

# Musselroe Wind Farm Annual Environmental Review 2019-20

September 2020



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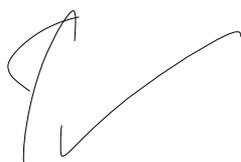
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## 1. General Manager's Statement

This is the 11<sup>th</sup> Annual Environmental Review (AER), including the 2013, 2016 and 2019 Public Environment Reports, published for the Musselroe Wind Farm (MRWF). The AER has been prepared according to condition G5 of the Environment Protection Notice (EPN) for the project (EPN 8657/2). According to G5, an Annual Environmental Review, that is also publicly available ([www.woolnorthwind.com.au](http://www.woolnorthwind.com.au)), must be submitted to the Director of the Environment Protection Authority (EPA) within 3 months of the end of the reporting period each year.

I acknowledge and endorse this report.

A handwritten signature in black ink, appearing to be 'S Ross', written over a faint horizontal line.

**Stephen Ross**  
**General Manager**  
**Woolnorth Renewables**

## 2. This report

This AER covers the period 1 July 2019 – 30 June 2020 and is provided to fulfil condition G5 of the MRWF EPN (8657/2) and relevant conditions of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC) approval number 2002/683. The report also provides a summary of additional work undertaken at the site to address any environmental issues and/or to improve environmental values of the site. Table 1 contains details of the sections within this report and the specific purpose of each section.

**Table 1. Sections contained within this report and details of reporting requirements met under Condition G5 of the EPN.**

<b>Sections of this report</b>	<b>Compliance details</b>
<b>1. Statement from General Manager of Woolnorth Wind Farm Holding Pty Ltd</b>	In response to 1.1
<b>2. This report</b>	General information
<b>3. Introduction</b> 3.1 Background 3.2 MRWF	General information
<b>4. General Environmental Management</b> 4.1 Public complaints	In response to 1.2
4.2 Details of environment-related procedural or process changes	In response to 1.3
4.3 Summary of the amounts (tonnes or litres) of both solid and liquid wastes produced and treatment methods implemented. Initiatives or programs planned to avoid, minimise, re-use, or recycle such wastes	In response to 1.4
4.4 Non-trivial environmental incidents	In response to 1.5
4.5 Monitoring data and record keeping required by these conditions	In response to 1.6
4.6 Identification of breaches of limits	In response to 1.7
<b>5. Other Environmental Actions and issues</b> 5.1 Eagle Management 5.2 Collision Mitigation 5.3 Eagle nests	In response to 1.8
<b>6. Environmental Management Plans</b>	
<b>7. State Environmental Management Plans</b>	In response to 1.9 and 1.6
<b>8. Commonwealth Environmental Management Plans</b>	In response to 1.6; Information for the Commonwealth Department of Agriculture, Water and the Environment (DAWE).
<b>9. Community consultation and communication undertaken</b>	In response to 1.10
<b>10. Glossary</b>	General inclusion
<b>11. References</b>	General inclusion

## **3. Introduction**

### **3.1 Background**

Musselroe Wind Farm is located in far north-east Tasmania (Figure 1) and is owned by Musselroe Wind Farm Pty Ltd (MRWF), a subsidiary of Woolnorth Wind Farm Holding Pty Ltd (now trading as Woolnorth Renewables). Woolnorth Renewables (WNR) is a joint venture between Hydro Tasmania and Shenhua Clean Energy Holdings (formed in 2012). WNR acquired the MRWF project in February 2013 and has been operating the site since it was commissioned in October 2013.

WNR manages the MRWF including compliance with its obligations under the EPN and EPBC approval conditions. The regulatory compliance obligations of MRWF are the focus of this report.

### **3.2 Musselroe Wind Farm Overview**

The MRWF consists of:

- 56 Vestas (3MW) wind turbines.
- Underground 33kV power collection system.
- An electrical substation, control room and associated buildings.
- Roads, fences and other associated infrastructure.
- A 110kV single circuit transmission line (49km in length, Figure 2), connecting the wind farm to the national electricity grid at the Derby substation.

Construction of the wind farm commenced in March 2009 and completion of the wind farm was contractually executed on 9 October 2013. For the purposes of several EPN requirements bound by the term 'commissioning/ed', 1 July 2013 is used (as 55 of the 56 wind turbines were operating by that time).

MRWF has been issued a Municipal Planning Scheme Permit (PLN/03-0161 & PLN/08-0714), an EPN (8675/2, replacing conditions attached to PLN/03-0161) and an EPBC approval (2002/683). These regulatory instruments are administered by the Dorset Council, the EPA and DAWE respectively. Attached to these legal instruments are environmental conditions with which MRWF must comply. The preparation of this AER is a requirement of the EPN. Environmental Management Plans that have been approved in accordance with the EPN and EPBC Approval also outline reporting commitments and requirements. This report contains the relevant reporting requirements for the MRWF and the associated 110kV transmission line.

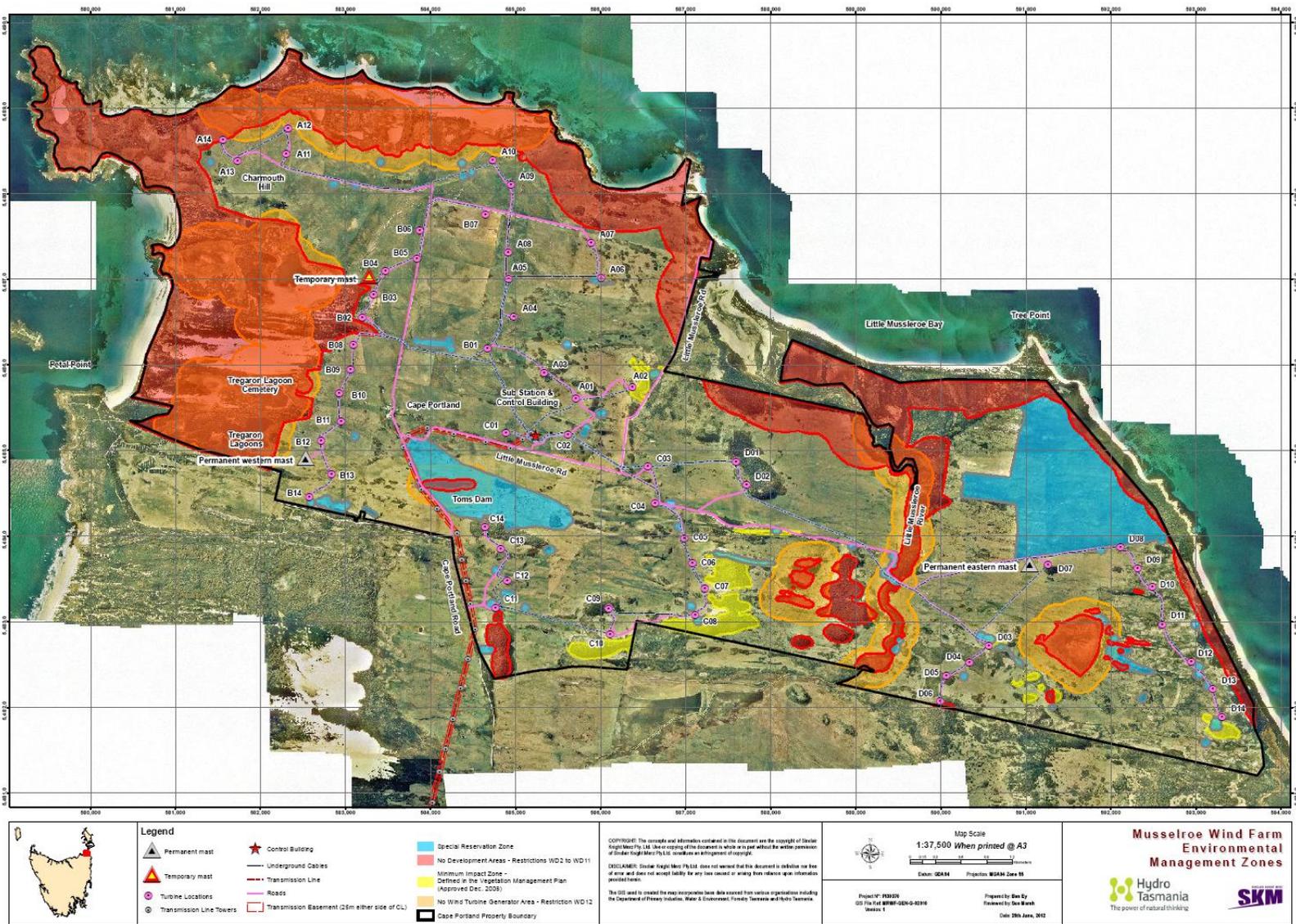


Figure 1. Musselroe Wind Farm layout

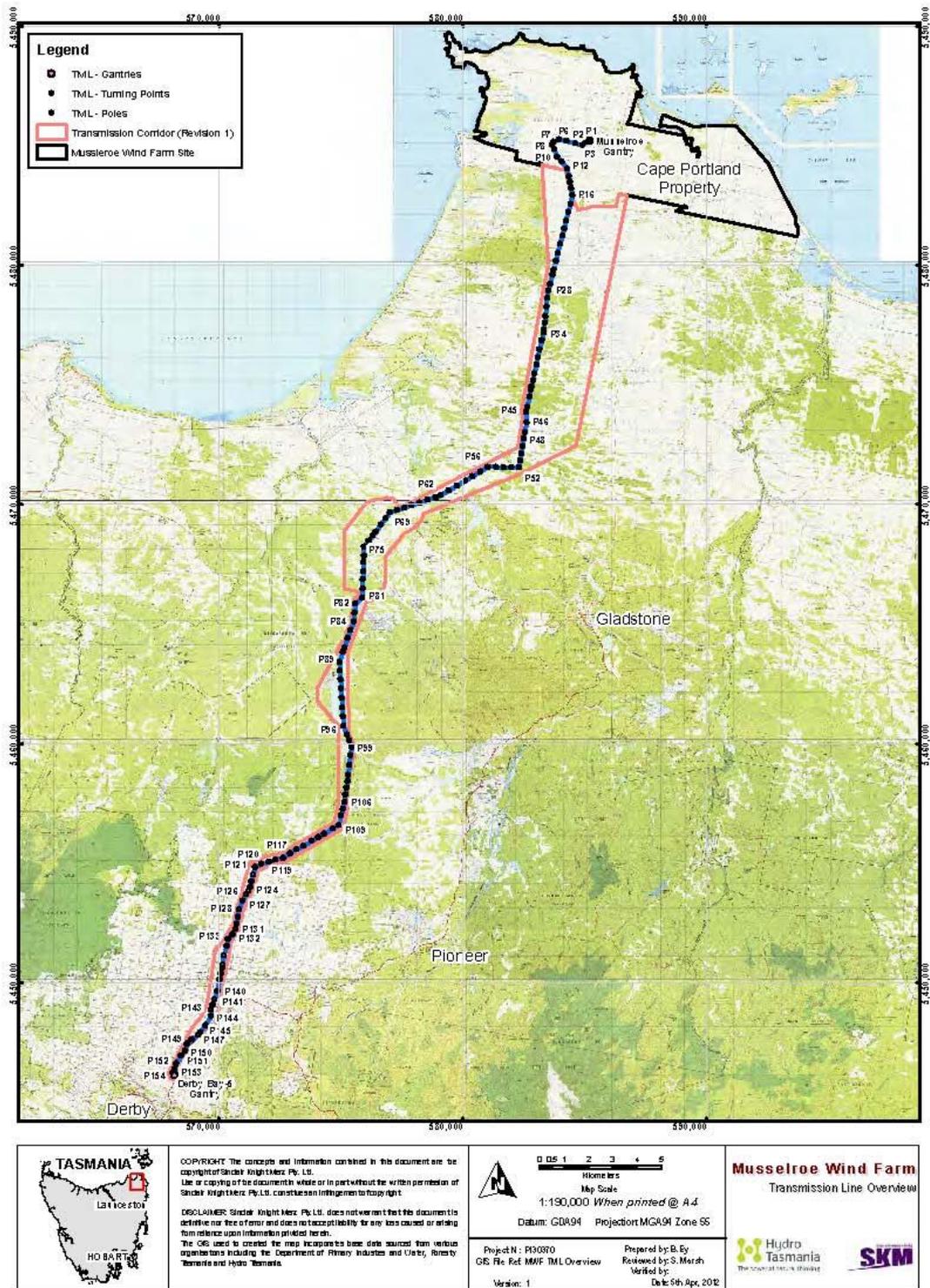


Figure 2. Transmission Line Route

## 4. General Environmental Management

### 4.1 Public Complaints

There were no public complaints in relation to environmental or other matters received by WNR during the 2019-20 reporting period.

### 4.2 Environmental Procedure or process changes

As highlighted in the previous AER (2017/18) the suite of State approved environmental management plans for the project were reviewed, consolidated into a single Plan ('State Environmental Management Plan 2016') and were subsequently approved by the EPA in July 2017. This State Environmental Management Plan was updated again in February 2020 in response to a request from the EPA to vary the Plan specifically relating to condition FF7 (1) (Wedge-tailed Eagle Offset Plan). Other minor amendments were made, however there were no other significant updates to the document.

In response to a higher than anticipated number of wedge-tailed eagle (WTE) mortalities, an observer-based wind turbine shutdown program was initiated. The observers have access to the software that controls the operation of the turbines. Observers shutdown turbines if there is a perceived risk to a wedge-tailed eagle (see Section 5.2.1).

### 4.3 Solid and liquid wastes

Solid and liquid wastes are divided into the following waste streams; general rubbish, hydrocarbon waste (liquid and solid) and coolant waste. The quantity of each of these streams produced during the reporting period is shown in Table 2.

**Table 2. Solid and liquid waste generated from the MRWF during the reporting period.**

Waste Stream	Quantity
General rubbish (m <sup>3</sup> )	24
Steel (tonne)	0
Hydrocarbon liquid (L)	22000
Hydrocarbon solid (m <sup>3</sup> )	10.5
Coolant (L)	1200
Filters (m <sup>3</sup> )	7.5
Co-mingled recycling (m <sup>3</sup> )	1
Cardboard and paper (m <sup>3</sup> )	15

Waste streams and volumes are regularly monitored and where possible materials are recycled rather than being disposed of as general waste. Waste volumes were slightly higher than previous reporting periods. Hydrocarbon liquid and coolant waste volumes increased due to fluid changes required (following failed sample quality results). All liquid hydrocarbon was recycled. A licenced contractor disposes of all waste, including waste classified as hazardous.

## **4.4 Non-Trivial Environmental Incidents and non-compliances**

### **4.4.1 Environmental Incidents**

There were eight non-trivial environmental incidents identified at the MRWF during the 2019-20 reporting period. These incidents were:

1. Wedge-tailed eagle collision, September 2019
2. Wedge-tailed eagle collision, September 2019
3. Wedge-tailed eagle collision, October 2019
4. Wedge-tailed eagle collision, October 2019
5. Wedge-tailed eagle collision, October 2019
6. Wedge-tailed eagle collision, December 2019
7. Wedge-tailed eagle collision, December 2019
8. Wedge-tailed eagle collision, April 2020

Other bird and bat collisions were recorded as incidents during the reporting period and managed according to the EPN and the approved Bird and Bat Mortality Monitoring Plan (see section 7.4.1) and the equivalent DAWE approved plan. Other ‘trivial’ environmental incidents were documented and managed by WNR.

### **4.4.2 Incident follow-up, mitigation and preventative measures**

The WTE incidents were managed according to the requirements outlined in the EPN and other approved management plans for the reporting of threatened species. Reporting of the incidents occurred within the required time frames. Corrective actions and offsets are required (see Sections 7.3 and 8.2.3).

In response to the number of WTE collisions in 2019, Wildspot Consulting was engaged to commence a WTE observation and turbine shutdown program. Further information on this program is provided in Section 5.2.1.

As a broad response to the number of eagle mortalities in previous reporting periods, the EPA and WNR agreed on conducting an Eagle Impact Review (EIR) to assist in determining whether the wind farm mortalities are impacting on the local wedge-tailed eagle populations in the Musselroe/Cape Portland region. The current status of the EIR is discussed in Section 5.12.4.

During the reporting period WNR also completed commercial discussions regarding the procurement of a Robin Radar MAX system for the exclusive purpose of implemented an automated wind turbine shutdown system. A full report on this project is included in Section 5.2.2. Woolnorth continued to review other technologies that may assist in the mitigation of eagle mortalities at its wind farms. An update is included in this report, Section 5.2.3.

### **4.4.3 Non-compliance**

During the reporting period there were no non-compliances identified with the EPN or other approval conditions. Internal and external audits conducted during the reporting period evaluated and examined compliance with EPN and other approval conditions with the objective of validating compliance.

## **4.5 Monitoring data and record keeping**

Monitoring and records of various parameters and activities are maintained by MRWF. These include (but are not limited to):

- Energy consumption and generation.
- Waste (including movements and disposal of controlled waste).
- Audits and emergency exercises.
- Incidents and non-compliances.
- Chemical inventory.
- Training and competencies (including inductions).
- Database of EPN and Approval conditions.
- Weed management activities.
- Records of wind turbine bird mortality survey effort.
- Records of any dead birds found on the land (as defined in EPN 8657/2).

## **4.6 Identification of breaches of limits**

There were no breaches of limits identified during the reporting period.

# **5. Other Environmental Actions and Issues**

## **5.1 Eagle Management**

WTE mortalities at MRWF are recognised by WNR as a significant issue and concern. Woolnorth, as an experienced wind farm operator, understands the complexity of the issue, the difficulties in understanding it and the various aspects and pitfalls of trying to establish mitigation solutions that have, or are likely to have, tangible and successful outcomes. Various technologies and mitigation options have been tested or implemented by WNR at MRWF and also at the company's other assets, Bluff Point and Studland Bay Wind Farms

Since the wind farm was commissioned in mid-2013 several measures have been developed and implemented and these have been described in previous reports. Many of the measures remain in place. During this reporting period several new measures have been developed and implemented and like previous years these range from possible direct collision mitigation measures to indirect collision mitigation measures through to general site-based research. Measures and actions relevant to the 2019/20 reporting period are described below.

## **5.2 Collision Mitigation**

### **5.2.1 Wedge-tailed eagle Observation and Turbine Shutdown Program**

In response to the higher than expected number of WTE mortalities in 2019 Wildspot Consulting were engaged to provide bird observers at MRWF in November 2019. The primary

function of these observers is to shut down wind turbines when a WTE(or white-bellied sea eagle) is perceived to be at risk due to its proximity to a turbine.

On a daily basis, three to four observers are stationed at vantage points around the site and are equipped with radio communication. The centrally located observer has direct access to the software that controls the wind turbines. If a WTE is deemed to be at risk, the relevant turbine/s are shutdown until the bird is clear from the area.

While detailed analysis of the shutdown data has not yet been conducted, since commencement of the program in November 2019, there have been approximately 1,300 individual shutdowns of wind turbines, which equates to approximately 160 a month or 5 a day. The program was in place at the end of the reporting period.

### **5.2.2 Robin Radar project**

As outlined in the 2016-19 Public Environment Report (PER), a detailed evaluation of technologies occurred in 2018/19. The Robin Radar MAX system was identified by WNR as the most appropriate technology to reduce the risk of eagle collisions with wind turbines at the Musselroe Wind Farm site. The system comprises of a phased array radar which is designed specifically to detect birds over a broad area. The radar will be coupled with a custom and configurable software program (shutdown module) integrated with the wind farm control system to curtail/shut down appropriate turbines.

In November 2019 WNR developed the project 'Using Robin (MAX) Radar to develop an eagle collision risk reduction strategy at Musselroe Wind Farm'. The project's overall objective is to determine if radar technology can be installed and operated to reduce the incidence of WTE mortalities at the Musselroe Wind Farm (and other wind farms). A summary project plan was established to guide the project.

Commercial discussions were finalised in November 2019 with a projected installation date of mid-2020. In late 2019, a site survey was completed by Robin Radar and the final system design completed. The final design established the optimum location for the radar antenna (250m NE of turbine C05, See Figure 3) and finalised other aspects of the project such as the mounting of the radar on top of a small sea container, server and other equipment locations, power and communication connections and access. From January 2020, various components of the project were completed by WNR including development approvals, cultural heritage assessments and the preparation of the site, such as construction of the access road, foundations, establishing power and optic fibre connections and the installation of a lightning protection system. The sea container was constructed in Western Australia and delivered to Tasmania in June 2020.

Figures 3 and 4 below show the location of the radar on the MRWF site, and the site at the end of the reporting period 2019/20.

The delivery and installation of the radar was delayed due to the impact of the COVID-19 global pandemic. By the end of the reporting period the radar had been built (by Robin Radar, Netherlands) but not yet dispatched to Musselroe Wind Farm.



**Figure 3. Location of the radar on the Musselroe Wind Farm site**



**Figure 4. Sea container installed at the radar site in June 2020. Radar antenna mount can be seen on top of the container and the lightning protection mast to the left of the container.**

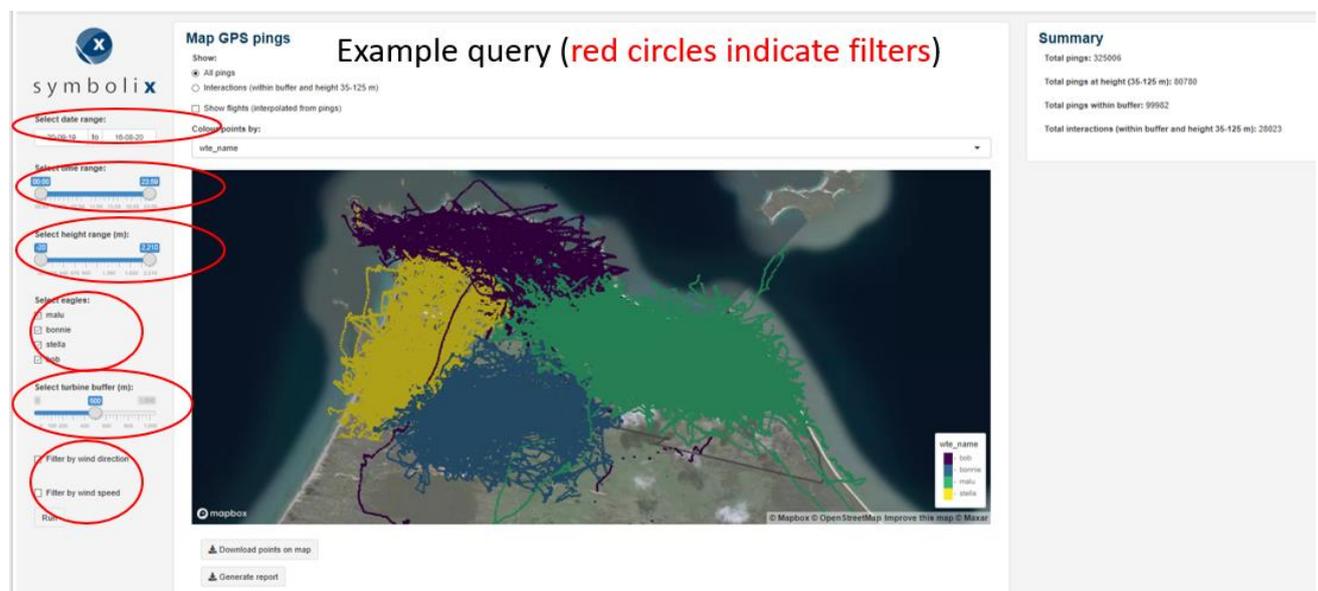
## 5.2.2 GPS tracked eagles

For several years WNR have been working with Tasmania eagle specialists and researchers. WNR have both supported research projects through offsets but also, where possible, been engaged in other collaborative ways. Through these collaborations, in mid-2019, WNR supported researchers to attach a GPS tracking device to an immature/mature male WTE at the MRWF site. Following the successful attachment of the first device, in early 2020, WNR again supported researchers to place GPS trackers on another 4 adult eagles as a part of a larger Tasmanian wide project. These 4 adults were either considered resident (3) to the MRWF site or local (1) to the site and each eagle was a part of a breeding pair with a unique territory on the wind farm site, this being confirmed through site observations.

WNR supported the project through direct financial support, procurement of specialist project equipment (net launcher, GPS trackers) and through the setting up of site-based stations where the eagles were captured.

Following the attachment of the GPS tracking devices, WNR have been receiving data on the movements of the 5 eagles. In general terms, the data is collected by the tracking device at 6 second intervals when the bird is in flight and at 15-minute intervals when the bird is stationary. The data collected is time and date stamped and includes a range of parameters including positional data, height and speed. Data is obtained daily and only during daylight hours. Data is transmitted at regular intervals over the mobile network.

WNR have commenced assessing the data and have engaged a specialist consulting firm to assist in the assessment of the data. A data management platform has been established to enable the data to be interrogated based on queries and filters. Figure 5 is provided as an example of a query.



**Figure 5. Example query showing all flights to the end of the 2019/20 reporting period for the 4 site-based eagles.**

As can be seen from the Figure above, the data should provide significant insights into the movement patterns of eagles on the wind farm and the interactions of the resident eagles

with the wind farm infrastructure. The data will be interrogated and assessed against a range of parameters and WNR are hopeful that these assessments will provide great insight into collision risk and what variables influence and change this risk. The data will also provide significant value to the radar project, through correlation of the two streams of data and the calibration of the radar to the Musselroe site.

### **5.2.3 Technological investigations**

Following the detailed appraisal of technologies in the 2018/19 reporting period and the decision to proceed with radar technology (as outlined in Section 5.2.2), the appraisal of technologies for understanding eagle collision risk, collision factors and potential mitigation options continued throughout 2019/20. This included a site visit to the Cattle Hill Wind Farm project for technical discussions on the Identiflight system installed at that project. Additionally, it included the review of technical reports and papers, summaries of conference proceedings and workshops, review of technology provider's websites and discussions or meetings with technology suppliers.

Throughout the reporting period, the literature published generally focused on assessing efficiencies being developed in pre-existing technologies. Much of this research was conducted in a northern hemisphere setting or at offshore wind farms. While not all of the findings are relevant to Tasmanian projects and settings, some of the findings and outcome are applicable.

The National Wind Coordinating Collaborative (NWCC) held their biennale Wind and Wildlife Research Meeting in November 2018, with the Proceedings of XII Wind and Wildlife Research Meeting published in 2019. The proceedings provide a summary of the advances in technology to reduce impacts on bird and bats at both onshore and offshore wind farms. The meeting proceedings are available [here](#).

### **5.2.4 Eagle Impact Review**

The EPA and Woolnorth agreed on conducting an Eagle Impact Review (EIR) to assist in determining whether the wind farm mortalities are impacting on the local WTE populations in the Musselroe/Cape Portland region. Woolnorth proposed five projects to provide streams of information to assist and the EPA endorsed these projects. See Table 3 for a summary of the EIR projects and their current status. It is important to highlight that most of the projects are collecting data/metrics that could, however, be considerably impacted by other landscape influences for which we cannot measure or fully understand. Therefore, our ability to clearly and unequivocally determine the impact of wind farm eagle mortalities will be difficult.

**Table 3. Eagle impact review projects and status**

Project title and description	Status at the end of the reporting period
<p><b>Eagle observation study – single study</b> A repeat of the two eagle movement studies conducted at the site.</p> <p>The study will contribute to the EIR by determining a current rate of utilisation for comparison with previous periods of observation (and corresponding rates of utilisation).</p>	<p>This study has been completed.</p>
<p><b>Where, where, wedgie (<a href="http://naturetrackers.com.au/">http://naturetrackers.com.au/</a>) – multi-year study</b> <i>Where, where, wedgie</i> is a state-wide eagle observation study. WNR participated in the study by placing observers in the Musselroe/Gladstone regions to collect eagle data.</p> <p>This study will contribute to the EIR by providing data for a regional level comparison of eagle data (e.g. count of observations, count of individuals) collected in the Musselroe/Gladstone Region with other regions in Tasmania.</p>	<p>Observations by WNR were not undertaken in 2020 due to COVID-19. Two years of data have been collected and WNR will discuss the possibilities of comparative analysis with the program statistician.</p>
<p><b>Wedge-tailed eagle nest checks – multi-year study</b> This study will assess the nest activity and breeding success of up to 15 known eagle nest sites in an approximate 30km radius from the wind farm site.</p> <p>This study will contribute to the EIR by providing regional level nest activity and breeding success data for comparison with state-wide data.</p>	<p>All known nest sites in the study area have been checked (post breeding season) across 3 years 17/18, 18/19, 19/20. WNR will finalise the data collected and present any findings.</p>
<p><b>Genetic assessment of collision victims and nest ‘cast-off’ material. – multi-year study</b> All collision victims have been sampled for DNA. Off-cast material collected from nest sites such as excreta, feathers, egg shell, pellets can sometimes yield DNA. Using DNA finger printing the collision victims will be compared with DNA extracted from ‘off-cast’ material.</p> <p>This study will contribute to the EIR by providing details on the origin of the collision victims (e.g. local vs itinerant).</p>	<p>In conjunction with the nest checks, a small amount of offcast material has been collected of the 3 years of nest checks. Genetic samples have been collected from all collision victims. Not all samples have been analysed. Given there is limited offcast material, the assessment to determine the relatedness between offcast material and collision victims cannot be conducted. The program will be finalised.</p>
<p><b>Assessment of individuals through remote stations on the wind farm.</b> Following the techniques of Driscoll and Koronkiewicz (2016), cameras located at fixed stations will be used to collect basic eagle characteristics (count, species, age, time of day) and possibly identify individuals based on plumage or other unique features.</p> <p>This study will contribute to the EIR by providing site level data on the age and number of individuals using the wind farm site. If successful, off site installations may provide a comparative data set.</p>	<p>The camera systems were designed, procured and trial units deployed on the wind farm site. A summary report was provided in the 2018/19 AER. The trial was completed in 2020 and the results will be provided in a separate report.</p>

### **5.3 Eagle nests at MRWF**

Two new nests were identified during this reporting period. These were both WTE nests and identified through the GPS tracking project. Both nest sites have been added to the Natural Values Atlas.

Observations of the existing nests on the property found that the white-bellied seas eagle nest (#2323) was active throughout the breeding season. Other nests on the property were also checked but no eagles were present and no changes to the nest structures were observed and therefore these nests determined inactive.

Prior to the 2019/20 breeding season nest access restrictions commencing, the trial of small (mobile network enabled) wildlife cameras continued. Three nest sites were monitored. One nest was not active, one nest was active but fell in late 2019 following heavy rain and wind, and the final nest monitoring failed due to a technical failure of the camera.

One nest camera remained in place for the 2020/21 breeding season but no data/ eagle observations had been made or confirmed at the end of the reporting period.

### **5.4 Other actions and issues**

#### **Road kill removal program**

The road kill removal program (along the Cape Portland Road), which has been maintained for a number of years, was continued through the 2019/20 reporting period. The project was originally initiated due to a number of WTE being killed in the area as a result of vehicle collisions and numerous observation of WTE feeding on road kill. Woolnorth are not aware of any WTE mortalities on Cape Portland Rd since the inception of this program.

The initiative involves a dedicated technician (whilst travelling to and from MRWF) relocating road kill to safer areas such as the non-road side of an adjacent farm fence or to the edge of the bush line. Fifty to 70 carcasses are typically removed each month, some of which are observed to have eagles feeding on them at the time of discovery.

#### **Ecological burning**

An ecological burning program was initiated in Autumn of the reporting period. The program will research the burning and disturbance regimes required to maximise the native vegetation communities across the property including an emphasis on the range of threatened species that exist. The research will include peer reviewed scientific articles, management guidelines and collaborations with DPIPWE staff and local Aboriginal communities. Burning and disturbance activities will be conducted using professional technicians and local Aboriginal elders.

#### **Other collaborations**

In addition, a number of collaborative relationships have been developed with organisations such as the Save the Tasmanian Devil Program, Wombats Rescue Tasmania, Dorset Coastal Working Group, Tasmanian Museum and Art Gallery with the Tasmanian Herbarium, Threatened Species Unit (Flora), the University of Tasmania and DPIPWE officers studying feral cats, forester kangaroos and wombats. In all cases WNR supports these agencies and organisations by facilitating land access, through to in-kind and financial support.

## 6. Environmental Management Plans

All necessary Environmental Management Plans (EMPs) for MRWF were prepared and approved prior to commissioning of the wind farm, as required by the approval conditions, permit and/or EPN. As highlighted above (section 4.2), in November 2016 the suite of State approved environmental management plans for the project were reviewed, consolidated into a single Plan ('State Environmental Management Plan 2016') and later approved by the EPA in July 2017. The review and consolidation of the Plans, primarily focussed on removing the information and commitments relating to the planning, construction and commissioning phases of the wind farm which are/were no longer relevant. This State Environmental Management Plan was updated again in February 2020 in response to a request from the EPA to vary the Plan pursuant to condition FF7 (1) of the EPN. Other minor amendments were made, however there were no other significant updates to the document.

The following table (Table 4a & 4b) summarises the relevant management plans and their details (the current Departmental names are used).

**Table 4a. Status of State Environmental Management Plans for the MRWF.**

<b>Environmental Management Plan and relevant permit condition</b>	<b>Authority</b>	<b>Year last approved</b>	<b>Status</b>	<b>Reporting required in AER?*</b>
Wader Monitoring Plan	EPA	2020	Active, but all requirements completed	Yes
Fauna Monitoring Report	EPA	2007	Requirement completed	No
Avian Collision mitigation Report (Transline)	EPA	2007	Requirement completed	No
Schayer's Grasshopper surveys	EPA	2007	Requirement completed	No
Construction Rehabilitation Plan	EPA	2008	Requirements completed	No
Weed and Disease Management Plan	EPA	2020	Active	Yes
Construction Solid Waste Management Plan	EPA	2009	Requirements completed	No, internal auditing
Hazardous Materials Management Plan	EPA	2020	Active	No, internal auditing
Eagle Impact Offset Plan	EPA	2020	Active	Yes
(Wind Farm) Vegetation Management Plan	EPA	2020	Active	No, general comments included
Transmission Line Vegetation Management Plan	EPA	2020	Active	No, general comments included

<b>Environmental Management Plan and relevant permit condition</b>	<b>Authority</b>	<b>Year last approved</b>	<b>Status</b>	<b>Reporting required in AER?*</b>
Wind Monitoring Tower Avifauna Management Plan	EPA	2012	Requirements completed	No
Bird and Bat Mortality Monitoring Plan	EPA	2020	Active	Yes
Final Wind Farm Design Report	EPA	2012	Requirements completed	No
Final Transmissions Line Design Report	EPA	2012	Requirements completed	No
Construction and/or Operational Environmental Management Plan	Internal	Not Required	Active	Internally approved

**Table 4b. Status of Commonwealth Environmental Management Plans for the MRWF.**

<b>Environmental Management Plan and relevant permit condition</b>	<b>Authority</b>	<b>Year last approved</b>	<b>Status</b>	<b>Reporting required in AER?*</b>
CEM2 Turbine 6 Migratory Bird Impact Mitigation Plan	DAWE	Not approved	Not Required	Turbine 6 on Tank Hill was not constructed
CEM3 Wind Farm Listed Species Impact Mitigation Plan#	DAWE	2012	Active	No, summary and general comments included (some monitoring is reported as part of the Bird behaviour, Utilisation and mortality Monitoring Plan)
CEM4 Bird Utilisation, Behaviour and Mortality Monitoring Plan#	DAWE	2017	Active	Yes
Adaptive Management Protocol	DAWE	Submitted but not yet Approved	Active	No, general comments included
CEM5 Transmission Line Listed Species Impact Mitigation Plan#	DAWE	2009	Active	No, general comments included.

CEM6 Wedge-tailed Eagle Impact Offset Plan#	DAWE	2009	Active	No, general comments included
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#compliance reporting is also conducted in accordance with Condition 7 of the EPBC Approval, e.g. "On 1 July of each year after the date of this approval, the person taking the action must provide a certificate stating that the conditions of this Approval have been complied with".

In summary, the following Sections of the State Environmental Management Plan 2020 require reporting are:

- Wader Monitoring Plan.
- Weed and Disease Management Plan.
- Eagle Impact Offset Plan (a consolidated version of the Wedge-tailed Eagle Impact Offset Plan and the White-bellied Sea Eagle Impact Offset Plan).
- Bird and Bat Mortality Monitoring Plan.

Relevant aspects of the Commonwealth Bird Utilisation, Behaviour and Mortality Monitoring Plan are also reported in this AER.

All of the above are reported in Sections 7 and 8 of this report.

Summary and general comments for the following plans/documents are provided section 7 and 8 of this report:

- (State) Wind Farm Vegetation Management Plan.
- (State) Transmission Line Vegetation Management Plan.
- (Commonwealth) Wind Farm Listed Species Impact Mitigation Plan.
- (Commonwealth) Transmission Line Listed Species Impact Mitigation Plan.
- (Commonwealth) Wedge-tailed Eagle Impact Offset Plan.
- (Commonwealth/State) Adaptive Management Protocol.

## **7. State Environmental Management Plan**

### **7.1 Wader Monitoring Plan**

#### **7.1.1 Bird Utilisation studies**

The required post construction bird utilisation surveys have been completed. A summary of the results was included in the 2016/17 AER and also reported separately to the EPA and DAWE.

#### **7.1.2 Crepuscular and nocturnal movements**

Monitoring of bird and bat collisions (see Section 7.4.1) has not detected a significant impact to priority species (or any species) known to be crepuscular or nocturnal in behaviour. As such no action was required during the reporting period.

#### **7.1.3 Avoidance behaviour around turbines**

The 2016/19 Public Environment Report provided a summary of the findings of the eagle avoidance study. See [MRWF PER 2016-19](#).

### **7.2 Weed and Disease Management Plan.**

#### **7.2.1 Operational Phase Commitments**

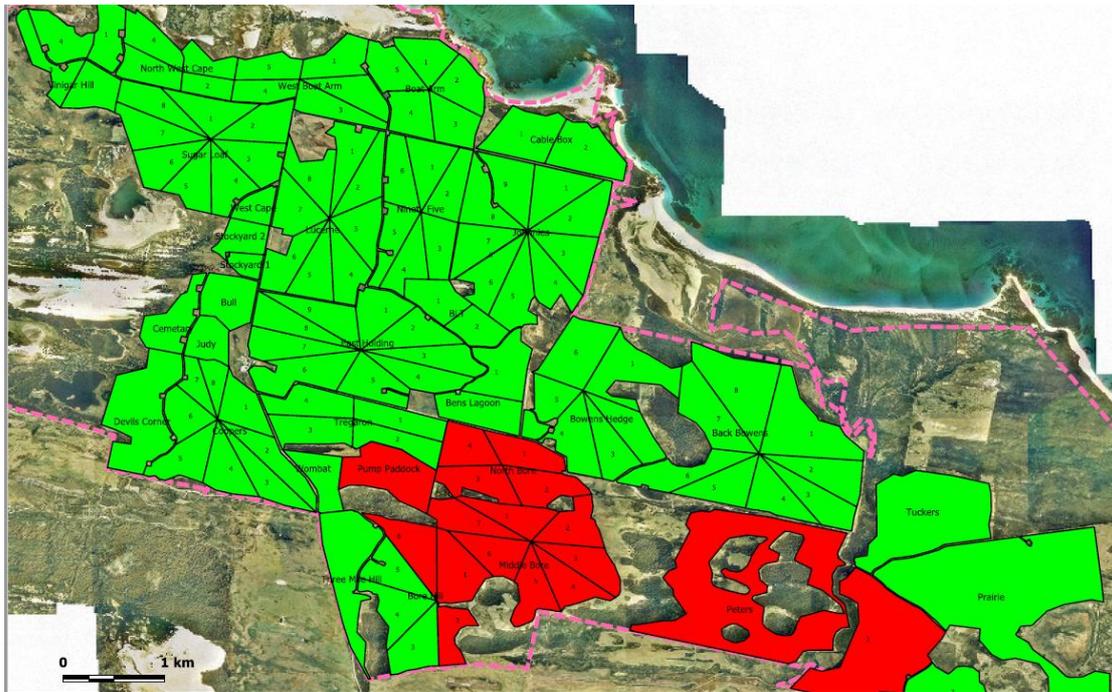
All areas of disturbance associated with the wind farm footprint are regularly surveyed for the existence of weeds. This is generally conducted throughout the reporting period as a part of the farm wide weed control program and routine road and hardstand maintenance. Herbicide treatment is the most common control technique utilised but mechanical removal is also used on larger stands.

Monitoring of the transmission line for various issues, including weeds, is ongoing and conducted on a regular/annual basis. Sections of the transmission line corridor have previously been managed for the presence of any weed species through chemical application and mechanical removal. Transmission line weed populations are best described as localised with small numbers of individual plants. No control works were undertaken in the 2019/20 reporting period.

#### **7.2.2 Controlling the spread of weeds**

As the wind farm and transmission line are in the operational phase, the majority of works undertaken on either the wind farm or on the transmission line infrastructure are accessed via formed, all weather roads. As such there are no significant controls required to manage the spread of weeds and soil borne diseases. The exception to this are weed management works, vegetation management works and bird mortality surveys, where off-road access is required. Standard wash-down guidelines, as per the *Tasmanian Wash-down Guidelines*, and internal environmental management procedures are applied to these tasks where required.

Weed management works across the property (farm wide weed control program) have continued during the reporting period (outside of the footprint of the wind farm). Works have continued to focus of African boxthorn and gorse, with a long-term view to eradicate or significantly reduce the extent of both noxious weed species. A paddock by paddock approach has been implemented since construction, which involves handing-over weed free paddocks to the property farm licensee, for ongoing maintenance. Figure 6 shows the paddocks that have been declared noxious weed free and those paddocks still undergoing weed treatment as of June 2020.



**Figure 6. Paddock weed status, where red indicates paddock undergoing weed treatment and green indicates paddocks handed over to the grazing licensee for maintenance.**

Weed management works have also been undertaken across areas of the property outside of the paddock areas, however, the priority at this stage is to see all paddocks handed to the licensee. This is expected to be completed within the next three years. Other weed species on the property that have received attention include slender thistle, horehound and Patterson’s curse.

### **7.3 Eagle Impact Offset Plan**

All initial actions outlined in this Plan (relating to both WTEs and white-bellied sea eagles) have been completed. This includes the nest protection program and the study into the effectiveness of nest protection management prescriptions. The objectives and outcomes of these actions are detailed in the MRWF Public Environment Report 2013 (available on request). The plan remains active for the purpose of providing guidelines for offsetting eagle collisions.

Since the commissioning of the wind farm through to the end of the current reporting period, twenty WTEs and one white-bellied sea eagle (WBSE) had been identified as turbine collision victims. The ‘base’ offsets that were required in accordance with the initial state and

commonwealth WTE Offset Plans were designed to mitigate the impacts of six WTE mortalities. WBSE offsets to mitigate the impacts of three mortalities were also required pursuant to the State permit conditions.

The first revision of the Eagle Impact Offset Plan revised in 2016 committed to maintaining the offset arrangements (inherent in the original approval) of one offset for each mortality. The latest revision of the Plan in 2020 (as of January 2020) increased MRWF's offset commitment from one offset per mortality to two offsets (equivalent nest protection offsets). The Plan commits to either the nest protection (and surrounding habitat) through a conservation covenant, or an alternative project approved by the Director (EPA).

With respect to the EPBC Approval obligations for WTE mortalities over the 'base' offset of six, these requirements are outlined in the Bird Utilisation Behaviour and Mortality Monitoring Plan (BUBMMP) as 'corrective actions'. According to the Plan, the corrective action required for mortalities over the original 'base' (or at a higher rate than anticipated) is the protection of two WTE nest sites (and surrounding habitat) through a conservation covenant, or an alternative project approved by the DAWE. This therefore means that the obligations of the EPBC Approval resulting from a WTE mortality up until January 2020 were significantly greater than those specified in the State Environmental Management Plan, 2020.

The following projects/actions have been implemented in response to the offset requirements (both State and Commonwealth) over and above the 'base' offset projects.

- Protection of 2 nest sites.
- Financial contribution, equivalent value to 2 nest sites, to UTAS eagle research project.
- Financial contribution, equivalent value to 2 nest sites, to Bookend Trust/Nature Trackers citizen science project 'Where, where, Wedgie?'
- Protection of 1 nest site completed.
- Financial contribution to UTAS eagle research project – 'Co-ordinating Conservation and Research Priorities'.
- Implementation of project 'Using Robin (MAX) Radar to develop an eagle collision risk reduction Strategy at Musselroe Wind Farm'.
- Pending approval of financial contribution to UTAS project 'Identifying risk to Tasmanian Wedge-tailed Eagles from wind Energy Development: A state-wide model of collision risk'.

As there has only been one WBSE mortality recorded, no further offset actions have been required.

## **7.4 Bird and Bat Mortality Monitoring Plan**

### **7.4.1 Operational Phase Wind Turbine Mortality Monitoring**

During the 2019/20 reporting period there were 364 unique formal turbine surveys conducted. The majority of carcasses detected were identified as part of the formal monitoring program, however, some were also identified outside the formal monitoring program.

In total, 21 carcasses or feather spots (finds) were found in formal surveys, equalling a find during 4.9% of surveys (Table 5).

**Table 5. Summary of mortality search finds across all survey years**

Year	Bat mortality	Bird mortality	Feather spot
13/14	2	26	4
14/15	1	28	4
15/16	1	33	5
16/17	0	21	5
17/18	0	23	5
18/19	0	34	6
19/20	0	18	3

7 carcasses were identified outside of the formal surveys. No bats were observed in this reporting period. Table 6 below summarises the species identified during formal surveys and Table 7 summarises the species identified outside of formal surveys.

**Table 6. Species identified during formal bird mortality surveys during the 2019/20 reporting period.**

Common name	Number found
Australian Pelican	3
Brown Falcon	4
Cape Barren Goose	1
Currawong sp	2
Forest Raven	2
Petrel sp	1
Wedge-tailed Eagle	3
White-faced Storm Petrel	2
White-throated Needletail	2
Unknown	1

**Table 7. Species identified outside of the formal bird mortality surveys during the 2019/20 reporting period.**

Common name	Number found
Australian Pelican	1
Wedge-tailed Eagle	5
Fairy Prion	1

Bird mortalities for the 2019/20 reporting period are lower than previous years, although they are generally comparable. The specific species identified (through formal and informal methods) during the 2019/20 reporting period are also similar to previous reporting periods. No injured birds were identified during the reporting period.

The only mortalities of listed species identified during the 2019/20 reporting period were the WTE (state and commonwealth listed) and the white-throated needletail (listed in June 2019 as Vulnerable under the EPBC Act).

### **Reporting**

All birds and bats detected in the monitoring (formal and informal finds) were reported as required in the Plan, by:

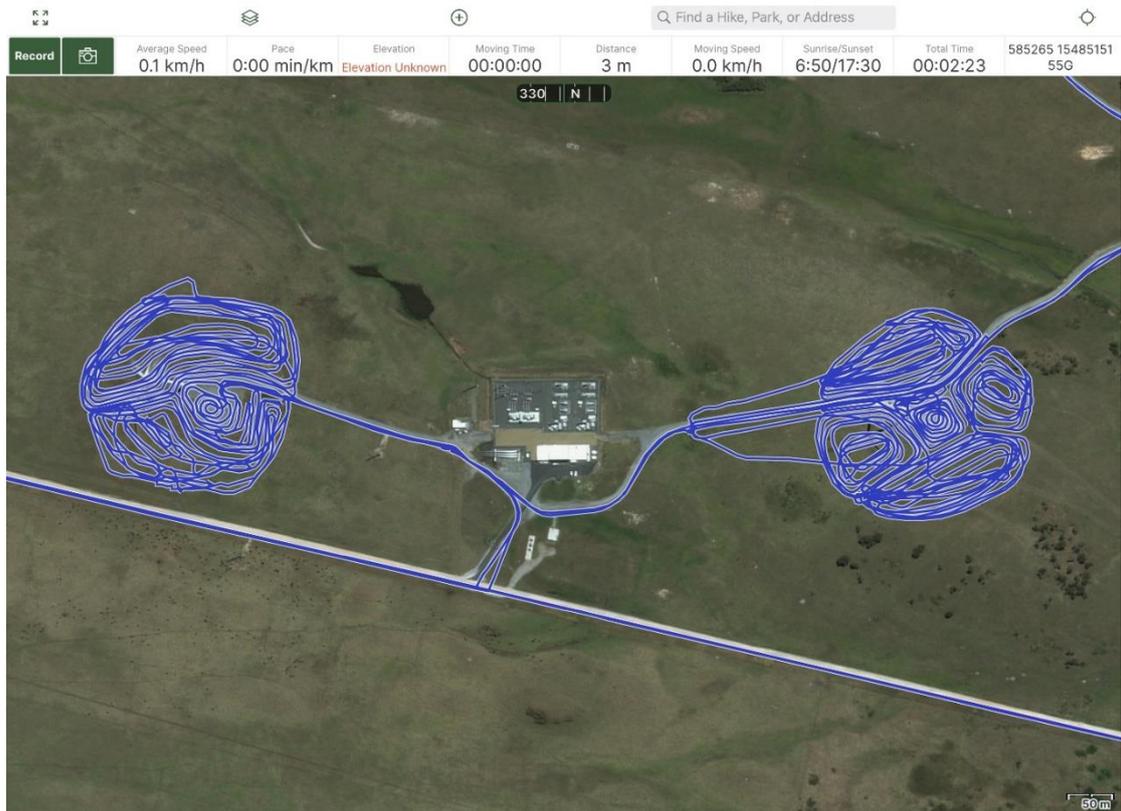
- Any birds and bats listed under the *Threatened Species Protection Act 1995* were reported to the Director of the EPA by telephone within 24 hours of their discovery, and to the EPA Project Officer and Manager of the Threatened Species Unit by email or telephone within 24 hours of their discovery.
- For all incidents relating to native species, a Bird/Bat Strike Report Form was submitted to the Director of the EPA within three days of discovery of a dead or injured threatened species.
- For all dead or injured EPBC listed bird species, a Bird/Bat Strike Report Form was submitted to the Commonwealth DAWE within seven days of discovery.

As agreed with DPIPWE all WTE carcasses were provided to the Tasmanian Museum and Art Gallery.

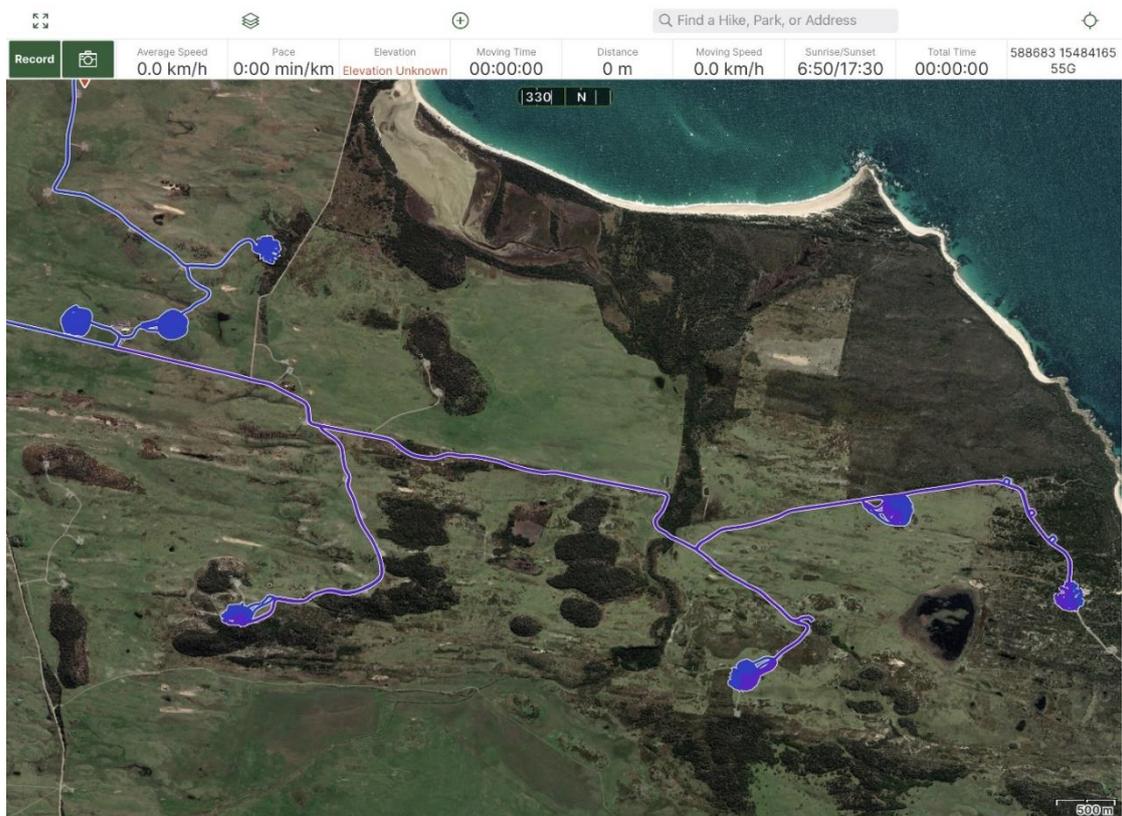
#### **7.4.2 Continuous Improvement of Bird and Bat Monitoring Program**

Wildspot Consulting are working on continually improving the accuracy and efficiency of the Bird and Bat monitoring program. Over the past six months, personnel conducting surveys have been provided with tablets equipped with mapping software.

The two surveyors completing each survey are accurately tracked across the survey area. Keeping an accurate track of the ground that has been covered can be practically difficult due to the grass length and obstructions such as fences that can break a pattern of movement. This can lead to the same area of ground being searched multiple times by mistake and other areas not surveyed to the required intensity. Figure 7 is an example of GPS search tracks at two wind turbines, while Figure 8 shows the GPS search tracks recorded over a full day of bird mortality surveys.



**Figure 7. GPS search tracks of two observers at MRWF turbines.**



**Figure 8. GPS tracks recorded during a day of bird mortality surveys.**

The new approach records a track on the tablets allowing the searchers to verify the accuracy of the search pattern. Any errors can be rectified immediately and identified for improvement

on subsequent surveys. The two tablets sync with each other and the Wildspot Consulting office when they have cellular reception. All bird strike records are also stored in the mapping software. When a bird is located, photographs are taken through the application which syncs back to the Wildspot Consulting office for immediate processing. Photographs are automatically geo-referenced to the location where they were taken and are also linked to the track being recorded at the time of discovery.

### **7.5 Wind Farm Vegetation Management Plan**

Beyond the initial clearing of the site for construction of the wind farm no additional clearing has been necessary. From time to time, some vegetation slashing for the purposes of property level fire management is undertaken, however none was conducted during the 2019/20 reporting period. The rehabilitation of disturbed areas has been successful.

### **7.6 Transmission Line Vegetation Management Plan**

Similarly to the wind farm, no further clearing of vegetation has been required in the transmission line easement during the 2019/20 reporting period.

## **8. Commonwealth Environmental Management Plans**

### **8.1 Wind Farm Listed Species Impact Mitigation Plan**

This Plan covers requirements relating to mitigating impacts on the habitats of listed migratory birds and listed threatened species during construction and maintenance of the wind farm (condition CEM3). There are no specific reporting requirements for the Plan beyond the requirements of Condition 7 of the EPBC Approval (*“On 1 July of each year after the date of this approval, the person taking the action must provide a certificate stating that the conditions of this Approval have been complied with”*). The only relevant information to report is included below:

- Bird and Bat collisions with turbines, identified during the reporting period, are summarised in Section 7.4.1 of this report.
- Discussion of activities relating to soil, vegetation and weed management are reported in Section 7 above.
- Two new WTE nests were identified on the wind farm site during the 2019/20 reporting period. See Section 5.3 describes wind farm nests.

### **8.2 Bird Utilisation Behaviour and Mortality Monitoring Plan**

This Plan covers requirements relating to the monitoring of utilisation, behaviour and mortality of Commonwealth listed threatened and migratory bird species at the MRWF site (condition CEM4). The sections of the Plan that require reporting (beyond the requirements of Condition 7 of the EPBC Approval *“On 1 July of each year after the date of this approval, the person taking the action must provide a certificate stating that the conditions of this Approval have been complied with”*), are detailed below. The Plan was re-approved in September 2017,

following a long review. The only noteworthy change was the removal of the intensive surveys of the NWWZ.

### **8.2.1 Bird utilisation and behaviour surveys**

The post-commissioning bird utilisation surveys have been completed and a summary included in the 2016/17 AER.

### **8.2.2 Mortality surveys for listed birds**

A general summary of the mortality surveys conducted during the reporting period is included in Section 7.4.1. As outlined above, two EPBC listed species were identified in the formal mortality surveys over the reporting period, three Wedge-tailed Eagles and two white-throated needtails. These incidents and any follow up investigation were reported to DAWE in the manner required by the Plan.

### **8.2.3 Management responses and mitigation**

A component of this plan is to outline the corrective action (offset) obligations associated with any wind turbine related mortality impacts on Commonwealth listed species. Over the life of the MRWF two EPBC listed species have been identified through the mortality monitoring program (both formal and informal), the white-throated needletail and the wedge-tailed eagle. No corrective actions have been implemented for the two white-throated needletail incidents.

For the 2019/20 reporting period eight WTE mortalities were recorded at MRWF (3 during formal survey and 5 from informal finds). Over the operating life of the wind farm (to the end of the 2019/20 reporting period), 20 WTE mortalities have been recorded. These numbers are consistent with the modelled estimates for a 90% avoidance rate presented in the assessment documentation and later the Plan but exceed the modelled estimates for a 99% avoidance rate on which corrective action benchmarks are based. During the reporting period, the benchmark requiring an Adaptive Management Protocol (AMP) as an additional corrective action was reached. On this basis an AMP was developed and provided to the DAWE in November 2019. The AMP is discussed in Section 8.2.5. Regarding corrective actions in response to WTE mortalities, Section 7.3 includes a summary of the offset projects/actions.

### **8.2.4 Benchmarks**

As stated above the number of collisions of WTEs has exceeded the base threshold described in the Plan. The threshold was exceeded on the basis that the rate of mortality exceeded the expected rate as well as the total number. The final level outlined in the Plan has been reached.

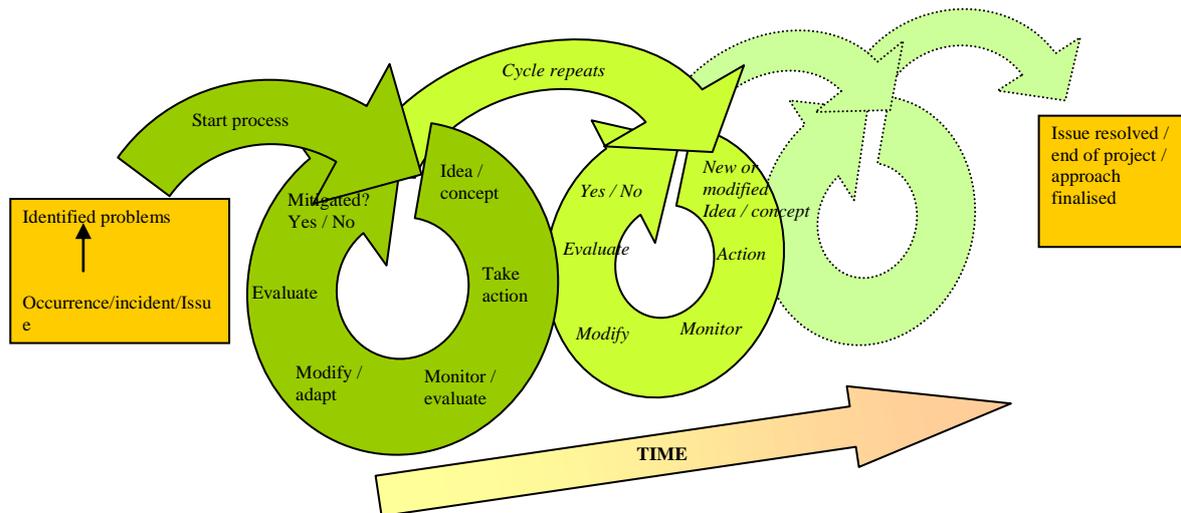
### **8.2.5 Adaptive Management Protocol**

An Adaptive Management Protocol (AMP) was developed in response to reaching the final corrective action benchmark described in the Bird Utilisation, Behaviour and Mortality Monitoring Plan. The AMP is implemented in addition to corrective actions/offsets. The objective of the protocol is to:

- Develop an understanding of why there are higher than expected levels of collisions, and

- Use this understanding to formulate, test and refine management responses aimed at reducing these levels.

Adaptive management is a process of identifying an environmental impact, obtaining relevant information and data, evaluating this for evidence of effects or the requirement for modifications to monitoring, preparation of trials and tests of potential mitigation strategies and the review and implementation of successful findings or other potential strategies for testing. The framework is illustrated in Figure 9.



**Figure 9. Schematic of the adaptive management approach used by WNR**

The application of the adaptive management framework to address WTE impacts commenced a decade ago at the two other wind farm sites owned and operated by WNR; Bluff Point and Studland Bay Wind Farms. The application of the process has led to numerous observational studies, implementation of practical control measures and field trials of various technologies. At various stages, consultation exercises have also been conducted with species experts and general environmental managers about mitigation measures and options to trial.

Based on the work conducted to date, a number of summary points can be made:

- Observational studies indicate that eagle collisions are not easily predictable events. There appears to be no one variable (or collection of variables) that will always result in an increased level of risk.
- The effects of practical measures to reduce the overall attractiveness of our wind farm sites to eagles has been implemented based on general logic.
- Noise deterrent trials have proved the technique is ineffective.
- Observer based and rule orientated turbine shutdown programs have resulted in mixed degrees of success.
- Nest activity and success studies and genetic studies have provided small insights but provided little to assist in providing a tangible solution to the issue.

The AMP also outlines several recent studies, actions and trials conducted at MRWF and some of these are reported in Section 5.1 Eagle Management

The primary area of focus of the AMP is a technological solution designed specifically for bird detection, understanding utilisation, flight path monitoring and finally integration with the wind turbine control system to implement turbine shutdowns. This solution is discussed in detail in Section 5.2.2.

### **8.3 Transmission Line Listed Species Impact Mitigation Plan**

This Plan covers requirements relating to mitigating impacts on the habitats of listed migratory birds and listed threatened species during construction and maintenance of the Transmission Line (condition CEM5). There are no specific reporting requirements for the Plan beyond the requirements of Condition 7 of the EPBC Approval (*“On 1 July of each year after the date of this approval, the person taking the action must provide a certificate stating that the conditions of this Approval have been complied with”*). The following information is provided to summarise activities and actions, relevant to the plan, undertaken during the reporting period.

#### **8.3.1 Management of listed threatened fauna**

The construction of the transmission line was completed in 2013 including installation of the avian collision mitigation (see the MRWF Public Environment Report 2010-13).

No spotted-tailed quoll or Tasmanian devil den sites, or new active WTE nests have been located. Therefore, no action has been required.

#### **8.3.2 Avian collision and electrocution mitigation**

All avian collision mitigation has been installed as outlined in the MRWF Public Environment Report 2010-13.

### **8.4 Wedge-tailed Eagle Impact Offset Plan**

This Plan satisfies the requirements of condition 6 (CEM6), which requires that a Plan be prepared to offset the impacts of the proposal on WTEs. The sections of the Plan that require reporting (beyond the requirements of Condition 7 of the EPBC Approval *“On 1 July of each year after the date of this approval, the person taking the action must provide a certificate stating that the conditions of this Approval have been complied with”*), are detailed below.

All the actions in this Plan (nest protection, aerial searches and the study into the effectiveness of nest protection management prescriptions) have been completed. Details of these studies were reported in the MRWF 2010-13 Public Environment Report.

## 9. Community consultation and communication undertaken

### 9.1 Environmental Management activities and meetings

A summary of environmental management activities and meetings for the reporting period is provided in Table 8.

**Table 8. Summary of environmental management activities and meetings during the reporting period 2019-20**

Date	Activity or meeting	Comment
<b>Activities undertaken and outlined in the approved EMPs are outlined in the relevant sections of this report. Other management activities and meetings held in conjunction or addition to the approved EMPS are listed in this table.</b>		
August 2019	EPA meeting	General catch-up
October 2019	External Audit	External audit by BSI for ISO 14001 certification
October 2019	EPA meeting	Eagle management discussions
November 2019	Robin Radar project execution	Final execution of contract and project commencement meeting
January 2020	EPA MRWF site visit	General field trip
April 2020	Presentation to HSE Industry Committee	Eagle Management in Tasmania
May 2020	Commence GPS tracking project	Project personnel on site
June 2020	Threatened Bird Strategy - industry discussion	TasNetworks, Hydro Tasmania

### 9.2 Other stakeholder activities

Table 9 below provides a summary of other community based engagement activities undertaken in relation to the MRWF during the reporting period.

**Table 9. Summary of other community based engagement activities undertaken during the reporting period.**

Event and comments	Date
Rail Trail Run Ride	August 2019
Bridport Scallop Fiesta	August 2019
Bridport 10 Plus support	October 2019
Clean Energy Open Day (Studland Bay Wind Farm)	October 2019
Scottsdale Show	November 2019
Mannalargenna Day	December 2019

## 10. Glossary

AER	Annual Environmental Review
AMP	Adaptive Management Plan
BPWF	Bluff Point Wind Farm
BUBMMP	Bird Utilisation Behaviour and Mortality Monitoring Plan
DAWE	Commonwealth Department of Agriculture, Water and the Environment
DPIPWE	Tasmanian Department of Primary Industry Parks Water and Environment
DPEMP	Development Proposal and Environmental Management Plan
Eagle	WTE or WBSE
EIR	Eagle Impact Review
EMP	Environmental Management Plan
EPA	Tasmanian Environment Protection Authority
EPBC	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPN	Environment Protection Notice
GPS	Global Positioning System
MRWF	Musselroe Wind Farm
NWWZ	North West Wader Zone
SBWF	Studland Bay Wind Farm
TSPA	Tasmanian <i>Threatened Species Protection Act 1995</i>
WBSE	White-bellied Sea-Eagle ( <i>Haliaeetus leucogaster</i> )
WNR	Woolnorth Renewables Pty Ltd
WTE	Wedge-tailed Eagle ( <i>Aquila audax fleayi</i> )

### Species names referred to in text

#### Birds

Australian Pelican	<i>Pelecanus conspicillatus</i>
Brown Falcon	<i>Falco berigora</i>
Cape Barron Goose	<i>Cereopsis novaehollandiae</i>
Currawong sp.	<i>Strepera</i> sp.
Forest Raven	<i>Corvus tasmanicus</i>
Petrel sp.	<i>Oceanitidae</i> sp.
Wedge-tailed eagle	<i>Aquila audax fleayi</i>
White-bellied sea eagle	<i>Haliaeetus leucogaster</i>
White-faced Storm Petrel	<i>Pelagodroma marina</i>
White-throated Needletail	<i>Hirundapus caudacutus</i>

#### Mammals

Forester Kangaroo	<i>Macropus giganteus</i>
Cat (feral)	<i>Felis catus</i>
Tasmanian Devil	<i>Sarcophilus harrisii</i>
Wombat	<i>Vombatus ursinus</i>