

Diapur Bat and Avifauna Management Plan



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Revision No	Date	Report Actions	Author	Reviewer	Review Date
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FINAL	19/12/2018	DELWP Amendments	Rob Gration	Tiago Brandão	19/12/2018
FINAL Amend 1	18/01/2019	Amend turbine AGL height	Rob Gration	Tiago Brandão	21/01/2019
FINAL Amend 2	11/01/2019	Amend turbine blade length	Rob Gration	Tiago Brandão	21/01/2019


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1 Introduction

1.1 Site Background

The Diapur Wind Farm is located at Diapur approximately 20km west of Nhill Victoria (refer to Figure 1), 350 kilometres north-west of Melbourne. The Diapur Wind Farm occurs in the Wimmera bioregion in the Wimmera Catchment Management Authority area (CMA) and within the jurisdiction the Shire of Hindmarsh.

The Diapur Wind Farm was to consist of two wind turbines (refer to Figure 2), each with a maximum tip height of 200 metres and a minimum Rotor Swept Area (RSA) height of 60 metres Above Ground Level (AGL) and maximum blade length of 75m. Diapur Wind Farm Pty Ltd is currently seeking an amendment to reduce the minimum Rotor Swept Area (RSA) to a height of 50 AGL whilst still maintaining a maximum tip height of 200m. In light that Ecology and Heritage Partners (2017) assessed the study area based on a maximum tip height of 220m and minimum rotor swept area of 24m AGL, the procedures in this BAMP as they stand are still applicable.

The total construction impact area is approximately 4.42 hectares including access tracks, cables and turbine hardstands (E&HP 2018).

The Bat and Avifauna Management Plan herewith is based on the findings of site assessments undertaken by Ecology and Heritage Partners (E&HP) on 13 and 14 October 2015 (EHP 2017) and input from representatives from DELWP's Grampians office.

1.2 Bird and Bat Management Plan Objectives

The objectives of this BAMP are to establish a monitoring framework aimed at answering the following:

- Is operation of the wind farm resulting in significant levels of bird and microbat mortality?
- What is the estimated annual mortality rate?
- What species are being impacted?
- Is there seasonal variation in the number of bird and bat mortalities?

Describe mitigation measures to reduce the risk of bat and bird mortality through turbine strike:

- Provide a framework for responding to detected impacts on bats and birds.
- Detail procedures for the periodic reporting to DELWP.
- Provide a clear summary of management actions required to address the Conditions of Approval (CoA).

Following endorsement of this BAMP, Diapur Wind Farm Pty Ltd will be responsible for engaging suitably qualified ecologists to implement the BAMP.





1 0 1 2 3 4 km



Legend

 Study Area

Figure 1: Diapur Wind Farm Location

Map Projection: Simple Mercator
WGS 84



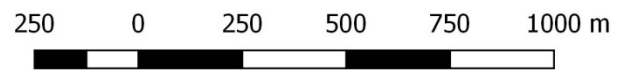
Drawn by: Rob Gratton

Date: 7/11/18

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Map Projection: Simple Mercator
WGS 84



Legend

-  Turbines
-  Development Footprint

Figure 2: Diapur Wind Farm Site

Drawn by: Rob Gratton

Date: 7/11/18

Drawing No: 1002062

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1.3 Site Context

The EHP (2017) site assessment identified approximately 37ha of native vegetation and 42 scattered trees within the wider study area. One community of state significance was present within the study area; Grey Box – Buloke Grassy Woodland (#434). No communities of national significance occur. Vegetation communities present within the project footprint include:

- Low Rises Woodland EVC_ 66 (Endangered)
- Sandstone Ridge Shrubland EVC _ 93 (Vulnerable)
- Lowan Sands Mallee EVC_ 882 (Vulnerable).

Twenty-nine native fauna species were recorded within the study; 28 birds and one reptile. No significant fauna species were recorded in the study area during the field assessment (E&HP 2017).

Notwithstanding the lack of records of threatened fauna within 10km buffer the study area, E&HP (2017) noted that there is suitable habitat, albeit marginal, within the site for the nationally threatened Red-tailed Black-Cockatoo south-eastern subspecies (RTBC). They considered that: *“Given the very small extent of potential habitat proposed for removal and availability of similar and higher quality habitat in the broader landscape, the project is considered unlikely to significantly impact upon the RTBC”*.

There are two historical records (1978 & 1979) of the *Flora and Fauna Guarantee Act 1989* (FFG Act) listed Eastern Great Egret *Ardea modesta*. *“Eastern Great Egret is likely to occasionally forage within the study area, particularly within areas of pasture following rainfall events. Given the small size of the proposed wind farm and low likelihood of large numbers of Eastern Great Egret regularly using the study area, the potential operational impacts on the species are likely to be low (E&HP 2017)”*.

Microbats are known to be susceptible to collision with wind turbines, in a particular White-striped Freetail Bats and Gould’s Wattle Bat (E&HP 2017). A review of VBA contains no bat records within 10 kilometres of the study area. The lack of records was considered an artefact that surveys have not been undertaken in the region rather than, the surrounding landscape does not support bat populations (E&HP 2017).

1.4 Compliance

The issued Planning Permit (PA1700251) states the requirement to prepare a Bird and Avifauna Management Plan (BAMP) Plan, aimed at minimising bird and bat strike events as a result of the operation of the wind farm.

EcoAerial was engaged by Diapur Wind Farm Pty Ltd to develop a Bat and Avifauna Management Plan (BAMP) in consultation with DELWP, to address the following planning permit conditions:



Condition 34: *The Environmental Management Plan must include a Bat and Avifauna Management Plan (BAM Plan), which must:*

- a) *include a statement of the objectives and overall strategy for minimising bird and bat strike arising from the operation of the facility*
- b) *include a mortality monitoring program of at least two years duration that commences when the first turbine is commissioned or such other time approved by DELWP (Environment Portfolio). The monitoring program must include:*
 - i. *procedures for reporting any bird and bat strikes to DELWP (Environment Portfolio);*
 - ii. *information on the efficacy of searches for carcasses of birds and bats, and, where practicable, information on the rate of removal of carcasses by scavengers, so that correction factors can be determined to enable calculations of the likely total number of mortalities; and*
 - iii. *procedures for the regular removal of carcasses likely to attract raptors to areas near turbines.*
- c) *Be prepared in consultation with DELWP Environment Portfolio prior to submission to the responsible authority.*

Condition 35: *When the monitoring program required under the BAM Plan is complete, the operator must submit a report to the responsible authority and DELWP Environment Portfolio setting out the findings of the program. The report must be:*

- a) *To the satisfaction of the responsible authority and DELWP Environment portfolio*
- b) *Made publicly available on the operator’s website.*

Condition 36. *After considering the report submitted under Condition 34 and consulting with DELWP (Environment Portfolio) the responsible authority may direct the operator to conduct further investigation of impacts on birds and bats. The further investigation must be undertaken by the wind energy facility operator to the satisfaction of the responsible authority and DELWP Environment Portfolio.*

1.5 Acronyms

Acronym	Description
BAMP	Bird and Avifauna Management Plan
CoA	Conditions of Approval
DELWP	Victorian Department of Environment, Land, Water and Planning
E&HP	Ecology and Heritage Partners
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
FFG Act	<i>Flora and Fauna Guarantee Act 1988</i>
RTBC	Red-tailed Black-cockatoo (<i>south eastern form</i>)
RSA	Rotor Swept Area
VBA	Victorian Biodiversity Database


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2 Operational Monitoring Program

The mortality analysis is based on completion of carcass searches, scavenger trials and detectability trials. The objective of the analysis of these combined attributes is to answer the following:

- Is operation of the wind farm resulting in significant bird and microbat mortality?
- What is the estimated annual mortality rate?
- What species are being impacted?
- Is there seasonal variation in the number of bird and bat mortalities?

Notwithstanding that the CoA states monitoring for 2-years is required, the second year of monitoring may not be warranted. In the event that the first year of monitoring provides sufficient information to not warrant another year of monitoring, or the risk to birds and bats is considered low, DELWP will be consulted to review the existing monitoring program. Options may be to cease monitoring or instigate alternative measures.

The first year of monitoring will commence within 30-days of the two proposed turbines being commissioned for operation. All monitoring activities will be undertaken by suitably qualified and experienced ecologist/s.

2.1 Carcass Searches

Monthly carcass searches will be undertaken at each turbine site to a 75m radius from the turbine tower. In order to reduce error and refine mortality estimates, a pulse search method will be employed, whereby a second carcass search (pulse search) will be undertaken two days following each primary search (Stark in press).

Searches will commence when suitable conditions prevail that provides good ground visibility. The ecologist will walk concentric transects (refer to Figure 3) around each turbine tower (2) at four metre intervals. A range finder will be directed at the turbine tower to maintain the correct transect spacing. A GPS will be carried to record transects for use in subsequent monitoring. This data will be collated and provided as GIS Shapefiles with the final data submission to DELWP. Each primary and pulse event will inspect an area within 75 metres of each turbine.

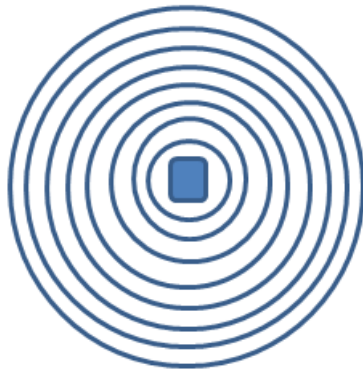
The following steps will be undertaken during each event:

1. The searcher will walk at approximately 30-60 metres per minute (slow walking pace) and search thoroughly for carcasses.
2. The Carcass Search Data Sheet will be completed (Appendix A).
3. Remove carcasses to avoid re-counting.
4. Handled by personnel wearing gloves, packed into a plastic bag, wrapped in newspaper and placed in a second plastic bag.
5. Clearly labelled with the species name, turbine number, waypoint number and survey date.



6. Transferred to a freezer for future use in scavenger/ detectability trials. Any specimens not used for subsequent monitoring will be stored for a minimum of 12 months and offered to DELWP prior to disposal.
7. Where the searcher is unable to identify the species of any carcass found, specialist advice will be sought.
8. In event that any carcasses of conservation-listed species are collected, DELWP will be notified within seven days. Records of non-conservation-listed species will be incorporated into reporting.
9. Carcass searches will cover both birds and bats and will be treated in accordance with the procedures outlined above.

Figure 3: Example of concentric transects at 4m intervals.



Notwithstanding the blade radius is 75m, there is currently no mortality models for 75m. The estimated total of mortalities will be based on the following proportion of bird and bat fatalities falling within a 60-meter radius (Hull & Muir 2010) and; adjusted accordingly by the contracted statisticians:

- Bat- 0.77
- Small bird- 0.59
- Medium bird- 0.54
- Large bird-0.46.



2.2 Scavenger Trials

Scavenger trials will be undertaken in the first year and second year, (unless otherwise agreed upon with DELWP), to estimate the length of time bat and bird carcasses remain detectable before being taken by scavenged. Scavenger trials will be undertaken immediately after the monthly carcass search is completed.

The carcass duration and confidence interval will be used to refine mortality estimates and account for the likely effects of scavengers on carcass detectability. Two one-month scavenger trials will be undertaken, one when vegetative ground cover is present (September or October), and one when vegetative cover is low (March or April). The following steps will be undertaken during each event:

1. At each turbine, two bat carcasses or surrogates (e.g. mice) and three bird carcasses or surrogates (feral pigeon or chickens) will be placed randomly within the 75 metre search area of each (2) turbine. Fresh carcasses will be used where possible. Normal OH&S procedures will apply e.g. gloves etc.
2. Conduct a manual inspection twice a day for at least the first 3-days then once a day thereafter for 3 days then every second day until the carcass is totally removed.
3. Weekly checks will be undertaken to record the state of carcasses and ensure that any scavenged carcasses have been moved outside the 75 metres search area.
4. The inspections will either continue for one month or cease if all carcasses have been removed by a scavenger prior to the one month period.
5. All carcasses will be removed after one month.
6. The persistence of carcasses and confidence interval at each turbine will be calculated and the results will be incorporated into the mortality estimate.
7. If a carcass is found, the relevant sections of the Carcass Search Data Sheet (Attachment A) will be completed.

2.3 Searcher Efficiency Trials

Detectability trials will be undertaken in the first year, and second year, (if required), to estimate searcher efficiency and refining mortality estimates. Two detectability trials will be undertaken immediately after a monthly carcass search. Each detectability trial will use five randomly placed carcasses (as per scavenger trials) at each turbine. The following steps will be undertaken during each event:

1. The timing of the two detectability trials will be randomly selected; however the selection process will ensure seasonal variation (i.e. Spring - September / October, and Autumn - March /April).
2. Carcasses will be deployed by personnel not performing the searches and will be placed in a variety of exposures to simulate a range of conditions. All personnel undertaking carcass searches will be subject to detectability trials.
3. The trials will be conducted as blind trials i.e. the searcher will not know the location of the carcasses, proportion of carcass types or timing. The searcher will deploy same search method as intended for standard carcass searches.
4. Results will be entered into the Detectability Trial Data Sheet (Attachment A).

2.4 Incidental Finds Protocol

During operation of the wind farm, carcasses may be discovered by personnel not engaged to implement this BAMP (e.g. technicians or landowners). Site users will be informed of the information they are required to collect should they discover a carcass and, who the relevant contact person is to forward the carcass information. The following information will be collected:

1. Carcasses will be photographed where they are found and the Carcass Search Data Sheet will be completed (Attachment A).

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2. The carcass will be placed in a plastic bag and stored in accordance with the procedures outlined for carcasses searches.
3. Any injured animals will be treated in accordance with the Injured Bird and Bat Protocol (see below).
4. In event that any carcasses of conservation-listed species are recorded, DELWP will be notified within seven days of the Diapur Project Manager being notified of the find. Records of non-conservation-listed species will be incorporated into annual reporting.

This protocol is valid for the operational life of the wind farm.

2.5 Injured or Dead Bird and Bat Protocol

The contracted Project Ecologist will identify local wildlife carers and / or veterinarian to deal with any injured wildlife found once the turbines are operational. All site users as part of their site induction will be informed of the protocols to deal with injured wildlife, (or carcasses), and the reporting requirements. The following sequence of actions will be undertaken by the person who finds the wildlife:

1. If safe to do so, take a photo of the animal.
2. Contact the Diapur Wind Pty Ltd Project Manager and / or Project Ecologist.
3. Ensure the animal is handled as little as possible. Where appropriate Personnel Protective Equipment (PPE) when handling any injured fauna, including a long-sleeved shirt, gloves, boots and eye protection.
4. Injured bird or bats will be placed in a box or cloth bag and kept in a warm, quiet and dark location. Arrange pickup or delivery of the injured animal. Where required, injured animals will be transported directly to a licensed wildlife carer or shelter.
5. Diapur Wind Pty Ltd Project Manager and / or Project Ecologist will notify DELWP of any injured or carcasses of conservation-listed species within seven days of discovery. Records of non-conservation-listed species will be incorporated into annual reporting.

This protocol is valid for the operational life of the wind farm.

2.6 Analysis of Results and Reporting

The methods outlined in this BAMP have been developed based on relevant literature and is consistent with BAMP's developed for similar wind farm developments. The carcass and searcher efficiency data sheet is based on statistical analysis sheets designed by Symbolix Pty Ltd; a specialist data analysis company with extensive experience in the wind farm sector. The information required for the scavenger trials should be discussed with suitably qualified data analysts engaged to undertake the statistical analysis.

The results of mortality monitoring will be analysed to provide the following information:

1. The species, number, age and sex (if possible) of birds and bats mortalities as a result of turbine strike.
2. Any seasonal variation in the number of bird and bat strikes
3. An estimate of the annual number of bird and bats killed as a result of wind farm operations.



The mortalities will be corrected for detectability, scavenger loss and incomplete coverage of the possible fall zone area. The estimated total mortality will be calculated for birds and bats and reported as an average (mean) loss, standard error and confidence level.

The selected method will be as described by Stark (in press) to generate the likely range of mortalities.

All raw data generated from carcass searches, detectability trials, scavenger trials and the will be incorporated into an annual report, including maps detailing the transects for each carcass search.

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3 Mitigation Measures

EHP (2017) considered the risk to birds and bats at the Diapur Wind Farm negligible to low risk. Notwithstanding this, the following mitigation measures address the CoA requirements to further reduce risk of bird and bat mortality.

3.1 Carrion Removal Protocol

The wind farm is located within a rural setting with the paddocks used for cereal cropping (80%) and grazing (20%). Although the presence of carrion is likely to be minimal, carcasses are known to attract raptors and scavengers, (ravens butcherbirds etc.), and will require the removal of carcasses to reduce the risk of attracting birds near the RSA.

The following protocols will be adopted, in consultation with the landowner, for the operational life of the wind farm:

1. Ensure any carrion stockpiles/ pits (i.e. during lambing if applicable) are located at least 500 metres from the nearest turbine.
2. All site personnel / contractors will be responsible for notifying the Diapur Wind Pty Ltd Project Manager of any carrion within 250 metres of the turbines.
3. The Project Manager will notify the landowner and arrange for any carrion to be removed. The removal of carrion will be recorded by the Project Manager and forwarded to the project ecologist for inclusion in the annual report.
4. In the event that large numbers of European Rabbit (>5 individuals or warren activity) are sighted within 250 metres of a turbine, control measure will be undertaken in consultation with the landowner.

3.2 General Mitigation Measures

The Diapur Wind Pty Ltd Project Manager will consult with the landowner to ensure that grain stock piles and stock feed is located no closer than 250m from the nearest wind turbine.



4 Responding to Adverse Event

This following section provides a decision framework in the scenario the monitoring program detects a significant impact on conservation-listed species. Conservation-listed species include those listed as threatened under the EPBC Act and / or FFG Act.

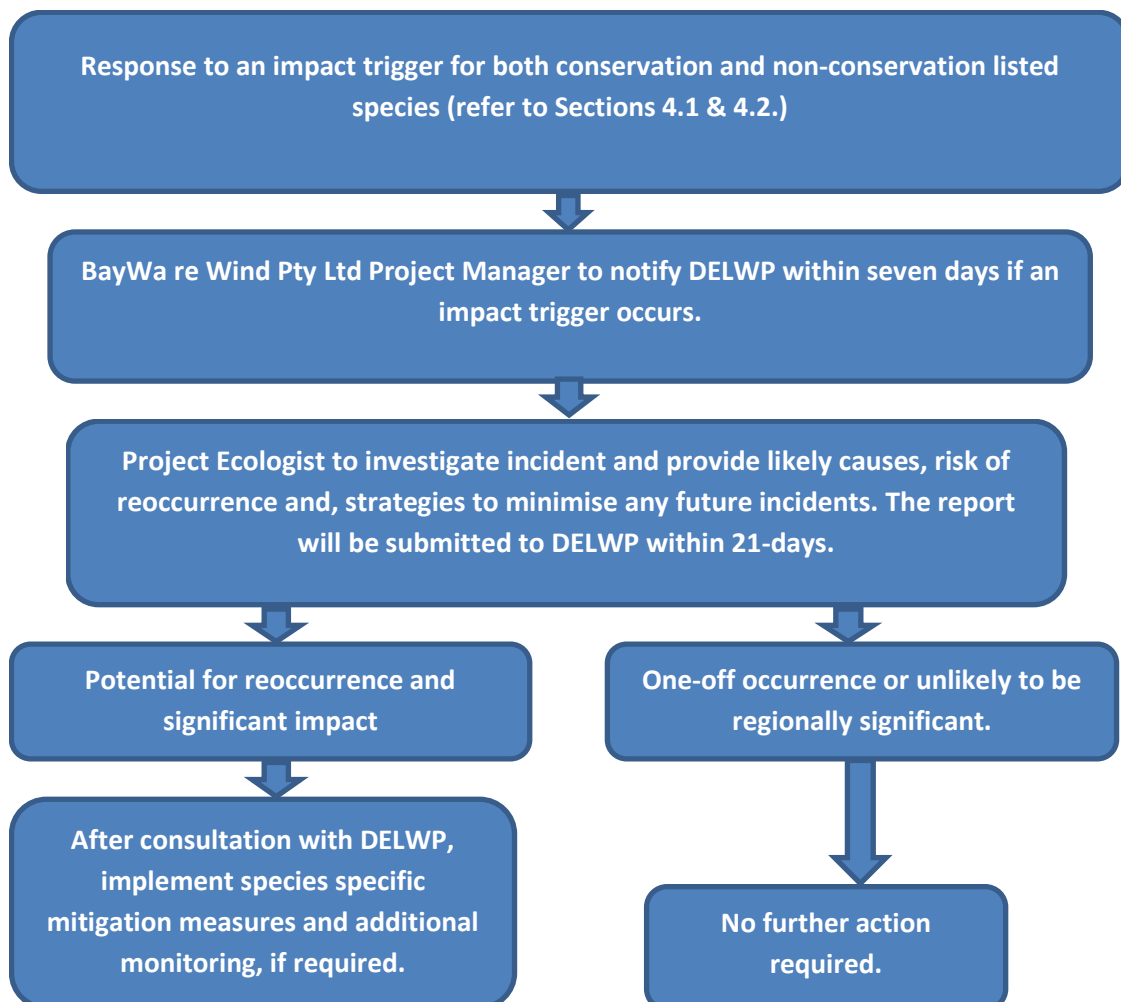
4.1 Conservation-listed Species

A significant impact will be confirmed if:

- Two or more carcasses of any conservation-listed species are found dead across the two turbines during any one year monitoring period (Year 1 or Year 2).

The process outlined in the flow chart below will be implemented to investigate the likely cause and identify measures to further reduce the risk of reoccurrence to conservation listed species.

Figure 4: Significant Impact Flow chart



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4.2 Non Conservation-listed Species

A significant impact will be confirmed if:

- Five or more carcasses of one species (excluding Magpies, Ravens and Pipits) are found dead across the two turbines during one annual monitoring period (Year 1 or Year 2).

In the event that an impact trigger for non-conservation-listed species occurs, the process outlined in Figure 4 above will be implemented to investigate the cause of death and identify measures to further reduce the risk of reoccurrence.



5 Reporting

An annual report will be submitted to DELWP within one month of completing the Year 1 monitoring program. The report will detail the methods and results of monitoring, and focus on providing recommendations for Year 2, specifically if ongoing monitoring is warranted or if alternative measures should be investigated.

The contents of the Year 1 report will include, but not be limited to the following:

- Detailed survey methods (including list of observers, dates and times of observations).
- Estimates of bat mortality rates based on carcass searches, detectability trials and scavenger trials.
- Any detected mortality for all species recorded during the carcass searches.
- Any other wind turbine related bird and bat mortality recorded on site but not during designated carcass searches (i.e. incidental records by site personnel, etc.).
- Raw data sourced from carcass searches, detectability trials and scavenger trials.

A discussion of the results, including:

- Whether indirect impacts on bird and bat use of the site are of significance at a regional, state or national level, or if listed species were affected indirectly.
- Whether the level of mortality was ecologically significant for birds and / or bat species.
- Whether continuation of the monitoring program is warranted and, if so, in what form.
- Any discernible differences in collision rates between lit and unlit turbines, where relevant.
- Any recommendations for reducing mortality, if necessary.

A second annual report will be submitted to DELWP following the completion of Year 2. This report will detail activities undertaken during the second year of monitoring, any alternative measures and an overview of the full two-year program of works. The Year 2 results will be reviewed by DELWP and the Responsible Authority to determine whether further monitoring and reporting is required.

In event that a carcass of conservation-listed species is recorded, DELWP will be notified within seven days. Records of non-conservation-listed species will be incorporated into annual reporting.

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If a significant impact occurs (refer to Section 4.1), DELWP will be contacted within 24-hours to discuss the incident and to initiated strategies to both investigate and if required, implement potential mitigation measures. Any significant impact event will be included in annual reporting and made publicly available on the Diapur Wind Farm website

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6 Summary of Actions and Responsibilities

6.1 BAMP Checklist

Table 1 provides a summarised account, in chronological order, of the tasks, responsibilities and timing for the BAMP's implementation. As each action is implemented and / or undertaken they should be marked in the relevant completed cell.

Table 1: Actions

Task: Year 1	Responsibility	Timing	Completed
1. Ensure resources are available to commence the monitoring program (e.g. access to freezer for collected carcasses).	Diapur Wind Pty Ltd Project Manager	Prior to operation of the turbines.	
2. Ensure that the landowner/s; site personnel and contractors are inducted as to the procedures should they find a carcass.	Diapur Wind Pty Ltd Project Manager	Prior to operation of the turbines.	
3. Project Ecologist engaged	Diapur Wind Pty Ltd Project Manager	Prior to operation of the turbines.	
4. Identify local wildlife carers / veterinarian.	Project Ecologist	Prior to operation of the turbines.	
5. Carcass searches	Project Ecologist	Monthly checks (12/year)	Jan Feb Mar Apr May June Jul Aug Sept Oct Nov Dec
6. Scavenger trial	Project Ecologist	Two one-month trials Spring / Autumn.	Sep or Oct Mar or Apr
7. Detectability trials	Project Ecologist	Two trials undertaken in conjunction with monthly carcass searches in Spring and Autumn.	Sep or Oct Mar or Apr
8. Notify PM of any conservation listed found	Project Ecologist	Within 24-hours of carcass being found.	
9. Notify DELWP of any conservation listed found	Diapur Wind Pty Ltd Project Manager	Within seven days of PM being notified.	
10. Annual report submitted to Diapur re Wind Pty Ltd	Project Ecologist	Within 7-days of first year monitoring.	
11. Annual report submitted to DELWP	Diapur Wind Pty Ltd Project Manager	Within 28-days of first year monitoring.	
Task: Year 2	Responsibility	Timing	Completed
1. Carcass searches	Project Ecologist	Monthly checks (12/year)	Jan Feb Mar Apr May June Jul Aug Sept Oct Nov Dec

Task: Year 2	Responsibility	Timing	Completed
2. Scavenger trial	Project Ecologist	Two one-month trials Spring / Autumn.	Sep or Oct Mar or Apr
3. Detectability trials	Project Ecologist	Two trials undertaken in conjunction with monthly carcass searches in Spring and Autumn.	Sep or Oct Mar or Apr
4. Notify PM of any conservation listed found	Project Ecologist	Within 24-hours of carcass being found.	
5. Notify DELWP of any conservation listed found	Diapur Wind Pty Ltd Project Manager	Within seven days of PM being notified.	
6. Final report submitted to Diapur Wind Pty Ltd	Project Ecologist	Within 7-days of first year monitoring.	
7. Final report submitted to DELWP	Diapur Wind Pty Ltd Project Manager	Within 28-days of first year monitoring and made publicly available on the Diapur Wind Farm website.	
Task: Years 1 & 2	Responsibility	Timing	Completed
1. Communication of incidental carcasses / injuries to conservation and non-conservation listed species, are to be reported to Diapur Wind Project manager.	3 rd parties e.g. technicians landowner etc.	Whenever on-site.	
2. Notify DELWP of any conservation listed found.	Diapur Wind Pty Ltd Project Manager	Within seven days of PM being notified.	

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8 Attachments

PLANNING and ENVIRONMENT ACT
HINDMARSH PLANNING SCHEME
PERMIT NO: PA17/0251-A
CONDITION 11
ENDORSED PLAN
Sheet 50 of 52
Signed:  for
MINISTER FOR PLANNING
Date: 20/04/2020

Attachment A – Data Sheet

PLANNING and ENVIRONMENT ACT
HINDMARSH PLANNING SCHEME
PERMIT NO: PA17/0251-A
CONDITION 11
ENDORSED PLAN
Sheet 5 of 32
Signed:  for
MINISTER FOR PLANNING
Date: 20/04/2020

