class.

The number of replicates (20 microbats/small bird equivalents per year, 10 medium birds per year, and 10 large birds per year) proposed is statistically reasonable for the searcher efficiency, and will give appropriate confidence intervals for input into mortality estimation.

Statistical adequacy - scavenger rate trials

We refer to Section 5.1.4 *Scavenger rates and trials* of the BAM Plan.

We measure time to (scavenger) loss with on-ground trials and analysis using standard survival study methods ((Kaplan and Meier 1958), (Terry M. Therneau and Patricia M. Grambsch 2000)). Although cameras will be used at Ryan Corner, we still support survival methods to account for any unknown loss times (e.g. carcasses still in place at end of trial).

If we assume an exponential loss function for carcasses, the relative standard error (RSE) is a simple function of the number of carcasses lost: RSE $= 1/\sqrt{n}$. As Figure 2 shows, the precision is not vastly improved by increasing the numbers of trials.

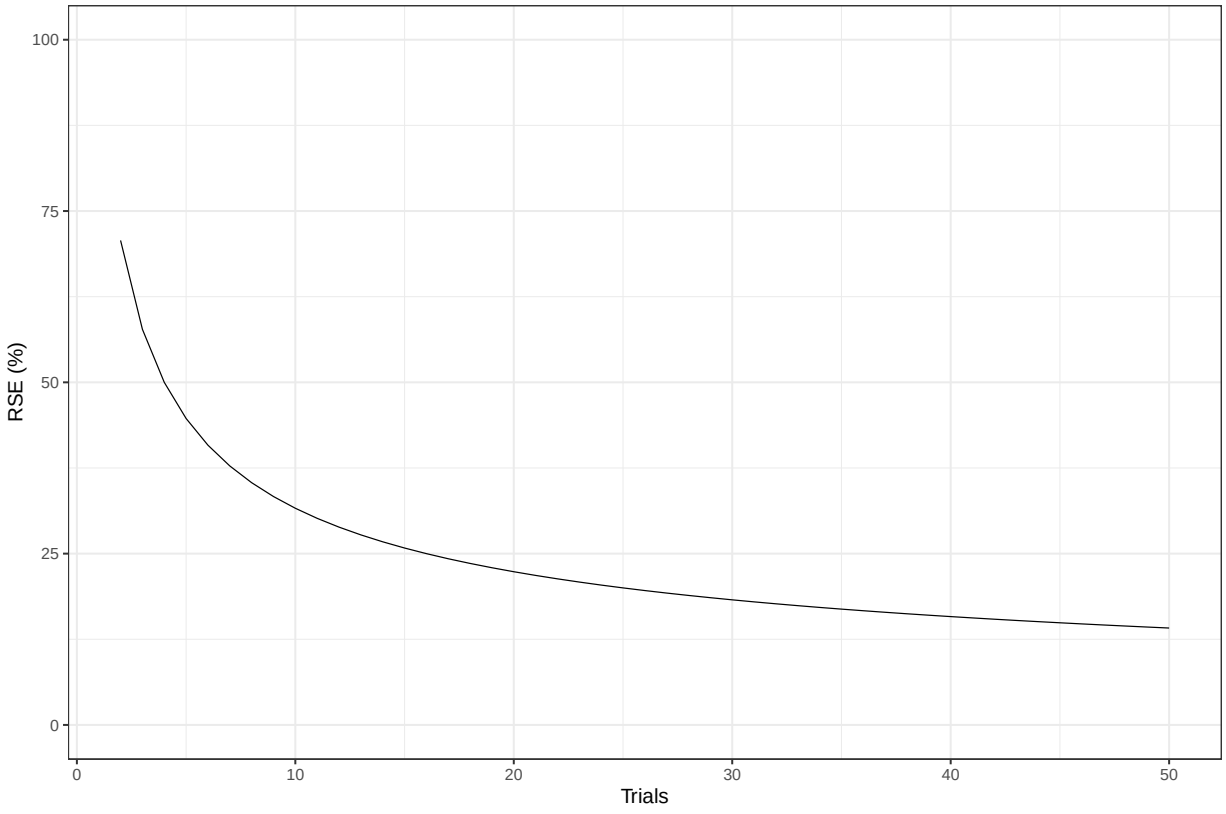

Figure 2: Relative standard error of scavenger rate as a function of carcasses lost

We would recommend 10 replicates per species class as a minimum. **The survey design proposed exceeds this, and therefore we conclude it is statistically sound.**

Statistical adequacy - carcass searches

We refer to Section 5.1.2 *Turbine selection* and 5.1.3 *Search protocol* of the BAM Plan.

The proposed carcass surveys will sample one-third of the turbines minimum (19 of 56). There

is no strict statistical rule for the right number of turbines sampled. It is more important to ensure the turbines are selected at random (assuming all turbines are accessible). This is the only way to enable an unbiased estimate of mortality. The survey will run for a minimum of two years, and has at least one survey per month, capturing seasonal variation on-site.

We also recommend the same turbines are searched each month. Having a consistent minimum time between searches minimises the variability in estimating the change a carcass has been lost to scavenge since the last survey.

The survey (as proposed in the BAM Plan) complies with these suggestions, and is statistically sound.

The proposed search areas (60m inner zone, and 120m outer zone) will capture 95% of the fall zone for bats and 95% of the fall zone for birds, according the models implemented from (Hull and Muir 2010).

Selection and timings

The three component surveys above are based on a single geographical site stratum. The land cover on the site is characterised as cleared grazing land with a limited number of small remnant areas of native vegetation (BAM Plan Section 1 *Introduction*). The choice of a single stratum is reasonable in this case.

Selecting turbines at random for the carcass search sample will ensure a unbiased sample of the turbines This is required to achieve a unbiased estimate of site mortality.

The searcher efficiency and scavenger rate trials will be timed to occur at times of the year that represent low vegetation load versus high vegetation load. This is a reasonable compromise between running multiple trials throughout the year, but still sampling the range of conditions that impact detection/scavenge activity.

Appraisal of the intensive bat survey

We refer to Section 6.1 *Intensive Southern Bent-wing Bat monitoring program* of the BAM Plan.

It has been requested by DELWP and Dr Lindy Lumsden (ARI) that intensive carcass searches for the Southern Bent-wing Bat are undertaken in Feb-Mar, and Oct-Nov. There are 17 selected turbines for this program, which are located to the west of the farm, and in proximity to nearby forest and river habitat. These turbines will be searched weekly in the 60m inner zone during the intensive survey period, using standard search protocols.

We discuss this separately to the general mortality study appraisal, as this is non-standard survey procedure.

The selection of turbines and timing of surveys for this program is non-random. Therefore, the

any analyses on this subset of turbines cannot be generalised to the whole of the farm, other Victorian sites, or other time periods. The data cannot be combined with the general mortality data.

As standard search protocols are used, an estimate of total Southern Bent-wing bat mortality can be obtained for the selected turbines and time periods only, using searcher efficiency and scavenger rate results from the general trials.

To summarise:

The DELWLP proposed change (Nature Advisory, n.d.) from monthly pulsed surveys to weekly surveys does not weaken the survey design, and is a statistically valid change. We caution that this data cannot be used to determine mortality for the period for the whole site (as the turbines are not statistically sampled but chosen in a biased way, based on assumption of higher risk). If a mortality estimate is carried out on these data, it is only applicable to the turbines and date ranges of the weekly surveys.

Comment on brolga equivalents in the scavenger and detectability trials

We note the recent request from DELWP to amend the scavenger and detectability trials to include 10 brolga equivalent carcasses.

It's not possible or ethical to source brolga carcasses for this trial and (we understand from conversations with Nature Advisory Ecologists) large birds like turkeys would have to be purchased live and culled by the field crews.

It's outside the scope of our professional training to quantify the ethical and OH&S implications of this request; suffice to say that we will not certify a design that requires ecologists to undertake animal slaughter without full ethics clearance and a very strong research justification. Contributing inputs to a statistical model for the purpose of furthering our research knowledge of the cumulative impacts of wind farms is not a strong enough justification, in our professional view as statisticians and environmental practitioners.

What are the implications if brolga-equivalent carcasses are not sourced?

- Mortality estimates can use scavenger / detectability rates determined from the large bird or general bird cohort in the proposed trials.
  - We do not know for certain the scavenge rate or searcher efficiency for brolgas. We do know that another roughly brolga-sized large bird, the Wedge-tailed Eagle, has a very long time to carcass loss (Stark 2020). Other birds / large birds in general (e.g. raven sized) do not have as long time to carcass loss as the WTE. We also know that birds (in general) have a high rate of detection in Victoria.
  - This suggests that using general bird / large bird rates as a proxy for brolga would

result in an underestimate of time to scavenge and a corresponding **overestimate** of mortality for brolga species. That is, we would tend to predict more brolga mortalities than then the actual. This is manageable with clear communication of the analysis assumptions when analysis is done.

- The Operational Procedures in the plan require immediate investigation upon **detection** of any threatened species, including Brolga.
  - As there is already a management plan based on actual counts of carcasses the role of the mortality estimation for brolgas is one of knowledge gathering rather than direct management or compliance. That is, the mortality estimates are useful for determining inputs for any future landscape scale cumulative research DELWP wishes to conduct.

With these considerations in mind we do not support the requirements to include brolga proxies in the study.

Final remarks

The survey program represents standard statistical best practice for estimating mortality at a wind farm, and satisfies the condition of the permit. It is consistent with other sites in Victoria, which enables future combined analysis. The pulse survey protocol over summer/autumn accounts for the shorter scavenge times expected for bat species.

The weekly carcass searches during October-November and February-March will use the same field protocols as the main survey. The data from these surveys will *"be available to DELWP and Dr Lumsden in hard-copy or electronic form and the information incorporated as a separate data appendix in the annual report"* (Brett Lane & Associates 2018). It is appropriate to treat this as a separate survey - the biased selection of turbines precludes its inclusion in an estimate of total site mortality.

The scavenger and detectability trials as proposed represent current best practice for these adjunct surveys. We do not support for the inclusion of brolga proxies in addition to the carcass sizes proposed. The statistical benefit does not outweigh the potential OH&S and ethical issues involved with sourcing carcasses of that size.

Regards,

Dr Elizabeth Stark MEIANZ

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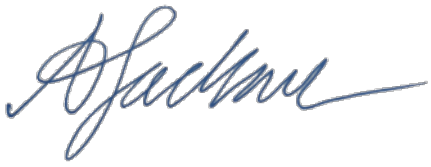

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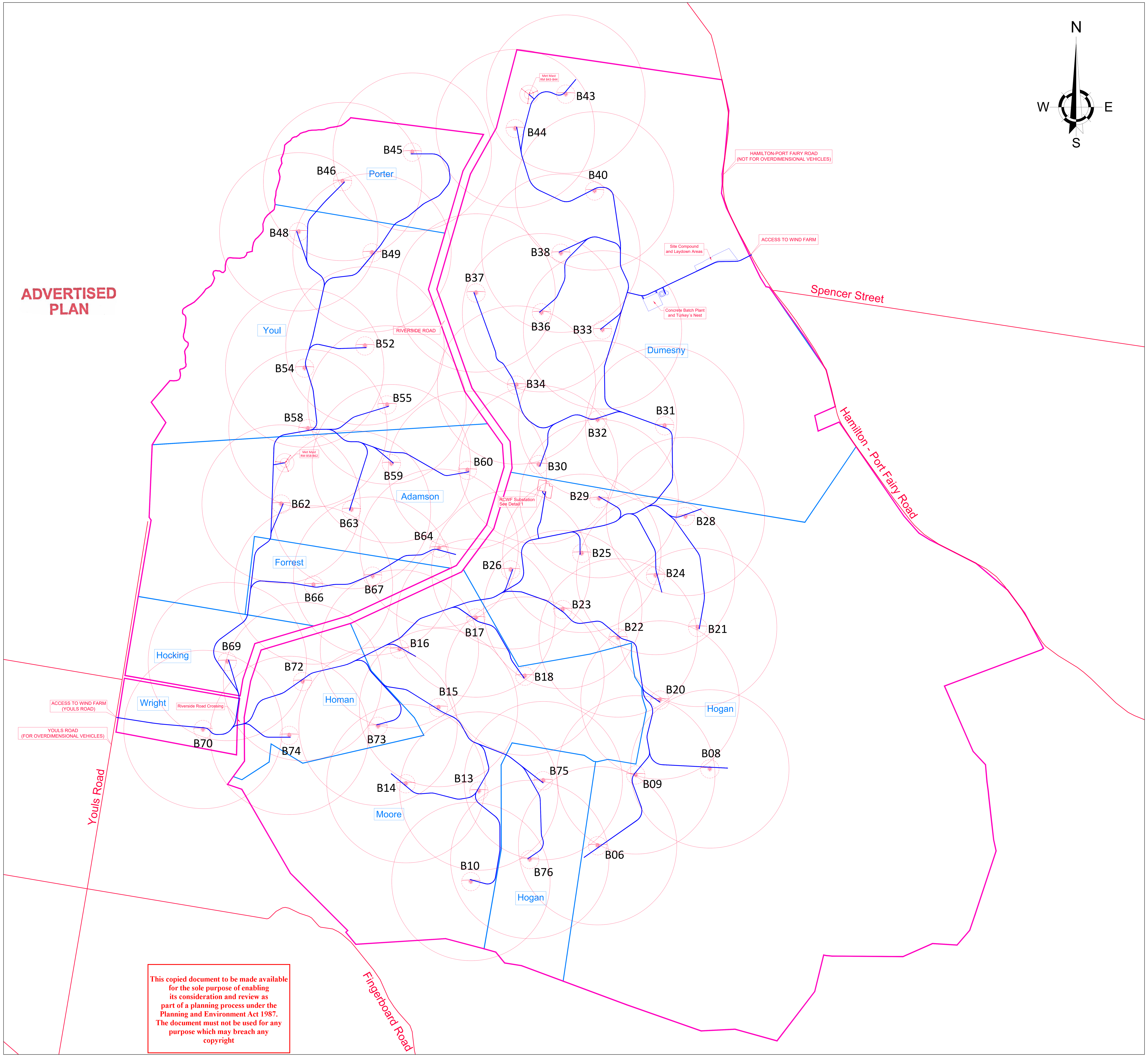
Appendix 3: Figure with radius of 600 metres around each turbine



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TURBINE ID.	GDA94 - MGA Zone 54 Coordinates (m.)		TURBINE ID.	GDA94 - MGA Zone 54 Coordinates (m.)	
	Eastings (X)	Northings (Y)		Eastings (X)	Northings (Y)
B6	598877	5759061	B38	598599	5763549
B8	599727	5759643	B40	598854	5764021
B9	599166	5759598	B43	598636	5764754
B10	597917	5758790	B44	598253	5764493
B13	597978	5759475	B45	597473	5764315
B14	597425	5759531	B46	596945	5764092
B15	597672	5760108	B48	596613	5763711
B16	597376	5760551	B49	597168	5763552
B17	597955	5760786	B52	597115	5762847
B18	598326	5760346	B54	596658	5762679
B20	599349	5760165	B55	597282	5762400
B21	599635	5760715	B58	596683	5762220
B22	599032	5760635	B59	597315	5761955
B23	598613	5760850	B60	597891	5761905
B24	599316	5761108	B62	596480	5761649
B25	598757	5761276	B63	597013	5761607
B26	598219	5761151	B64	597676	5761315
B28	599542	5761555	B66	596725	5761036
B29	598888	5761690	B67	597173	5761103
B30	598430	5761948	B69	596072	5760456
B31	599385	5762242	B70	595888	5759942
B32	598877	5762286	B72	596642	5760305
B33	598914	5762968	B73	597214	5759966
B34	598263	5762550	B74	596541	5759897
B36	598452	5763098	B75	598465	5759554
B37	597956	5763248	B76	598363	5758957

POINT ID	GDA94 - MGA Zone 54 Coordinates (m.)	
	Eastings (X)	Northings (Y)
Ryan Corner WF Substation - Fence Setout		
F1	598433.0447	5761833.8340
F2	598490.2903	5761824.5098
F7	598420.1837	5761754.8745
P1	598487.2540	5761805.7593
P2	598513.4093	5761801.4992
P3	598510.9797	5761786.6919
P4	598537.1350	5761782.4317
P5	598529.7400	5761737.0300
P6	598477.4294	5761745.5503
P7	598522.5058	5761692.6153
P8	598486.4805	5761698.4831
P9	598482.0054	5761708.3306
Met Mast		
RM B58-B62	596508.00	5761962.00
RM B43-B44	598357.00	5764752.00

SUBSTATION LOCATION - DETAIL 1
SCALE 1/2000

LEGEND

- WIND FARM BOUNDARY
- WIND FARM ROAD
- PLOT - LANDOWNERS
- WIND TURBINE & HARDSTAND AREA
- MET MAST

GPG
OPEN DRAWING EDITION
COPY FOR:
COMMENTS
Date: 29/04/2024

NOTES
1. CAD file and external reference files are in GDA94 - MGA zone 54 Coordinate System.
2. Dimensions in meters

0 100 250 500 750 1000 1500m
GRAPHIC SCALE 1/15000

1		SAM	SAM	DHJM	BMJ	INFORMATION
Ed.	Date	Designed	Pr. Eng.	Revised	Approved	Issued For

Ryan Corner Development Pty Ltd

PROJECT:
RYAN CORNER WIND FARM

DRAWING TITLE:
WIND FARM GENERAL LAYOUT
600 m. radius influence from wind turbines

SCALE: INDICATED

GPG Naturgy Group

CUST. CODE:
GPG CODE: 31405I00nnn
SHEET NEXT

DIN-A1