

Musselroe Wind Farm Annual Environmental Review 2022-23

September 2023



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1. General Manager's Statement

This is the 13th Annual Environmental Review (AER), including the 2013, 2016, 2019 and 2022 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.woolnorthrenewables.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.

Stephen Ross General Manager Woolnorth Renewables

2. This report

This AER covers the period 1 July 2022 – 30 June 2023 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.

Sections of this report	Compliance details
1. Statement from General Manager of Woolnorth Wind Farm Holding Pty Ltd	In response to 1.1
2. This report	General information
3.1 Background 3.2 MRWF	General information
4. General Environmental Management 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
5. Other Environmental Actions and issues 5.1 Eagle Management	In response to 1.8
5.2 Collision Mitigation	
6. Environmental Management Plans	
7. State Environmental Management Plans	In response to 1.9 and 1.6
8. Commonwealth Environmental Management Plans	In response to 1.6; Information for the Department of Climate Change, Energy, the Environment and Water (DCCEEW).
9. Community consultation and communication undertaken	In response to 1.10
10. Glossary	General inclusion
11. References	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 DCCEEW 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. Musselroe Wind Farm to Derby Transmission Line Route, owned and operated by Woolnorth Renewables

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 2022-23 reporting period.

4.2 Environmental Procedure or process changes

As highlighted in previous AERs (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 in late 2019. 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). This program was maintained throughout the 2022-23 reporting period.

As a longer-term strategy for managing eagle collisions, an avian specific radar was installed, the system was operational by October 2020 and was in a testing and trial phase up until the end of 2022. The Robin Radar project was decommissioned in the second quarter of 2023 due to what was deemed an unsuccessful trial. Further details on the radar are provided in section 5.2.2.

In June 2023 WNR executed an agreement with IdentiFlight for the supply and installation of an aerial detection system that blends artificial intelligence with high precision optical technology to detect eagles and other avian species. The system once installed will integrate with the wind turbines and curtail operation when eagles fly in proximity to the blades. The installation of the system is expected to commence in late Q1 2024 and be operational by the end of Q2 2024. Further details on the IdentiFlight system are provided in section 5.2.3.

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 ³)	20
Steel (tonne)	0
Hydrocarbon liquid (L)	3544
Hydrocarbon solid (m ³)	9
Co-mingled recycling (m ³)	5
Cardboard and paper (m ³)	26

Waste streams and volumes are regularly monitored and where possible materials are recycled rather than being disposed of as general waste. The general waste volume was similar to previous reporting periods. Hydrocarbon solid waste (oily rags, filters) were down compared to last year. Hydrocarbon liquid and coolant waste volumes were also down considerably due to a reduction in gear box oil changes. 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 four non-trivial environmental incidents identified at the MRWF during the 2022-23 reporting period. These incidents were:

- 1. Wedge-tailed eagle collision, July 2022
- 2. Wedge-tailed eagle feather spot, July 2022
- 3. Wedge-tailed eagle collision, August 2022
- 4. Wedge-tailed eagle collision, June 2023

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 DCCEEW 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 2022, and the years leading up to this, the approval of the IdentiFlight aerial detection system was given in June 2023. Further information on this program is provided in Section 5.2.3.

As a broad response to the number of eagle mortalities on the wind farm, 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 5.2.6.

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 environmental and business 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, however, no new strategies were developed due to the focus on the testing of the robin radar system and the procurement of the Identiflight system. Like previous years these investigations range from possible direct collision prevention measures to indirect collision mitigation through to general site-based initiatives. Measures and actions relevant to the 2022/23 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. This program has been maintained through the 2022-23 reporting period.

On a daily basis, covering the vast majority of daylight hours, 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 shut down until the bird is clear from the area.

While detailed analysis of the eagle observation and turbine shutdown data has not yet been conducted, since commencement of the program in November 2019, there have been approximately 500 eagle flights observed every month, with a strong relationship seen between the number of birds and the number of turbine shutdowns. The gradual increase in the number of flights that is evident in Figure 3 is largely due to an increasing number of eagles present on site.



Figure 3. Number of eagle flights (WTE and WBSE) observed from the start of the observer-based shutdown program in November 2019 through to the end of the 2022-23 reporting period.

5.2.2 Robin Radar project

The MRWF PER 2019-22, section 7.17.3, provided an update on the Robin Radar project, including the development and implementation of the final project steps, which ultimately were developed to assist Woolnorth in determining if the project was likely to achieve or reach the project's objectives.

The following 3 additional tasks were agreed with Robin Radar and Western Advance:

- 1. Evaluate targets, eagle recognition and wind turbine shut down on a bigger data set.
- 2. Identify suitable locations for a two Radar solution (each Radar intended to cover half of the wind farm), upgrade the radar with new hardware.
- 3. Final evaluation of the performance based on ONE radar covering half the farm.

Results from the final three steps are summarised below:

<u>Task 1</u>

A detailed assessment of techniques to improve eagle recognition (and ensure wind turbine shutdowns are targeted) was undertaken on a larger dataset (comprising 4-5 months of data). The assessment explored the recall rate (eagle is an eagle) and error rate (false positives). Three approaches were assessed, being the standard decision tree, random forest model and XG boost model. The XG boost model yielded the best results with 89% recall rate with a 1.8% error rate. This assessment was not conducted in 'real-time' and 'real-time' results are not likely to be the same (lower).

<u>Task 2</u>

Prior to the commencement of Task 2, the radar unit was upgraded to an A3 model. The A3 transmits at a higher-power, and this was determined by Robin Radar as a necessary upgrade.

A key aspect in determining the future use of the technology, was to understand whether two radars could adequately cover the turbines at the site and provide a uniform and even coverage – allowing effective detection. This is largely because three radar are an uneconomical solution, as alternative technologies can be procured for less.

Based on the upgraded A2 to A3 and the two locations trialled:

- The coverage, especially in the range between 4-8km, was improved with a more homogeneous cover.
- Gaps around turbines were smaller with the A3 generation radar.
- Using two radars instead of one single radar does lead to a more complete coverage of the whole wind farm (Figure 4).
- A number of areas were identified that showed indications of potential problems (low coverage or clutter).

Plots size -17 to -12DB (Birds only) at varied altitudes, 2022-07-01 08:30:57 - 2022-07-09 23:5



lots size -17 to -12DB (Birds only) at varied altitudes, 2022-06-15 23:46:56 - 2022-06-23 05:47:4



Figure 4. Visualisation of coverage difference between one radar (top) and two radars (bottom)

<u>Task 3</u>

The final task was undertaken to gain a more certain understanding of the coverage and performance of the radar at one of the two locations (Site A, shown tin Figure 2, bottom image)

The radar was operated at Site A for approximately 6 weeks. During this time Woolnorth conducted a period of observer-based comparisons to assess the performance against field observations.

The results of the 6-week trial are summarised below.

Coverage

- It is confirmed that the radar optimally detects large and medium birds between ground level and 700m, with a range of up to 8 km, while the maximum detection range of bird tracks is up to 10 km with a height range between 250m and 700m.
- From horizontal coverage diagrams it is confirmed that coverage is more uniform than at the original radar location. Limited coverage was noted by Robin Radar around turbines C05-C10 due to terrain effects introducing clutter.

Correlation of radar tracks and GPS tagged eagles

- Only one GPS tagged eagle (Bob) could be used to conduct the correlation exercise and because of the territorial nature of eagles this limits assessment to only a portion of the radars range.
- Robin Radar chose to limit the correlation assessment to a sample of data when the GPS tagged eagle was most active. Each period of correlation had over 2000 GPS points.
- There were clear examples of the radar not tracking GPS targets and not correctly classifying them as eagles in high-risk areas around wind turbines. See Figure 5 below.
- The average correlation between 'all/any bird' radar data and GPS tagged eagle data was 85.9% and this lowered to 82.5% when correlating GPS tagged eagle data with radar tracks classified as eagles.



Figure 5. Examples of GPS tracking versus radar output for one small portion of the wind farm and of one GPS tagged eagle (Bob). The examples highlight intermittent tracking or regular non-tracking and misclassification of eagles often in high-risk areas. Note - Black tracks are GPS data, green tracks are radar data from birds, yellow tracks are classified as eagle.

Conclusions of Task 3

The conclusions that can be drawn from the task 3 trial are:

- The coverage is improved with less areas of concern. Turbines C05-C10 are highlighted by Robin Radar as being impacted by clutter.
- The system detected 85.9% of the GPS tagged eagle tracks, but only classifying the track as an eagle 82.5% of the time.
- Using a model to improve the classification of tracks as eagle is possible (based on theoretical assessments), but changes in the percentage of correct classifications remains less that Woolnorth's requirement (of at least 90%).
- Only extended operation of the radar was conducted at one of the two proposed locations. Therefore, there is a gap in our understanding of the exact nature of the coverage and performance at the second location. The second location may produce poorer results due to topography and vegetation as these have been associated with limitations at the tested location.

Determining the project's future

Since installation of the Radar in September 2020, various performance issues have been methodically worked through. The potential for a two-radar solution has been explored, as well as the use of different classification models to improve the detection of eagles (and limit false positives and false negatives).

Referring back to the project objective, **'...to implement a successful and commercially viable solution to mitigate and reduce the risk of eagle mortalities',** the performance assessment results of the system do not provide clear or strong evidence that the objective will be met.

Based on the available information, Woolnorth determined:

- 1. The system's capacity to detect eagle tracks is below our requirements.
- 2. The system's capacity to routinely and continuously be in alignment with known GPS tagged eagles, highlights an unacceptable level of flight activity near turbines that will be undetected, or will not trigger appropriate wind turbine shutdowns.
- 3. There remains an unacceptable residual risk of an eagle mortality while the system is operational.

As a result of our conclusions, notwithstanding the significant time taken to explore the performance issues and the opportunities to improve the system, Woolnorth agreed with Robin Radar and Western Advance to cease the project. During the second quarter of 2023, the system was decommissioned and returned to Robin Radar.

5.2.3 Future Eagle Management and Mitigation

To ensure an appropriate level of preparedness, given the status of the Robin Radar project, Woolnorth re-evaluated the Identiflight solution. Preliminary discussions were undertaken with Identiflight including the receipt of an updated project proposal. Following Woolnorth reaching agreement with Western Advance and Robin Radar to suspend the Robin Radar project, discussions with Identiflight were accelerated including a site visit, agreement on commercial terms and in late June the execution of a supply and install agreement. The installation of an Identiflight system demonstrates Woolnorth's ongoing commitment to minimise it's impacts on eagles. The total value of the installation cannot be disclosed, however it is a substantial multi-million dollar investment.

The following section describes the Identiflight system and its application at MRWF.

Overview

The IDF system consists of monopole towers with high precision optical cameras at the top of each tower (Figure 6), couple with Artificial Intelligence (AI) networks that rapidly analyse image data collected. IDF stations are strategically located across a wind farm with approximately one IDF tower for each two wind turbines. Each IDF has visibility of an approximate one-kilometre hemisphere, and all cameras have overlapping fields of view, providing coverage of the entire airspace above and around the wind farm. Each IDF station is connected to a nearby turbine by power and communications cables which link the IDF stations to an IDF Base Station located at the wind farm control building.

The IDF System tracks the movement of objects in the sky around the wind farm and quickly determines whether they are birds, then whether the bird is an eagle. If a bird is identified as an eagle, IDF commences tracking the eagle, recording its position, and trajectory in real time relative to turbines. Pre-defined curtailment conditions are then used to shutdown (curtail) turbines if the trajectory of the bird indicates it would cross the rotor swept area of a turbine. When an eagle is at risk, the IDF Base Station issues a signal to the wind farm SCADA system, which sends control signals to curtail one or more turbines to avert risk of eagle collision. When the eagle is no longer at risk, another signal is sent to restart the turbine. The IDF system can track multiple eagles simultaneously and shutdown any number of turbines required to avoid a collision.



Figure 6. Field installation of IDF (Wyoming, USA)

Global IDF Field installations IDF

IDF have 150 installations (units) across USA, Europe and Australia (16). A further 75 units will be deployed at a large wind farm in Uzbekistan by the end of 2024. Office location now exist beyond the USA, with locations in Germany, Netherlands and Spain. A presence in Tasmania is likely if the wind farm project pipeline eventuates (as almost every wind farm will require an automated shutdown system).

One of the field installations is the Cattle Hill Wind Farm (CHWF) in Tasmania's central highlands. Sixteen IDF towers were installed during the construction phase in 2018/19. Following 18 months of operation, a detailed review of the performance of the IDF system was undertaken by the wind farm operator (Goldwind Australia). The review was made publicly available in late February 2022.

Key findings of the review are summarised below:

• Three wedge-tailed eagle mortalities have been observed at the wind farm (there have now been 8), including one where a curtailment was overridden by an operator

and two at a vegetation affected turbine. The collision risk model (CRM) for the project predicted five by the end of year one and 8 by the end of year 2. The project is running well under the modelled predictions.

- From a technical reliability perspective, IDF has operated as intended, has not been impacted by any major or unresolvable issues, has been successfully serviced and maintained by wind farm staff with technical support for IDF headquarters in the USA.
- The IDF system communication with the wind farm SCADA system is reliable with no issues relating to curtailment/shutdown signals.
- The IDF system, with a high degree of accuracy and precision, is able to distinguish between eagles and other birds on site, and issue curtailment signals only for the target species (eagles).
- The IDF system have operated without incurring excessive generation losses.
- Specific metrics to note:
 - Overall classification accuracy continuously >92%, in cases exceeding 95%.
 - False negative rate low (approximately <1%) non detection or eagle classified another species.
 - False positives consistently <20% non protected species classified as eagle.

In addition to the general performance attributes outlined above, IDF has been subject to rigorous performance studies and these studies have been published in various scientific journals (peer reviewed). These are listed below.

Christopher J. W. McClure, Luke Martinson, & Tabar D. Allison, (2018). Automated monitoring for birds in flight: Proof of concept with eagles at a wind power facility. Biological Conservation, 224, 26–33.

Christopher J. W. McClure, Brian W. Rolek, Leah Dunn, Jenifer D. McCabe, Luke Martinson, Todd Katzner: Jan 2021, Eagle fatalities are reduced by automated curtailment of wind turbines. Journal of Applied Ecology.

Christopher J. W. McClure, Brian W. Rolek, Leah Dunn, Jenifer D. McCabe, Luke Martinson, Todd Katzner. (2020), Data from: Automated curtailment of wind turbines reduces eagle fatalities, Dryad, Dataset, https://doi.org/10.5061/dryad.pnvx0k6kx

Aschwanden, J. & F. Liechti (2020): Testing of the automatic bird detection system Identiflight on the test field of WindForS in the context of nature conservation research (NatForWINSENT). Swiss Ornithological Institute, Sempach.

ARSU GmbH (2021): Investigation of the effectiveness of IdentiFlight in protecting the red kite from collisions with Wind turbines. renewables energies Europa GmgH.

In summary, the published performance studies have been undertaken at a range of locations and on wind farms with different raptors. Studies provide evidence of the performance attributes including percentage of target detection and other standard metrics such as false negative, false positive. Other studies also demonstrate collision reduction, shutdown operation and effectiveness. In all cases, IDF demonstrates a high degree of precision and accuracy with low rates of non-detections and other false negatives. Installations in Wyoming (Top of the World Wind Farm) and CHWF demonstrate an effective lowering of the collision rate (or numbers of mortalities).

MRWF project

Thirty Identiflight units will be installed across MRWF, as shown in Figure 7. This achieves a full and complete coverage of all wind turbines and takes into account relevant site environmental factors, as well as Woolnorth's understanding of eagle utilisation and behaviours at the site.

The project scope is split and defined. Identiflight will supply, install, and commission the 30 units across MRWF. Post-commissioning, Identiflight will provide remote system surveillance, service, and maintenance.

Woolnorth will ensure any project approvals are secured, assessment of any site-based impacts are conducted, prepare foundations, unit security and fencing, provide power and communication supply to each of the 30 units.

At the end of the reporting period, Woolnorth had commenced project planning and establishing the schedule and timing of key activities. The project is working toward having all 30 units commissioned and operation by quarter 2, 2024.



Figure 7. Overview of the layout of Identiflight towers (pink symbols) relative to wind turbines across the Musselroe Wind Farm.

5.2.4 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.

Since the establishment of the project and the fitting of the trackers, most adult birds continue to occupy their original territories successfully as adult breeding pairs. Two of the birds are no longer transmitting data due to malfunction of the unit on the bird called "Bonnie" and either a malfunction or death of the bird called "Stella". Genetic analysis is currently being conducted to confirm whether Stella could be associated with the wind farm collision identified at B09.

5.2.5 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 has continued. Through this current reporting period, the focus has been on the trial of Robin Radar and investigations into Identiflight, and therefore limited research into developments in the field have been maintained.

5.2.6 Eagle Impact Review

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 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.

Project title and description	Status at the end of the reporting period
Eagle observation study – single study	This study has been completed.
A repeat of the two eagle movement studies conducted at the site.	
The study will contribute to the EIR by determining a current rate of utilisation fo comparison with previous periods of observation (and corresponding rates o utilisation).	r f
Where, where, wedgie (<u>http://naturetrackers.com.au/</u>) – multi-year study Where, where, wedgie is a state-wide eagle observation study. Woolnorth participated in the study by placing observers in the Musselroe/Gladstone regions to collect eagle data.	WNR continue to support the project by continuing data collection. Discussions with statisticians has determined that it is not currently possible to compare the site collected data with data collected elsewhere. Despite this, WNR will continue to support the project and contribute to the surveys.
This study will contribute to the EIR by providing data for a regional level comparisor of eagle data (e.g. count of observations, count of individuals) collected ir the Musselroe/Gladstone Region with other regions in Tasmania.	
Wedge-tailed eagle nest checks – multi-year study	All known nest sites in the study area have been checked (post breeding season)
This study will assess the nest activity and breeding success of up to 15 known eagle	across 4 years 17/18, 18/19, 19/20 and 20/21. Checks were conducted by a mix of
nest sites in an approximate 30km radius from the wind farm site.	aerial and ground surveys. Any statistical assessment of the data is unlikely to provide any insight into wind farm impacts. Nests survey information has been
This study will contribute to the EIR by providing regional level nest activity and	compiled and provided to the NVA. The broader study is considered complete,
breeding success data for comparison with state-wide data.	however WNR continue to check some nest sites local to the site to provide basic population dynamic information.
Genetic assessment of collision victims and nest 'cast-off' material multi-year	In conjunction with the nest checks, a small amount of off-cast material has been
study	collected during nest checks.
All collision victims continue to be sampled for DNA. Off-cast material collected from	
nest sites such as excreta, feathers, egg shell, pellets can sometimes yield DNA. Using	Genetic samples have been collected from all collision victims. Not all samples
DNA finger printing the collision victims will be compared with DNA extracted from	have been analysed.
'off-cast' material and blood samples taken from eagles trapped for the satellite	
tracking work (see 5.3.5).	Given there is limited off-cast material, the assessment to determine the
	relatedness between off-cast material and collision victims cannot be conducted.
This study will contribute to the EIR by providing details on the origin of the collision	However, the blood samples from trapped birds and collision victims continues,
victims (e.g. local vs itinerant).	with results to be provided in future annual reports.
Assessment of individuals through remote stations on the wind farm.	The trial was completed in 2020. A detailed report was provided in the 2018/19

Following the techniques of Driscoll and Koronkiewiscz (2016), cameras located at fixed stations will be used to collect basic eagle characteristics (count, species, age,	AER which presented the majority of the relevant information and conclusions of the study.
time of day) and possibly identify individuals based on plumage or other unique features.	The study is considered complete.
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.	

5.3 Eagle nests at MRWF

Based on information gathered from the eagle observer team based permanently on site, the previous breeding season has been notably successful. At least three young WTE have successfully fledged from pairs of birds on or immediately adjacent to the site. One of these is from the satellite tracked bird "Malu", but the origin of the other two is uncertain. A new nest yet to be registered has also been recently built in pine trees in the middle of the property. Figure 8 provides an overview of the estimated nest activity across the breeding season based on assessments from the observer team. No camera systems were installed on any of the nests through the last breeding period.



Figure 8. Activity status and current species usage of wedge-tailed eagle and white-bellied sea eagle nests across the property, with their Nest Id number corresponding to the record in the Natural Values Atlas.

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 2022-23 reporting period. The project was initiated due to reports of a number of WTE being killed in the area as a result of vehicle collisions, and numerous observations of WTE feeding on roadkill. WNR 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 roadkill to safer areas such as the non-roadside 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 plan was approved by NRE Tas in 2021, following considerable consultation and research by Pinion Advisory, on behalf of Musselroe Wind Farm. Small burns and preparatory works have started at different sites across the property, in close consultation with aboriginal elders and burn technicians. The priority for the plan is the longevity of threatened native orchid populations in the area, but also the maximisation of biological values across the property, where traditional burning was once prevalent prior to settlement. Through the last reporting period, a number of small burns were conducted in the NW of the property in sedgeland country. Further work is awaiting capability development within the local aboriginal community (mtwAC) who will be driving this initiative in the future.

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 Coast Care Working Group, Threatened Plants Tasmania, Field Naturalists Society, Tasmanian Museum and Art Gallery with the Tasmanian Herbarium, Threatened Species Unit (Flora), the University of Tasmania and NRE Tas 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).

Environmental Management Plan and relevant permit condition	Authority	Year last approved	Status	Reporting required in AER?*
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

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

Environmental Management Plan and relevant permit	Authority	Year last approved	Status	Reporting required in AER?*
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
WTE Collision Mitigation Adaptive Management Protocol	EPA	2021	Active	No, general comments included

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

Environmental Management Plan and relevant permit	Authority	Year last approved	Status	Reporting required in AER?*
condition				
CEM2 Turbine 6 Migratory Bird Impact Mitigation Plan	DCCEEW	Not approved	Not Required	Turbine 6 on Tank Hill was not constructed
CEM3 Wind Farm Listed Species Impact Mitigation Plan#	DCCEEW	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#	DCCEEW	2017	Active	Yes
CEM5 Transmission Line Listed Species Impact Mitigation Plan#	DCCEEW	2009	Active	No, general comments included.

CEM6 Wedge-tailed	DCCEEW	2009	Active	No, general
Eagle Impact Offset				comments
Plan#				included
WTE Collision	DCCEEW	2020	Active	No, general
Mitigation Adaptive				comments
Management				included
Protocol				

#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 in 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 DCCEEW.

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 <u>MRWF PER 2016-19</u>.

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 2022-23 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 is 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 visually-eradicating 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 9 shows the paddocks that have been declared noxious weed free and those paddocks still undergoing weed treatment as of August 2022.



Figure 9. 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. 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, 30 WTEs and two white-bellied sea eagles (WBSE) have 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 DCCEEW. 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 Sate 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.
- 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'.
- 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 two WBSE mortality recorded, no further offset actions have been required.

In addition to these projects, since 2018 Woolnorth Renewables has provided a financial contribution to the Raptor Refuge to assist in the operation of the facility. This arrangement will continue until at least 2024.

7.4 Bird and Bat Mortality Monitoring Plan

7.4.1 Operational Phase Wind Turbine Mortality Monitoring

During the 2022-23 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, 23 carcasses or feather spots (finds) were found in formal surveys, equalling a find during 7.4% of surveys (Table 5). Six feather spots were identified, one if which was identified as a Wedge-tailed eagle.

	Bat	Bird	Feather
Year	mortality	mortality	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
20/21	0	21	6
21/22	0	13	0
22/23	0	16	7
Av yr*	1	24	5

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

* rounded

Four carcasses and one injured bird (Pelican) 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 2022-23
reporting period.

Common name	Number found
Australian Pelican	1
Brown Falcon	5
Cape Barron Goose	1
Cormorant	1
Forest raven	2
Peregrine Falcon	1
Short Tailed Shearwater	1
Currawong	1
Wedge-tailed eagle	3
Unknown	7

Table 7.Species identified outside of the formal bird mortality surveys during the
2022-23 reporting period.

Common name	Number found
Australian Pelican	3
Wedge-tailed Eagle	1
Brown Falcon	1

The numbers of mortalities identified through formal surveys in the 2022-23 reporting period were slightly higher than the previous year, but on average lower than previous periods. The specific species identified during the 2022-23 reporting period are also similar to previous reporting periods.

The only mortalities of listed species identified during the 2022-23 reporting period were the WTE (State and Commonwealth listed).

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 *Threated 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 DCCEEW within seven days of discovery.

As agreed with NRE 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. Following the substantial changes made in 2020 with the adoption of tablets equipped with mapping software for field work, data collection apps have been added to improve the precision and accuracy. This software has been utilised for both the bird mortality surveys and the turbine shutdown work described in section 5.2.1.

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 2020-21 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 2020-21 reporting period other than a small amount of roadside and hardstand slashing.

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.
- An overview of the eagle breading and nesting activity during the 2022-23 reporting period (see Section 5.3).

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, the only EPBC listed species that was identified in the formal mortality surveys over the reporting period, two wedge-tailed eagles and one wedgetailed eagle featherspot (one was also found outside the formal surveys). These incidents and any follow up investigation were reported to DCCEEW 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 2022-23 reporting period three WTE mortalities and one feather spot were recorded at MRWF (3 during formal survey and 1 from informal finds). Over the operating life of the wind farm (to the end of the 2022-23 reporting period), 30 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. Because of this exceedance, 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 DCCEEW 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. Named the Wedge-Tailed Eagle Collision Mitigation Adaptive Management Protocol, this document 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 10.



Figure 10. 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 5.2.3.

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 2022-23

Date	Activity or meeting	Comment	
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.			
Nov 2022	NRE survey	Wombat mange assessments	
Nov 2022	Botanical survey	Richard Schahinger survey for threatened plants	
Dec 2022	DCCEEW visit	General site tour	
Dec 2022	External Audit	External audit by BSI for ISO 14001 certification	
Feb 2023	Field trip to Cattle Hill	Meet property owner and view the Identiflight system	
April 2023	EPA meeting	General catch-up	
Range of dates	Birds Australia (Tas)	Wader monitoring surveys	
Throughout	Discussions with Poulsen & Co	Discussions with the farming licensee were conducted regularly throughout the year to discuss and action a range of topics.	
Throughout	Discussions with Robin Radar, Western Advance	Regular project meetings on the MAX radar project	
Throughout	Discussions with Identiflight	Regular project meetings on the Identiflight project	
Throughout	mtwAC	Regular meetings on property management	

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 undertakenduring the reporting period.

Event and comments	Date
Bridport Scallop Fiesta	July 2022
Rail Trail Run Ride	September 2022
Bridport 10+ Fun Run	November 2022
Scottsdale Show	November 2022
Mannalargenna Day	December 2022

10. Glossary

AER	Annual Environmental Review		
AMP	Adaptive Management Plan		
BPWF	Bluff Point Wind Farm		
BUBMMP	Bird Utilisation Behaviour and Mortality Monitoring Plan		
CHWF	Cattle Hill Wind Farm		
DAWE	Commonwealth Department of Agriculture, Water and the		
	Environment (Now DCCEEW)		
DCCEEW	Department of Climate Change, Energy, the Environment and		
	Water (Formerly DAWE)		
DPIPWE	Tasmanian Department of Primary Industry Parks Water and		
	Environment (Now NRE Tas)		
NRE Tas	Department of Natural Resources and Environment Tasmania		
	(Formerly DPIPWE)		
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 Environment Protection and Biodiversity		
	Conservation Act 1999		
EPN	Environment Protection Notice		
GPS	Global Positing System		
MRWF	Musselroe Wind Farm		
NWWZ	North West Wader Zone		
SBWF	Studland Bay Wind Farm		
TSPA	Tasmanian Threatened Species Protection Act 1995		
WBSE	White-bellied Sea-Eagle (Haliaeetus leucogaster)		
WNR	Woolnorth Renewables Pty Ltd		
WTE	Wedge-tailed Eagle (Aquila audax fleayi)		

Species names referred to in text

Birds

Australian Pelican Brown Falcon Cape Barron Goose Cormorant Currawong sp. Forest Raven Peregrine Flacon Petrel sp. Shearwater sp. Short-tailed Shearwater Wedge-tailed eagle White-bellied sea eagle White-faced Storm Petrel White-throated Needletail

Mammals

Forester Kangaroo Cat (feral) Tasmanian Devil Wombat Pelecanus conspicillatus Falco berigora Cereopsis novaehollandiae Cormorant Strepera sp. Corvus tasmanicus Falco peregrinus Oceanitidae sp. Puffinus sp. Ardenna tenuirostris Aquila audax fleeyi Haliaeetus leucogaster Pelagodroma marina Hirundapus caudacutus

Macropus giganteus Felis catus Sarcophilus harrisii Vombatus ursinus

11. References

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