

CATTLE HILL Wind Farm



Annual Environmental Review 2024

Review period: 1 July 2023 to 30 June 2024

Prepared in satisfaction of State EPN 10105/1 Condition G10

Prepared By: Goldwind Australia



On behalf of: Wild Cattle Hill Pty Ltd



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Definitions and Abbreviations

AER	Annual Environmental Review
BBMMP	Bird and Bat Mortality Monitoring Plan
Cattle Hill Wind Farm	Wind Farm comprising 48 wind turbines and up to 150 MW capacity
CADP	Collision Avoidance and Detection Plan
Central Highlands Region	Is that described as the area north of Bothwell, east of Bronte Park and surrounds, south of Liawenee, and west of the Great Western Tiers
CHC	Central Highlands Council
CHWF	Cattle Hill Wind Farm
DAWE	Department of Agriculture, Water and Environment
DCCEEW	Commonwealth Department of Climate Change, Energy Efficiency, and Water
DNRE	Tasmanian Department of Natural Resources and the Environment
DPEMP	Development Proposal and Environmental Management Plan
EMOP	Eagle Mortality Offset Plan
EMPCA	<i>Environmental Management and Pollution Control Act 1994</i>
EMS	Environmental Management System
ENPMP	Eagle Nest Productivity Monitoring Plan
EPA	Tasmanian Environment Protection Authority
EPBC	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPN	Environment Protection Notice
ERP	Emergency Response Plan
EUMP	Eagle Utilization Monitoring Plan
FPA	Forest Practices Authority
FOMP	Flora Offset Management Plan
GWA	Goldwind Australia Pty Ltd (ACN 140 108 390)
HCMP	Hunting and Culling Management Plan
Ha	Hectare
IDF	IdentiFlight
MW	Megawatt
NVA	Natural Values Atlas
O&M	Operations and Maintenance
OEMP	Operations Environmental Management Plan
PCA	Powerchina Australia Development Pty Ltd.
SCADA	Supervisory Control and Data Acquisition
SES	State Emergency Services
TasNetworks	Own, operate and maintain the electricity transmission and distribution network in Tasmania.
TFS	Tasmanian Fire Services
The Land	Described as that situated immediately east of Lake Echo and off Bashan Rd, approximately 3km southwest of Waddamana in central Tasmania, including part or all of titles 135246/1; 29897/1; 29897/3; 29897/5; 248810/1; 135247/1; 135247/2; 29888/4; and 29897/6
The Proponent	Wild Cattle Hill Pty Ltd (WCHPL) ACN 610 777 369
WTE	Tasmanian Wedge-tailed Eagle (<i>Aquila audax fleayi</i>)
WBSE	White-bellied Sea-eagle (<i>Haliaeetus leucogaster</i>)
WCHPL	Wild Cattle Hill Pty Ltd (ACN 610 777 369).

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- Appendix B Hazardous Substances Inventory
- Appendix C Wedge-Tailed Eagle Research Fund 2024 Annual Report

Managing Director's Statement

This is the Seventh Annual Environmental Review (AER) for the Cattle Hill Wind Farm, located in Tasmania's Central Highlands.

The AER has been prepared in accordance with the requirements of Condition G10 of Environment Protection Notice 10105/1 issued by EPA.

This AER will be made publicly available through publication on the Cattle Hill Wind Farm website: (www.cattlehillwindfarm.com).

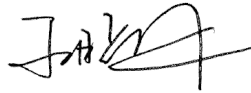
As required under Condition G10, this AER has been prepared for submission to the Director of the Environment Protection Authority within 3 months of the end of the review period (1 July 2023 – 30 June 2024).

I acknowledge and endorse the contents of this review.

Xiaolin Wang

Managing Director, PowerChina Australia, on behalf of Wild Cattle Hill Pty Ltd

19 August 2024



Ning Chen

Managing Director, Goldwind Australia, on behalf of Wild Cattle Hill Pty Ltd

19 August 2024

1. Introduction

1.1 Purpose of this document

This Annual Environmental Review (AER) 2024 has been prepared in accordance with requirements of Environment Protection Notice (EPN) No. 10105/1 Condition G10, which requires annual reporting of project performance against environmental requirements outlined in the project's regulatory approvals, and their implementation via relevant approved management plans.

The report has been prepared by Goldwind Australia (GWA) on behalf of the proponent, Wild Cattle Hill Pty Ltd (WCHPL).

This AER covers the period from 1 July 2023 to 30 June 2024 (the review period) and has been prepared in accordance with State EPN 10105/1 Condition G10 (provided in full as Appendix A).

1.2 Cattle Hill Wind Farm

The Cattle Hill Wind Farm (CHWF) has an installed total capacity of approximately 148.5MW and is allowed by the Grid operator to export up to 144 MW to the Grid when wind conditions allow for maximum generation.

The amount of clean energy generated by the CHWF each year is sufficient to meet the total power demand of approximately 16,765 Tasmanian households (around 7% of the houses in Tasmania)¹.

The CHWF commenced operations in 2020, boosted Tasmania's renewable energy supply by 5%, and helped Tasmania achieve its goal of becoming 100% powered by renewable energy the same year. Approval of CHWF as an accredited power station in 2020 also allowed the Australian Government's Large-scale Renewable Energy Target of securing an additional 33,000-gigawatt hours of renewable energy to be surpassed.

CHWF was the first wind farm in the southern hemisphere to install the IdentiFlight eagle detection and collision avoidance system, winning the Clean Energy Council innovation award in 2021 for successfully pioneering this technology in Australia. The CHWF was also the first wind farm in Tasmania to utilize detection dogs for carcass monitoring. During the review period, CHWF environmental representatives have continued to share lessons from these and other initiatives with regulators and wind farm developers in the interest of advancing best practices for protection of the environment on wind farms.

1.3 Proponent Details

Wild Cattle Hill Pty Ltd (WCHPL) is the proponent, and the 'Responsible Person' for the project under State EPN 10105/1. Shareholders for WCHPL are:

- Powerchina (80%), and
- Goldwind Australia (20%).

¹ 2021 Census data recorded a total of 229,000 occupied houses in Tasmania.

1.4 Structure of this Report

This AER provides a review of performance against environmental obligations outlined in the project’s regulatory approvals and implementation of associated approved management plans.

Table 1.1 provides a reference to sections of this AER which address the requirements of Condition G10 of the State EPN.

Table 1.1: AER Reporting Requirements and where they are addressed in this document.

Condition G10 reference and Summary of Reporting Requirements		AER Section
1.1	Statement by General Manager or equivalent acknowledging contents of AER	Preface
1.2	List of complaints received from the public and description of any actions taken as a result	4.1, 4.1.1
1.3	Environment-related procedural or process changes implemented during the review period	4.4
1.4	Amounts of waste produced and treatment methods implemented during the review period	4.3.1
1.5	Non-trivial environmental incidents and/or noncompliance with permit conditions	4.2
1.6	Summary of monitoring data and record keeping required by conditions of EPN	5
1.7	Breaches of limits specified in conditions	4.5
1.8	Other issues	5.4, 7
1.9	Summary of fulfilment of environmental commitments	8
1.10	Summary of any community consultation and communication	6
1.11	Potential changes to the activity over the next 12 months	8



Figure 1.1: Cattle Hill Wind Farm

2 Project Overview

2.1 Project Location

The CHWF is located in Tasmania’s central highlands, immediately east of Lake Echo and approximately 3km southwest of Waddamana. The site is within a sparsely populated and relatively isolated part of the Central Highlands Council municipal area, on land which ranges from 700-920 metres above sea level (Figure 2.1).

The site is approximately 35 kilometres south of the township of Miena and is bordered geographically by Lake Echo to the West, and the Ouse River valley to the east, where the former Waddamana Power Station remains as a heritage site and museum.

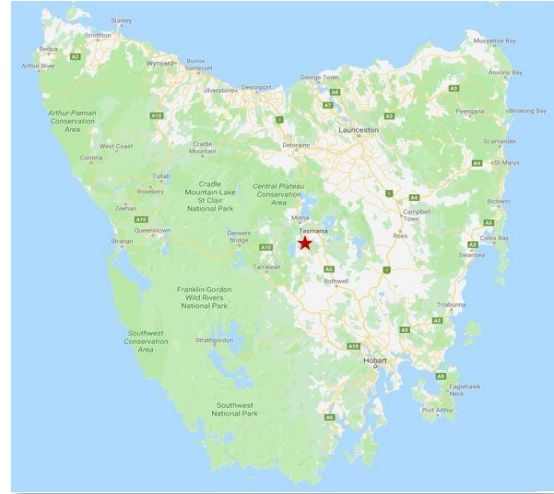


Figure 2.1: Cattle Hill Wind Farm location

The site is accessible by unsealed roads from the northeast, east and south, which after completion of construction of the CHWF in 2020, have returned to their former low traffic levels.

CHWF exports power to the Tasmanian electricity supply network via a short section (approximately 250 metres) of 220 kV overhead line which connects the wind farm substation to the TasNetworks high voltage electricity transmission network which crosses the site. Aside from this, there are no overhead lines associated with the development.

In addition to operation of the CHWF, other land use activities on the site include farming, operation and maintenance of the TasNetworks transmission line, and scattered residential dwellings.

2.2 Project Background

CHWF has had a long planning history; subject to a planning application based on a Development Plan and Environmental Management Plan (DPEMP, 2010) that led to initial approval by Tasmanian State and Local Regulators on 15 December 2011 that was amended by RMPAT in April 2012 and, an EPBC Referral (EPBC 2009/4839) to the (now) Commonwealth Department of Climate Change, Energy, Environment, and Water (DCCEEW) (previously Department of Agriculture, Water and Environment (DAWE) and subsequent EPBC approval in December 2014.

The initial development approval was issued to NP Power Pty Ltd, then transferred to One Wind Australia Pty Ltd and followed by Tasberry Holdings Pty Ltd in 2016. WCHPL (the current proponent) acquired the project in October 2017 and redesigned aspects of it in accordance with a series of Commonwealth, State and Local development approvals (see Section 2.5).

WCHPL has substantially condensed the project footprint from its original proposal for a 100-turbine layout to a more compact 48 turbine layout, with increased tower height and higher capacity turbines, resulting in a more efficient project, with significantly reduced environmental impact.

2.3 Infrastructure Components

Following completion of construction of the CHWF, all temporary facilities such as batching plants and the main construction compound were removed from site. Permanent infrastructure components which will remain throughout the life span of the project are described in Table 2.1 and shown on the wind farm layout map (Figure 2.2).

Table 2.1: CHWF Infrastructure (Operations Phase)

Component	Description
Turbines and towers	The CHWF consists of 48 wind turbines with a generating capacity of 148.5 MW. The turbines utilise Goldwind Permanent Magnet Direct Drive technology, and have a tip height of 170 m above ground level, a hub height of 100 m and rotor diameter of 140 m. Near the base of each tower is an external kiosk-style 33kV transformer and two banks of cooling fans. Cooling fluid circulates between the cooling fan units and internal areas of the tower and turbine. No aviation safety lighting is required on the wind turbines. Lighting is provided at the entry to each tower. The turbines are off-white/grey with non-reflective finish.
Hardstands	Hardstands formed during construction are used for large cranes and component laydown at each turbine site and are retained and maintained to allow for maintenance activities during the operation of the wind farm.
Substation and switchyard	An on-site substation within a security fenced compound receives 33 kV cables from each of the wind farm's five collector groups, via a 33-kV switch room. Voltage is stepped up to 220kV by a bundled 33kV/220 kV transformer before connecting to the Tas Networks 220 kV OH transmission line via a switchyard, overhead gantry, and short section of overhead 220kV line and cut-in poles. Beneath the substation is an earthing grid for electrical protection.
O&M facility	The Operations and Maintenance (O&M) facility is a permanent facility which will be used for operation and maintenance functions throughout the life of the project. The facility includes offices and amenities, a carpark, storage and maintenance buildings, a workshop, laydown area, and fire safety infrastructure.
Underground cables	A network of 33kV underground cables links each of the 48 turbines to the onsite substation. Where possible, these cables were installed adjacent to access tracks to minimise disturbance.
Internal access tracks	A network of internal access tracks has been established to provide all weather access to all turbine sites and the substation and has been designed to facilitate over-dimensional deliveries.
IdentiFlight system	The CHWF includes 17 IdentiFlight (IDF) pole mounted avian protection units installed as part of an Australian first technology trial aiming to reduce collision risk for the Tasmanian Wedge-Tailed Eagle. The IDF units are connected to the wind farm's electrical and communication systems and integrated with the CHWF SCADA system, and send signals to curtail any turbine, if an eagle is at risk of entering the turbine's Rotor Swept Area (RSA) based on its speed and trajectory. The 17th IDF unit was installed in October 2023 to address IDF blind spots caused by vegetation to improve coverage of turbines.
External road upgrades	To allow large component deliveries such as turbine blades, nacelles, tower sections and generators during construction, as well as provide safe access for maintenance of components during operations, significant upgrades to approximately 30 kilometers of external roads were undertaken. These works were completed during the previous review period, prior to the over-dimensional transport of Wind Turbine components. The upgraded roads have since been handed back to CHC for ongoing management.

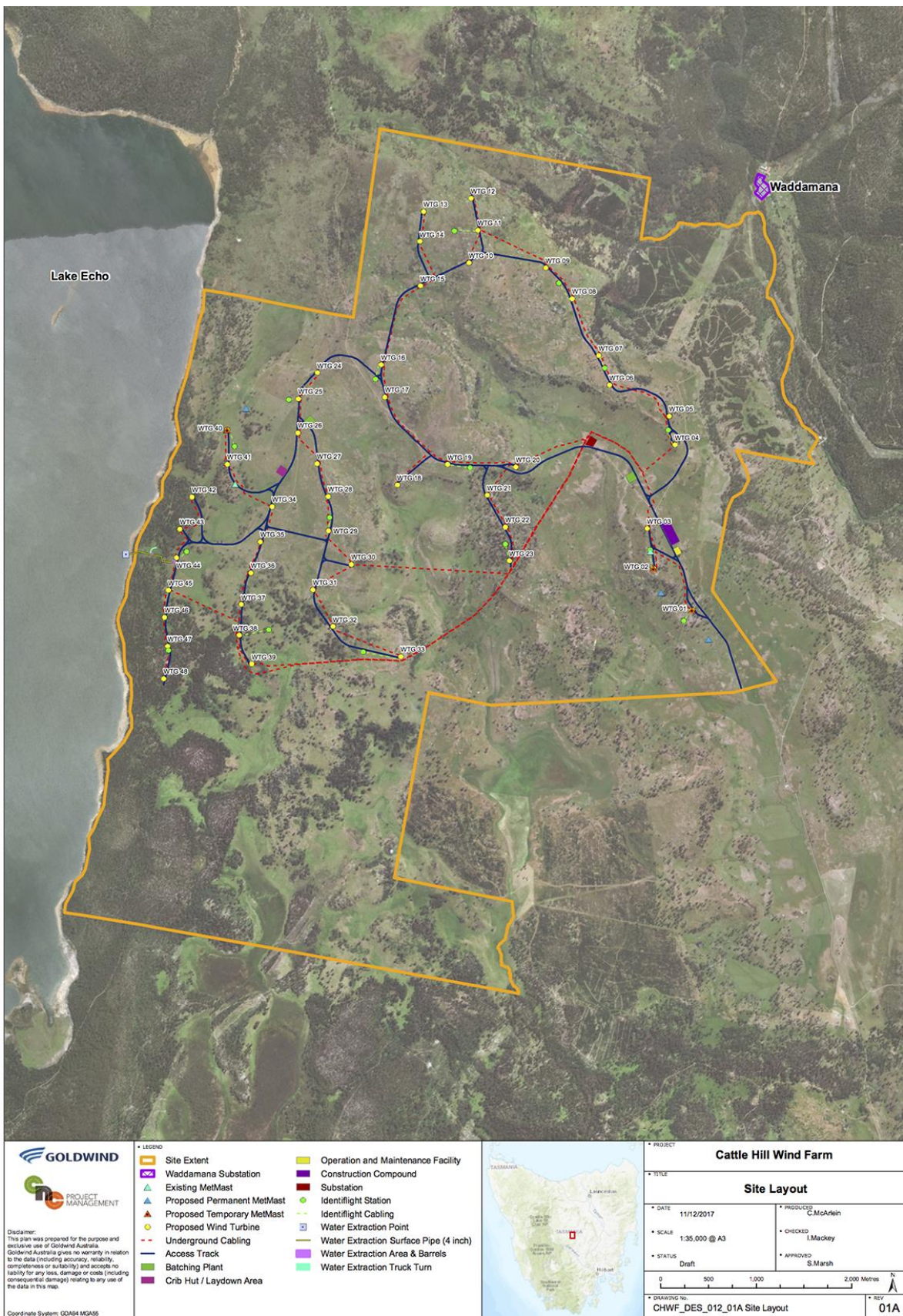


Figure 2.2: Cattle Hill Wind Farm Final (As-Built) Layout (Revised December 2023)

2.4 Site Exclusions and Restricted Areas

The CHWF is situated in a remote part of the Central Highlands, spanning two large private landholdings which are primarily used for farming purposes (sheep and cattle). Parts of the site contain areas of cultural heritage and ecological significance, which are protected by existing and proposed covenants.

The following restrictions and requirements have been incorporated into the design of the CHWF and are to be adhered to by all persons on site, for the operational life of the facility:

- A pre-existing 'Lake Echo' conservation covenant which has limits on the placement of infrastructure.
- Avoidance of disturbance of Highland Poa and orchid habitat within the 'Lake Echo' covenant, except as permitted by Permits to Take and/or the Covenant Authorisation
- A 1,000 m infrastructure buffer from known Wedge-tailed Eagle or White-bellied Sea Eagle nests as of December 2017, when the wind farm layout was approved by EPA).
- An infrastructure buffer of 100 m from the high-water mark of Lake Echo
- An infrastructure buffer of 150 m from the nearest transmission line on the site
- A 30 m buffer from known mammal dens and nests.
- A 30 m buffer around listed flora and habitat to be protected.
- A 50 m buffer zone around European (Huts) and Aboriginal cultural heritage sites (TASI sites)
- Animal carcasses (e.g., from shooters operating on the property to control deer on behalf of the landowner) found within 500m of turbines must be disposed of in approved carcass pits on site and covered within 24 hours, so as not to attract eagles near turbines.
- Shooters are prohibited from shooting native animals within the Lake Echo Conservation Covenant, or within 200 metres of turbines.
- Calving is not to be undertaken within 200m of turbines.
- Carbon Credits Forest, part of the Forests Alive project administered by the Clean Energy Regulator. Turbines 42 - 48 near Lake Echo are located within this forest. To allow for construction of these turbines, parts of this covenant had been previously removed by the landowner, however for Carbon Forest outside these areas, clearance of vegetation is prohibited.

Following detailed design of the CHWF, two covenant areas were proposed to offset impacts to Commonwealth and State listed species which could not be avoided in design:

- A conservation covenant for protection of EPBC listed orchid *Liawanee Greenhood*;
- A conservation covenant for protection of State listed species *Discaria pubescens*.

These covenant areas have been excluded from staff or visitor access since 2020, with ecologists carrying out monitoring in accordance with the Flora Offset Management Plan, and protective fencing established.

During the review period, the long process of registering these offsets as protective covenants was completed, with Covenant Dealings for Dungrove Land Co P/L (Stone Hut), and Tasberry Holdings (Womans Creek and Bashan Ledge) being registered on 8th April 2024.

2.5 Key Project Approvals

CHWF operates in accordance with Commonwealth, State, and Local permits and approvals, and related approved management plans and processes to support effective implementation of requirements (summarized in Table 2.2).

Table 2.2: CHWF regulatory approvals and related management plans and processes

Primary approval	Related Approved Management Plans / Processes
<p>EPBC Approval Notice 2009/4839 issued by the Department of Agriculture, Water and Environment (DAWE) (now DCCEEW) on 15 December 2014. Amended on 22 November 2022 to change the timeframe for submission of incident investigations to fifteen (15) days following notification.</p>	<ul style="list-style-type: none"> • Weed Management Strategy • Flora Offset Management Plan • Flora Offset Management Plan • Collision Avoidance and Detection Plan • Annual Compliance Review • Notifications and Reporting
<p>State Environmental Protection Notice EPN 10105/1 issued by the Tasmanian EPA on 13/03/2019 <i>(Superseded by EPN 10105/2 provided near the end of the review period)</i></p>	<ul style="list-style-type: none"> • Design Report • Eagle Nest Productivity Monitoring Plan • Post Commissioning Eagle Utilisation Monitoring Plan • Bird and Bat Mortality Monitoring Plan • Eagle Mortality Offsets and Offset Plan • Hunting and Culling Management Plan • Complaints Register • Emergency Response Plan • Turbine Shutdown Management Plan • Operational Environmental Management Plan • Annual Environmental Review • Notifications and Reporting
<p>Planning Permit DA 2010/19 to use and develop land to establish wind farm and ancillary infrastructure, issued by Central Highlands Council (CHC) on 15 December 2011, RMPAT decision April 2012 as amended on 25/10/18.</p>	<ul style="list-style-type: none"> • Traffic Management Plan • Approval of Signage • Approval of colours / finishing on towers and turbines • Building permits (permanent buildings)
<p>Planning Permit DA 2017/56 to use and develop land to install sixteen IdentiFlight stations as part of an eagle collision avoidance trial, issued by CHC on 30/01/18. Amended in March 2023 to allow for the use and development of land to establish an additional 17th IDF station (discussed in Sections 4 and 7 of this AER).</p>	<ul style="list-style-type: none"> • Location and Design in accordance with the Permit • Building permits for IdentiFlight towers • Design report • Eagle Nest Productivity Monitoring Plan.

3 CHWF Project Status

3.1 Design Changes during the review period

The major design change which occurred during the review period was completion of a 30m IdentiFlight (IDF) Station to complement the sixteen IDF stations established for the IDF technology trial to reduce impacts on eagles. This additional IDF station (IDF-17) was sited within a heavily forested section of the CHWF near Lake Echo, as a mitigation measure following the eagle mortalities reported in the previous AER. Due to the topography of the site, and protected Carbon Forest the 10m IDF stations installed as part of the trial could not see over the 30m tree canopy and did not detect the low flying eagles due to screening from vegetation.

The taller tower initiative has been successful, with no eagle mortalities occurring during the review period (see also Sections 4 and 7).

3.2 Activities Undertaken within Review Period

Key activities for CHWF undertaken during the review period are summarised in Table 3.1.

Table 3.1: Activities undertaken within Current Review Period.

Key Activities Undertaken within Current Review Period	Date	AER Section
Voluntary shutdown of T46 to reduce eagle risk commended by EPA	5 July 2023	Section 7
Completion of 2 years post construction eagle utilization monitoring	25 July 2023	Section 5.2.3
EPA confirms satisfactory completion of eagle utilization monitoring.	1 September 2023	Appendix C
Presentation and Tour of IDF with Ark Energy, DCCEEW, and EPA	7 September 2023	Section 7
Commissioning complete for IDF17	2 October 2023	Section 7
Request to EPA seeking permission to recommence generation at T46	12 October 2023	Section 7
IdentiFlight performance update - Presentation to EPA Tasmania	21 November 2023	Section 7
Permission to recommence generation at T46 granted by EPA	24 November 2023	Appendix C
Suspension bridge over Ouse Rover (Waddamana Road) collapses	23 March 2024	Appendix A
Final EPN for operations phase provided by EPA	12 June 2024	Section 5.2.1
Ongoing implementation of OEMP	Throughout review period	Section 5
Ongoing eagle nest checks required by ENPP	Mid-November	Section 5.2.2
Ongoing treatment of weeds on wind farm roads and hardstands	Throughout review period	Section 5.3.3
Collection of quarterly shooters records as required by HCMP	Quarterly	Section 5.3.4
Ongoing carcass monitoring as required by BBMMP	Monthly	Section 5.2.5
Ongoing community engagement activities	Throughout review period	Section 6
Ongoing operation and maintenance of IDF system	Throughout review period	Section 7

4 General Environmental Management

4.1 Complaints made by the Public during the Review Period

Enquiries and complaints in relation to CHWF are managed in accordance with a Complaints Management System designed to meet *AS/NZS 10002:2014 – Guidelines for Complaint Management in Organisations*, which outlines processes and associated timeframes for:

- registering all enquiries and complaints
- collecting information and responding to enquiries and complaints
- addressing and resolving complaints; and
- mediation if resolution is not reached.

The system includes a dedicated database which is used to store, track, and manage all complaints.

During the review period, the CHWF received its first operational noise complaint, from a resident in Miena (approximately 15 kilometres from the CHWF). However following investigation, the CHWF was ruled out as a possible noise source, and the matter was closed out.

No other complaints were received during the review period.

4.1.1 Management Actions undertaken in response to Complaints

The subsequent investigation concluded that the noise source was not attributable to the CHWF, and the matter was resolved.

4.2 Incidents

The major incident occurring during the review period was the collapse of the Waddamana suspension bridge over the Ouse River, which subsequently limited vehicle access to the CHWF.

4.2.1 Environmental Incidents Notified to Regulators

During the review period, no incidents associated with wind farm operations triggered a requirement to formally notify regulators, however several Commonwealth listed bird species detected during routine carcass monitoring and have been informally notified (see Section 5).

4.2.3 Management Actions resulting from Incident Investigations

No management actions resulted from incident investigations, including the noise complaint referred to above.

4.3 Waste Management

4.3.1 Waste Volumes Generated during Review Period

Waste volumes generated during the review period were similarly low to the previous year and are expected to remain low for the remainder of the operational life of the wind farm, as only a small team is present on site.

Table 4.1 summarizes waste volumes generated during the review period.

Table 4.1: Total Waste Volumes Generated during Review Period

Category	Volume	Treatment / Disposal Method
Solid Wastes		
General waste	114 cubic metres	Launceston Landfill
Liquid Wastes		
Sewerage (amenities)	N/A	AWTS System Serviced and Maintained by Professional Plumbing
Controlled Wastes		
Hydrocarbon (total)	Zero	N/A
Empty oil drums	Zero	N/A
Waste grease	5 x 44-gallon drums	Delivered to Tasmania Oil for disposal.

4.3.2 Waste Strategies Implemented within Review Period

The approach to managing waste on site remains focused on avoiding, reducing, and reusing waste, in accordance with the waste hierarchy, as outlined in the approved OEMP but due to the low volumes and absence of local recycling facilities options are limited.

One opportunity identified during the review period which is the process of implementation is the salvage and re-use of steel components from a decommissioned met mast tower on an adjoining landowner property. The salvaged steel will be cut into sections and used at CHWF to install upgraded calibration targets supplied by IDF as part of ongoing improvement of the IDF system.

4.3.3 Inventory of Hazardous Goods

Condition H4 of EPN 10105/1 requires an inventory to be kept of all environmentally hazardous materials stored and handled on The Land, specifying the location of storage facilities and maximum quantities of hazardous materials held. This is provided in Appendix C.

As most of the hazardous materials held on site during construction of the wind farm have since been removed, only minor volumes of hazardous materials are held on site; these are limited to those required to operate and maintain the wind farm.

4.4 Changes to Environmental Procedures or Processes within Review Period

No changes to environmental procedures and processes were adopted during the review period.

4.5 Compliance Breaches

No compliance breaches occurred during the review period.

5 Implementation of Environmental Management Plans

5.1 Management Plans required by Approval Conditions

The CHWF operates in accordance with various management plans approved by State and Commonwealth regulators.

Table 5.1 outlines the plans required by the conditions of approval and implementation activities undertaken within the review period.

Table 5.1: Approved Management Plans and associated Implementation Actions within Review Period

Condition reference / Title of Plan		Approval	Activities Within Current Review Period
Plans required by State EPN			
DC2	Decommissioning and Rehabilitation Plan	29/07/22	<ul style="list-style-type: none"> Approval of DRP by EPA
G9	Emergency Response Plan	03/04/20	<ul style="list-style-type: none"> Annual review and site familiarisation with TFS and SES.
G11	EMP (Operations)	06/08/19	<ul style="list-style-type: none"> Ongoing implementation of management plans
FF5	Eagle Nest Productivity Monitoring Plan	30/10/17	<ul style="list-style-type: none"> On site nest checks undertaken as required.
FF6	Eagle Utilization Management Plan	06/02/18	<ul style="list-style-type: none"> Two-years post commissioning eagle monitoring completed.
FF7	Hunting and Culling Management Plan	20/11/18	<ul style="list-style-type: none"> Collation of Records provided by Shooting Groups.
FF10	Bird and Bat Mortality Monitoring Plan	26/03/19	<ul style="list-style-type: none"> Main and pulse surveys of 24 turbines each month.
FF15	Eagle Mortality Offset Plan ²	21/12/18	<ul style="list-style-type: none"> No contributions to WTE research fund during the review
Plans required by Commonwealth EPBC Approval			
6A	Collision Avoidance Detection Plan	29/05/18	<ul style="list-style-type: none"> Additional 30m IDF station completed and commissioned. Ongoing use of detection dogs for carcass monitoring.
22	Weed Management Strategy	14/12/17	<ul style="list-style-type: none"> Monitoring of priority weeds and treatment as required
23	Flora Offset Management Plan	10/08/19	<ul style="list-style-type: none"> Monitoring required by FOMP undertaken. Finalisation of covenants on land titles.

Activities relating to the above plans are discussed in more detail in the following sections.

² Also addresses EPBC conditions 16 – 19 (inclusive)

5.2 Management Plans required by State EPN

5.2.1 CHWF Operational Environmental Management Plan

The OEMP describes the elements of the Environmental Management System (EMS) which WCHPL is implementing and continually improving to avoid, mitigate, and manage potential environmental impacts associated with CHWF operations. High level objectives of the OEMP are to:

- Protect the environment by preventing or mitigating adverse environmental impacts.
- Facilitate efficient conduct of activities in accordance with environmental conditions.
- Assist the organization in the fulfilment of compliance obligations.
- Enhance environmental performance.
- Communicate environmental information to relevant interested parties.

The OEMP has been developed to enable the project to achieve these outcomes by:

- Establishing an EMS framework to enable WCHPL to protect the environment and respond to changing environmental conditions in balance with the project operational requirements.
- Setting out details of each relevant environmental aspect (specific issues) and the management controls for potential impacts in respect of each specific issue.
- Establishing objectives and targets for environment protection and biodiversity conservation.
- Compiling all environmental aspects, management strategies, and compliance requirements for CHWF operations in a single, clearly presented, and accessible reference document.

Now in its fourth year of full operation, many of the environmental requirements and obligations associated with the construction phase have been satisfactorily addressed, and the majority of the site has been satisfactorily rehabilitated.

During the review period, a new EPN was issued for the wind farm operations phase, which removes a number of requirements which have now been fulfilled, or related to construction of the wind farm and are no longer relevant.

The OEMP is in the late stages of being refreshed in accordance with the new EPN 10105/2 provided by EPA during June 2024.

Actions relating to approved plans implemented under the framework of the OEMP are discussed in the following sections.

5.2.2 Eagle Nest Productivity Monitoring Plan

Condition FF5 of the State EPN required the preparation of an Eagle Nest Productivity Monitoring Plan (ENPMP) prior to construction. The ENPMP approved by EPA requires undertaking activity and productivity checks of eagle nests within and outside the wind farm each year, as described below:

On Site Nest Checks

Eagle nests within the wind farm were checked by VDC during the 2-23/24 review period in accordance with *Forest Practices Authorities Fauna Tech Note No. 1 - Eagle nest searching, activity checking and nest management*³. All nests were approached and examined from previously established vantage locations designed to avoid disturbance of nesting eagles.

While the ENPMP defines ‘on-site’ nests as those within 2 kilometers of turbines, a broader scope of nest checks is undertaken each year. Figure 5.1 shows the seventeen nests recorded on NVA within 4 kilometers of the CHWF, fourteen of which are checked by VDC every year. Nests which are not checked include RND 872 on the western bank of Lake Echo, RND 490, a recorded nest which does not exist, and RND 1320, which is 3.5 kilometers outside the wind farm’s northern boundary, and 4.3 kilometers from the nearest turbine. The activity status of these nests is drawn from searches undertaken by others.



Figure 5.1 – Known nests within 4km of CHWF.

³ http://www.fpa.tas.gov.au/_data/assets/pdf_file/0012/110208/Fauna_Tech_Note_1_Eagle_nest_management_May_2015.pdf

Figure 5.2 shows the activity status of nests from checks undertaken in 2024. Three nests outside the boundary of the CHWF were active in 2024, including RND 1724, just outside the southern boundary of the CHWF, regularly active white bellied sea eagle nest RND1318 on the north shore of Lake Echo, and a possible new nest location near RND2470 on the eastern side of the Ouse River catchment. All three nest locations are approximately three kilometers from CHWF turbines.

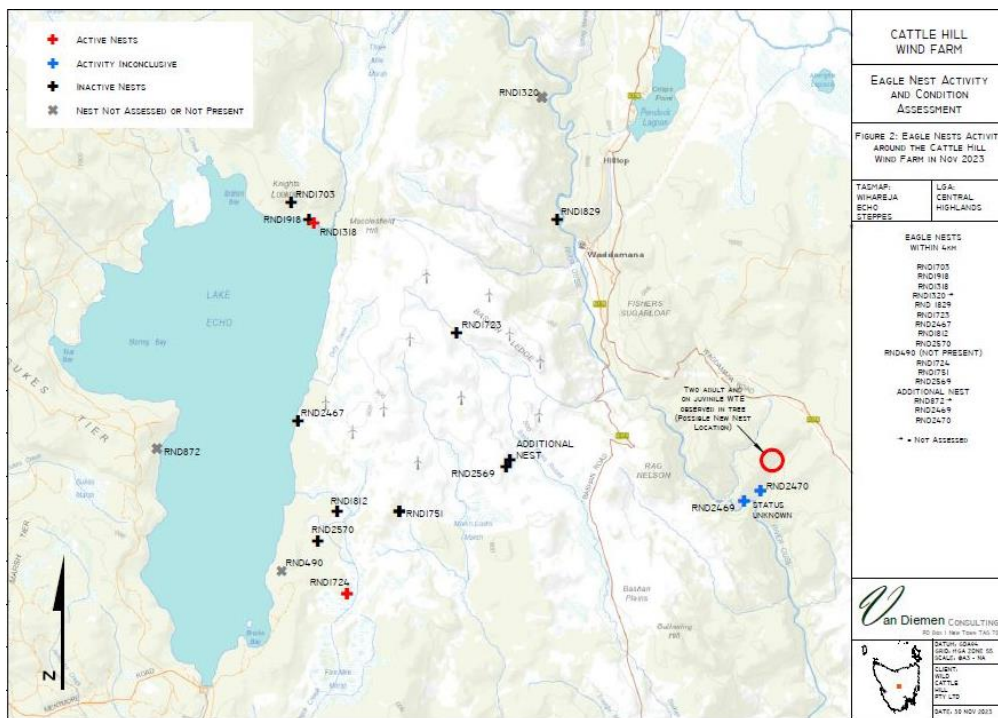


Figure 5.2 – Activity status of known nests from checks undertaken during 2023.

5.2.3 Post Commissioning Eagle Utilization Monitoring Plan

The Post Commissioning Eagle Utilization Monitoring Plan (EUMP) developed in response to Condition FF6 of the EPN, outlines the requirement for two years of post-commissioning eagle utilization monitoring at the below periods:

- Breeding season (8 days in mid-November)
- Breeding season (3 days in mid-December)
- Post breeding (4 days in late February)
- Non-breeding (5 days in early May)
- Display period (6 days in Mid-August).

During the previous review period, the two-years of monitoring was completed and a report comparing the findings was provided by Wildspot in July 2023, comparing the results with the pre-construction monitoring previously undertaken. The report was provided to EPA, and confirmation of satisfaction of the requirement provided from EPA in September 2023 (see Appendix B).

The IdentiFlight trial reviewed the effectiveness of humans versus IdentiFlight for monitoring the movement of eagles within the wind farm, which concluded humans could not match the data or accuracy provided by IdentiFlight. While the human monitoring obligation has been satisfied, the CHWF continues to monitor the movements of eagles using IdentiFlight as the preferred method.

The Wildspot report also confirmed that a significantly greater population of eagles was present during the two-year period of post commissioning / operational monitoring than there had been before construction of the CHWF. This trend continued during the review period, with the population of eagles utilizing the CHWF continuing to increase, and many new juvenile eagles detected within the wind farm.

5.2.4 Hunting and Culling Management Plan

The Hunting and Culling Management Plan (HCMP) was developed in accordance with Condition FF7 of EPN 10105/1 and Commitment 126 of the DPEMP. In parallel, Conditions 3 and 4 of the EPBC approval required the location of four carcass disposal pits within the wind farm to be approved by the Commonwealth Minister responsible for administering the *EPBC Act 1999*. These pits were established prior to construction at approved locations (referred to as Top Ridge, Mushroom, Bashan, and Five Mile) each over 500 meters from the nearest turbine. Placement away from turbines was designed to reduce Eagle Collision risk.

During the 2022/23 review period, a change to the management of carcass pits occurred in consultation with DAWE and EPA, to enable compliance with the *Animal Health Act*. The pits, predominantly used by Hunting and Shooting groups operating on behalf of the landowners, had previously been left open, with the view that this would provide a similar food source for eagles to that prior to the wind farm, however they are now covered following use within 48 hours (or sooner) to comply with the requirement of the *Animal Health Act* for covering of carcasses.

During the review period, shooters continued to operate on the site, removing and / or disposing of a total of 2,563 carcasses in carcass pits throughout the CHWF (Figure 5.3).

Approximately 36% of the carcasses removed / disposed of, were the native bennet’s wallaby, the main food source of the Tasmanian Wedge Tailed Eagle, along with padymelon (10%) and European hare (1%).

As the carcass pits are now required to be closed following use, they can no longer provide a similar food source for the Wedge Tailed Eagle as intended by the original permit conditions.

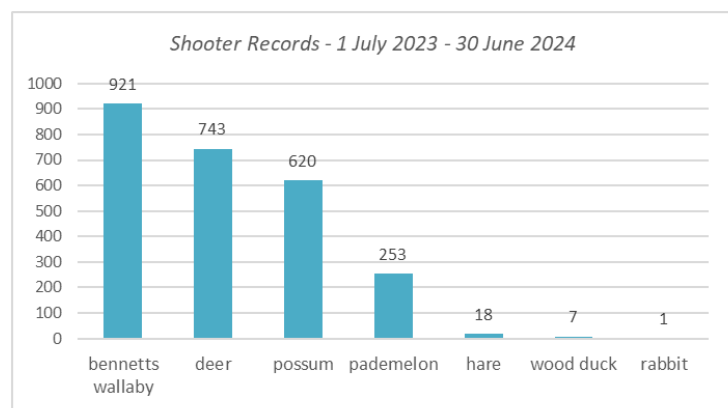


Figure 5.3: Carcasses removed during review period from shooters records collected in accordance with the Hunting and Culling Management Plan.

Research undertaken under the Tasmanian Wedge Tailed Eagle Research fund also suggests eagles are susceptible to ingestion of lead from bullets when feeding on prey shot by hunters. Four out of five previous eagle mortalities tested at CHWF also had elevated lead levels in their blood, bone, and tissue, suggesting they had been ingesting lead over a long period of time.

The impact on eagles associated with removal of prey from site and use of lead bullets by hunters is not fully understood. Further research is being carried out via the WTE research fund.

5.2.5 Bird and Bat Mortality Monitoring Plan

The Bird and Bat Mortality Monitoring Plan (BBMMP) addresses requirements of EPN Condition FF10 and has been approved by EPA. The Plan stipulates requirements for monitoring at Carcass Monitoring Zones (CMZ) beneath each turbine, and the procedures to be carried out following discovery of any injured or dead bird or bat species.

Throughout the review period, detailed surveys of 24 turbines per month continued to be carried out using trained detection dogs ('Phase 2 surveys'), searching the area around each turbine, out to 120m. Within three days of each Phase 2 survey, 'Pulse' surveys were undertaken, searching the inner 60m carcass monitoring zone around each turbine.

Between 1 July 2023 and 30 June 2024, a total of 88 native birds (35 species) 33 introduced birds (4 species) and 35 bats (6 species), and 8 migratory birds (one species) were detected during carcass monitoring surveys, which is similar to the proportion of native birds (57%), introduced species (23%) and bats (20%) to last year's results.

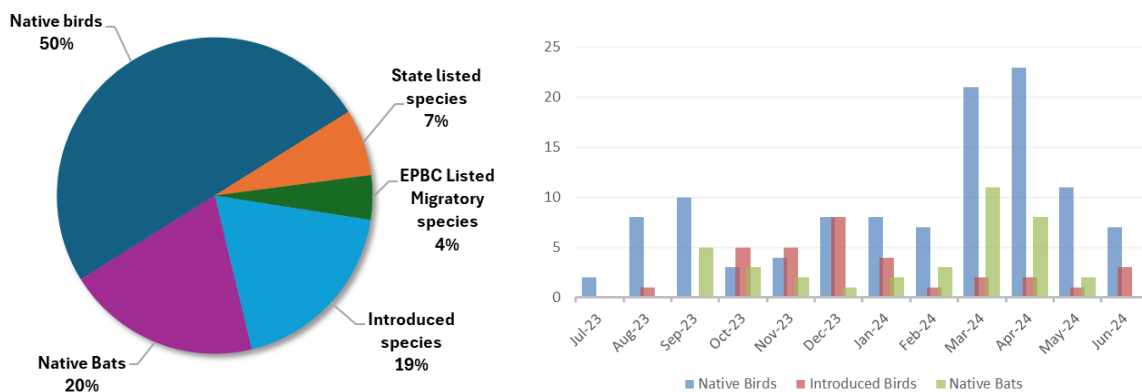


Figure 5.4: Bird and bat species detected by carcass monitoring at CHWF – 1 July 2023 – 30 June 2024

Table 5.2: Bat species detected by carcass monitoring.

Species	Count	Percent
Chocolate wattled bat	3	8%
Eastern false pipistrelle	2	5%
Gould's Wattled Bat	16	43%
Large Forest Bat	11	30%
Lesser long-eared bat	2	5%
Southern forest bat	3	8%

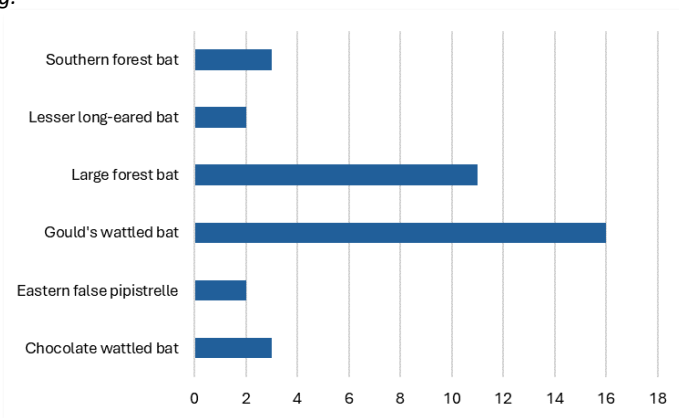


Figure 5.5: Bat species detected by carcass monitoring.

<i>Table 5.3: Bird species</i>	Count	Percent
Australian magpie	4	3%
Australian pipit	1	1%
Australian wood duck	3	2%
Black currawong	15	12%
Black-faced cuckoo shrike	1	1%
Black-headed honeyeater	1	1%
Blue-winged parrot	12	9%
Bronze cuckoo	1	1%
Brown falcon	4	3%
Brown quail	1	1%
Crescent honeyeater	1	1%
Eastern rosella	4	3%
Eurasian skylark	7	5%
European goldfinch	2	1%
European starling	23	18%
Flame robin	1	1%
Forest raven	2	1%
Green rosella	6	5%
Grey currawong	1	1%
Horsfield's bronze cuckoo	1	1%
New holland honeyeater	2	1%
Noisy miner	1	1%
Peregrine falcon	1	1%
Pied cormorant	1	1%
Pink robin	3	2%
Robin	1	1%
Silvereye	5	4%
Spotted pardalote	2	2%
Striated pardalote	4	3%
Tasmanian native hen	1	1%
Tawny frogmouth	1	1%
Tree martin	5	4%
Welcome swallow	1	1%
White-throated needletail	8	6%
Yellow wattlebird	2	1%
	129	100%

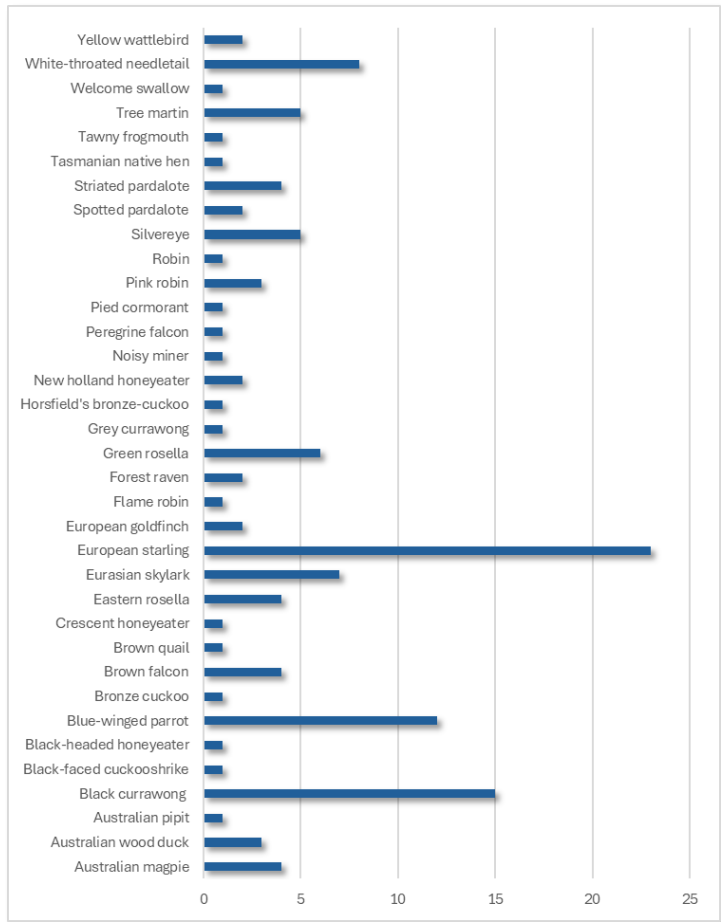


Figure 5.6: Bird species detected by carcass monitoring



Figure 5.7: The European Starling was again the most frequent bird detected by carcass monitoring, followed by the Black Currawong-

During the 2023/24 review period, the major change compared with last year’s results was the lack of eagle mortalities due to the installation of an additional 17th IdentiFlight station (Section 7).

Though no eagle mortalities occurred in 2023/24, there was an increase in mortalities of the below Commonwealth listed species (see Table 5.3)

- Blue winged parrot (Vulnerable) (12 mortalities)
- White Throated Needle-tail (Vulnerable) (8 mortalities)

White Throated Needle-tail observations

- White-throated Needle-tail has been confirmed on site on multiple occasions from review of IdentiFlight images (Figure 5.6) and site observations.
- Previously only one White-throated Needle-tail mortality had occurred since 2019, on 16 March, 2021.
- In 2024, White-throated Needle-tail was confirmed present as early as January and as late as June, suggesting the species may be present over a much longer duration than previously thought.
- The majority (63%) of White-throated needle tail mortalities occurred in March.

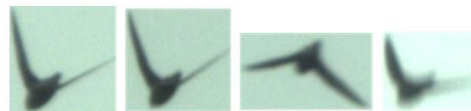
Table 5.4: Listed species mortalities within the review period

Blue Winged Parrot Mortalities		
Date	Mortalities	Turbines
29 January, 2024	One	Turbine 16
31 January, 2024	Two	Turbine 16, Turbine 17
17 February, 2024	One	Turbine 14
26 March, 2024	Five	Turbine 24
27 March, 2024	Two	Turbine 16, Turbine 17
28 March, 2024	One	Turbine 17
White-throated Needle-tail Mortalities		
Date	Mortalities	Turbines
20 March, 2024	One	Turbine 31
21 March, 2024	One	Turbine 28
22 March, 2024	One	Turbine 36
27 March, 2024	Two	Turbine 20, Turbine 23
20 April, 2024	One	Turbine 41
23 May, 2024	One	Turbine 18
5 June, 2024	One	Turbine 41
Peregrin Falcon Mortalities		
Date	Mortalities	Turbines
21 April, 2024	One	Turbine 1

White Throated Needle-tail

22 Jan 2024 180m AGL 188m from T45 at 5.17pm.

Verified by Nick Mooney



White Throated Needle-tail

21 March 2020 140m AGL 238m from T32 at 4.26pm.

Verified by Nick Mooney



Figure 5.8: White Throated Needle-tail images captured by IdentiFlight.



Figure 5.9: Blue-winged Parrot

Small Species Neural Network Initiative

A current issue being discussed amongst wind industry bird and bat representatives is how to reduce risk of collision for small, fast flying and flocking bird species such as the Blue Winged Parrot and the White Throated Needletail. Related to this issue is the lack of available data for these species, such as the flight heights and the timing and duration of their presence on a wind farm site.

Though there are no specific requirements for either species in the conditions of approval, and IdentiFlight is not designed to protect small species, WCHPL is investigating whether IDF has collected sufficient images to develop additional neural networks; both species are relevant to other wind farms, and there is currently no proven solution to mitigate impacts.

To date, IdentiFlight has collected over 4 million non-eagle bird species, along with over 17 million eagle images. If these images could be used to develop a parrot neural network, for example, this would lead to a much more accurate understanding of the timing and duration of their presence on site, which could in turn enable alternative mitigation measures to be developed to reduce impacts.

Any additional neural networks able to be developed would also be available for use on other wind farms, as with the WTE and WBSE neural networks developed using data from CHWF.

Comparison of Mortality Levels with Published Data

Carcass monitoring during the review period resulted in the following mortality levels:

- Wedge Tailed Eagle 0 mortalities per turbine / per year
- White Bellied Sea Eagle 0 mortalities per turbine / per year
- Native birds 1.85 mortalities per turbine / per year
- Native bats 0.72 mortalities per turbine / per year

These figures are well below reported industry average bird/bat mortalities for large turbines⁴ (5-7 birds per turbine/year and 7-10 bats per turbine/year).

Despite the significant increase in eagle utilization and eagle nests within and outside the CHWF site since pre-construction monitoring was conducted, eagle mortalities remained below predicted mortality levels outlined in Attachment 3 of the State EPN.

5.2.6 Eagle Mortality Offset Plan

The Eagle Mortality Offset Plan (EMOP) developed in accordance with Condition FF15 of EPN 10105/1 requires the following measures to offset eagle impacts associated with operation of the wind farm:

- Placement of a 20ha conservation covenant around five WTE nests outside the wind farm (implemented prior to construction of the wind farm based on predicted mortalities)
- Placement of a 20ha conservation covenant around an additional WTE nest for every WTE mortality in excess of five mortalities; OR
- Annual payments to the Tasmanian WTE research fund established for the project⁵.

⁴ VIC ARI 2020 data

⁵ Joint requirement of the EMOP (EPN Condition FF15 3.3) and EPBC Approval Notice Condition 17

During the review period, annual contributions to the WTE research fund were made which are being used to further the understanding of the Tasmanian WTE. No additional contributions to the fund were made as no eagle mortalities occurred.

Eagle Research supported during the Review Period

The WTE research fund is independently managed by NRM South and allows qualified researchers to apply for funding to support WTE research meeting fund objectives.

The major projects supported during the review period are summarised below:

Investigation the spatial ecology and habitat use of Tasmania wedge-tail eagles in the Tasmanian Midlands using high-frequency GPS telemetry.

This project will provide information on the spatial ecology and resource use of adult Tasmanian wedge-tailed eagles in the agricultural area of the Tasmanian Midlands. Furthermore, the data from this project will be combined with data from other GPS-tracked eagles across Tasmania to provide a state-wide understanding of how the species uses different landscapes. The insight into the importance of different habitats and the spatial modelling of this information will address two research priorities identified in the Tasmanian wedge-tailed eagle recovery plan (Threatened Species Section, 2006) and by the Technical Advisory Committee.

Comprehensive analysis of the exotoxin threat to Tasmanian Wedge-Tail Eagles

The aims of this research are to estimate the prevalence of ecotoxin exposure across the Tasmanian wedge-tailed eagle population, the magnitude of potential demographic impacts of ecotoxins and the source of the ecotoxins. This research builds on the work of Dr James Pay (Pay, Katzner, Hawkins, Barmuta, et al., 2021; Pay, Katzner, Hawkins, Koch, et al., 2021) that observed a high frequency of ecotoxin exposure in wedge-tailed eagle carcasses from around Tasmania.

The NRM South 2023 Annual Research Fund report is provided in full as Appendix C to this AER.

Further details can be found at: <https://www.nrmsouth.org.au/wedge-tailed-eagle-research-fund/>

5.2.7 Decommissioning and Rehabilitation Plan

Condition DC2- of the EPN 10105/1 outlines the requirement for a Decommissioning and Rehabilitation Plan (DRP) to be approved by the Director, EPA, within three years of commencement of construction (by 4 August 2023). The DRP was submitted to EPA during the previous review period and approved during the current review period on 27 July 2023.

The purpose of the DRP is to provide surety on decommissioning and rehabilitation activities to be undertaken when the end of operational life of the CHWF has been reached. The context for the CHWF is that full operation of the wind farm commenced on 4 August 2020 and operations are expected to continue for about 25 years (approx. 2045).

As the CHWF is at an early stage in its operational life cycle and given the legislative changes and technological advancements likely to occur over the operational life of the wind farm (for example blade recycling), the DRP will be revised on a five-yearly basis, consistent with the Clean Energy Council Best Practice Guidelines for Wind Farms⁶.

⁶ Best Practice Guidelines for Implementation of Wind Energy Projects in Australia, Clean Energy Council, June 2018.

5.3 Management Plans required by Commonwealth EPBC Approval

5.3.1 Collision and Detection Avoidance Plan

The Collision Avoidance and Detection Plan (CADP) was developed in response to Condition 6A of EPBC Approval 2009/4839 and together with Conditions 1 to 5 and 10 to 20 of the EPBC Approval, provide a range of measures to protect the Tasmanian Wedge-Tailed Eagle (WTE). The EPBC Conditions complement provisions of the EPN that provide protection for the WTE.

The CADP is specific to the Endangered Tasmanian WTE and was preceded by a report titled ‘Strategies for monitoring bird and bat collisions’ required by Condition G9 of the State EPN. That report assessed existing technologies which could be applied at wind farms to reduce the risk of eagles colliding with turbines and led to the selection of IDF for an 18-month technology trial.

Findings of the trial can be found at this link: [Assessment of the IdentiFlight Avian Detection System \(cattlehillwindfarm.com\)](http://cattlehillwindfarm.com)

Condition 6c of the EPBC Approval Notice required the CADP to be updated following completion of the trial and revised, if necessary, based on the trial outcomes. A revised CADP was submitted to the Commonwealth in March, following the IDF trial which had showed IDF to be effective, with zero eagle mortalities at all turbines fully ‘covered’ by IDF stations. The revised CADP highlighted some areas for improvement to reduce eagle risk and outlined WCHPL’s intention to continue operating IDF. The CADP has recently been revised to incorporate the 30m IDF Station to complement the existing 16 IDF stations as the preferred method of reducing risk to eagles.

5.3.2 Flora Offset Management Plan

The Flora Offset Management Plan (FOMP) required by Condition 23 of EPBC Approval Notice 2009/4839 (approved on 27 July 2019) outlines monitoring and management requirements for three protective covenant areas identified to offset impacts associated with construction of the CHWF.

Two of the three protective covenants are located outside the CHWF, and one is within the CHWF in an elevated area dominated by Highland Poa grasslands to the west of Turbine 7 (Bashan Ledge Covenant, Figure 5.10).

The Bashan Ledge covenant is designed to protect known habitat or occurrence of the following conservation significant species, in perpetuity:

- Highland Poa grassland - a State threatened vegetation community.
- Liawenee greenhood (*Pterostylis pratensis*), an EPBC listed orchid.
- Ptunarra brown butterfly (*Oreixenica ptunarra*) a State and EPBC listed invertebrate.
- Clover glycine (*Glycine latrobeana*) a State and EPBC listed herb.

During the review period the long process of formal registration of the three protective covenants was finalized on 8 April 2024.

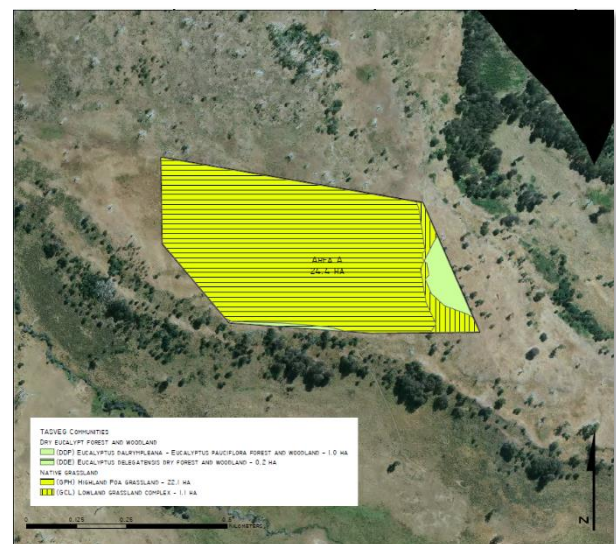


Figure 5.10: Bashan Ledge covenant area.



Figure 5.11: Photos of Liawenee Greenhood and *Glycine latrobeana* taken from transect monitoring within the Bashan ledge covenant Ledge covenant area (VDC).

5.3.3 Weed Management Strategy

To control potential for weed infestation and propagation the following measures were implemented during the review period in accordance with the CHWF Weed Management Strategy:

- Annual and targeted weed treatment following approved methodologies.
- Implementation of site requirements to ensure all machinery was brought onto site in a clean condition, free of weed propagules, dirt, or vegetative matter.
- Site monitoring and reporting in accordance with the OEMP.

During the period, Whispering Landscapes, CHWF's provider for treatment of weeds continued to treat weeds on roads and hardstand areas using approved methods.

5.4 Other Environmental Actions undertaken within Review Period

5.4.1 Discaria Covenant

A covenant has been established within the CHWF for protection of the Spiky anchor plant (*Discaria Pubescens*) to account for potential impacts during construction of the wind farm. Spiky anchor plant is listed as endangered under the *Threatened Species Protection Act 1995*.

During the review period, actions were undertaken by NRE to progress the formalization of this covenant, which first required removal of a TasNetworks caveat on the relevant land title to allow the covenant to be registered. This caveat has now been removed and the covenant was formally registered on 8 April 2024.

6 Community Engagement

6.1 Community Engagement Activities within the review period

Local engagement activities during the review period reflected specific characteristics, community interest and measures to ensure reputation management of the wind farm asset.

CHWF operates under a Local Business Participation Program which facilitates engagement of local suppliers throughout the life of the wind farm. Any enquiries from local businesses are forwarded to the site team for consideration.

During the review period, administration of the CHWF Community Fund was scrutinized by some community members and organisations, with views that the funding commitments did not align with public promotional material regarding the annual community fund amount available for allocation to community organisations.

New community fund guidelines were published on the Cattle Hill website in mid-July 2024 in preparation for the fourth round of the community fund.

6.1.1 Project website

The project website (www.cattlehillwindfarm.com.au) was updated periodically throughout the review period with relevant announcements including successful community fund applicants and details on applying for the annual fund.

6.1.2 Dedicated communication channels

A dedicated 1800 phone number and email address for the project was maintained throughout the review period, with 52 enquiries being received via these communication channels. Responses to enquiries were managed in accordance with the project's Enquiries and Complaints Handling Plan.

6.1.3 Project updates in local publications

The following project-related advertisements were placed in the local newspaper (the Highland Digest) as below.

- Advertisement for Community Fund in July and September 2023 (Figure 6.1).
- Advertising related to Community Fund recipients, HATCH, was published over several months.

6.1.3 Project Newsletter

An asset newsletter was produced and distributed throughout local towns in April 2024, offering an overview of site information, community support initiatives and CHWF events.



Figure 6.1 Community Fund advertisement

6.1.4 One-on-one meetings

Representatives from the project maintain engagement with a wide range of stakeholders, including near neighbours, local government representatives, the broader community, interested persons, wildlife groups and representatives and members of the public.

One-on-one meetings are undertaken as required or as part of the annual Community Fund initiatives for both funding liaison and local research for community projects.



Figure 6.2: CHWF Site Manager Peter Jackson attending an ANZAC Day event at Bothwell District High School on 5 May

6.1.5 Media events and announcements

In September 2023, Cattle Hill and the Identiflight system to detect threatened bird species was released on ABC Northern Tasmania (Launceston) and ABC Radio Hobart.

6.2 Community Investment and Funding Initiatives

6.2.1 Local Business Participation Program

CHWF operates under a Local Business Participation Program which facilitates engagement of local suppliers, spanning the construction and operation phases. A good example of linking our community benefit sharing commitments was done for a local coffee van project with local business Waddamana Stays becoming a recipient of the community fund in early 2024.

6.2.2 Community events and participation

CHWF frequently hosts visits to the wind farm by regulators, politicians, schools and other interested parties. During the review period the CHWF hosted over 200 persons, including approximately:

- 100 members of the community;
- 40 environment regulators including representatives from DCCEEW, EPA, and NRE;
- 10 emergency services regulators including representatives from TFS, SES, Tas Police;
- 20 representatives from other wind developers including Woolnorth and Arc Energy;
- 15 near neighbours and adjoining landowners; and
- 15 ecologists, eagle experts, and interested avifauna stakeholders.

Details are provided below of some of the visits which took place during the review period.

WCHPL representatives visited the following events:

- The Bothwell Shearing Cup event on 16 February 2024
- Bothwell District High School ANZAC Day event on 5 May 2024 (Figure 6.2).

The CHWF service team enjoyed hosting forty students from around Southern Tasmania as part of the Hydro Tasmania Girls in Power initiative (Figure 6.3). The initiative is designed to encourage female high school students to consider a career in the renewable energy sector.



Figure 6.3: Girls in Power trip to CHWF

6.2.3 Community Fund

CHWF continued the annual Community Fund in November 2023.

A dedicated website page provided information on how to apply including Fund guidelines, application information and templates to assist local groups. The funding process was run through SmartyGrants, with applications open from 31 July 2023 to 17 September 2023.

The Round was advertised in The Highland Digest and shared online via e-newsletter and local communication channels. Information was also provided to The Central Highlands Council, to spread the word and encourage applications through local channels.

12 applications for funding were received and an Assessment Panel consisting of six community members and one CHWF representative determined the successful applicants.

CHWF was pleased to support seven community projects through Round Three of the Fund:

- Steppes Community Hall – Maintenance
- Lions Club of Bothwell and Districts inc. – Local Community Shelter for New Seating
- Waddamana Stays – Portable Coffee Stand
- Jericho Fire Brigade – Communications Technology
- Health Action Team Central Highlands (HATCH) – Ouse Walking Track
- Bothwell Wellness Group – Wellness Activities
- Westerway - Tyenna River Walk

Round Four of the Community Fund will take place in the next review period, in the last half of 2024.

Recent feedback from the community and community representatives implores the community fund allocations to provide a more diverse and proactive approach to applying the updated community fund guidelines, in line with the Tasmanian Government’s Renewables, Climate and Future Industries Tasmania (ReCFIT) approach to Community Engagement, Benefit Sharing and Local Procurement Guidelines. Regional engagement will be an essential part of raising awareness of the community fund process.

A selection of photos from successful applicants are included in Figures 6.4 - 6.6.



Figure 6.4: Jericho fire Brigade.



Figure 6.5: Steppes Community Hall



Figure 6.6: Meal Program Volunteers Bill, Catherine, and Paula

7 Identiflight

7.1 Overview and Current Status

Identiflight system (IDF) is designed to detect eagle movements and shut down turbines when eagles are approaching turbines, to reduce the risk of collision. The system was installed as part of a technology trial in accordance with the Collision Avoidance and Detection Plan (CADP) approved by the Commonwealth in accordance with Condition 6A of the EPBC Approval Notice.

As of 30 June 2023, IDF has been in continuous operation for 1,717 days (4.7 years) curtailing turbines to protect eagles from risk of collision at the CHWF. During this period, eight eagle mortalities have occurred, two of which were not related to IDF (operator error, and eagle attack) with the remaining six mortalities occurring at four turbines only partially protected by IDF due to screening from vegetation. Three mortalities occurred at the turbine most affected by visibility constraints (Turbine 46), which was voluntarily shut down during daylight hours following the third mortality to prevent recurrence, an action which was commended by EPA.

This AER is pleased to report completion of a successful mitigation measure in response to the identified root cause of mortalities at Turbines 42, 45, 46, and 38; the installation of an additional 30m IDF station (IDF-17) located between T45 and T46 within the forested section of the CHWF. This mitigation measure has achieved the intended outcome, which was to achieve 'fully covered' protection status from IDF for T46 so the turbine could safely operate during daylight hours. As a secondary outcome, IDF-17 has also improved visibility of T42, T43, T44, T45, T47, and T38.

Following completion of commissioning of IDF-17, and after a period of close monitoring, permission was sought and obtained from EPA to recommence generation at T46.

No further mortalities have occurred since IDF-17 was commissioned, and due to this initiative and the previous voluntary turbine shut down mitigations, T46 is now approaching two years with no eagle mortality.

Additionally, no further mortalities have occurred at any of the previous turbine locations due to implementation of mitigation actions, and no eagle mortalities occurred at any of the CHWF's 48 turbines during the 2023/2024 reporting period.



Figure 7.1: EPA and DECCEW representatives inspect IDF-17 during the final stages of commissioning (September 2023).

7.2 Utilisation of the CHWF by Eagles

The two-year period of post commissioning eagle utilization carried out by Wildspot has confirmed the CHWF now has a considerably larger population of eagles than it did before construction of the wind farm, based on comparison with two years of equivalent pre-construction monitoring.

Table 7.1 below shows the number of curtailments per day, the total curtailment count per year, the number of eagles tracked, and the number of eagle images collected have all increased each year since the IDF system was first installed.

The table also shows that despite the increasing eagle activity, efficiency of the Identiflight system has improved, with the duration of each curtailment, and overall curtailment hours reducing each year since installation.

Table 7.1 – Comparison of IDF data during the review period vs all-time data collected (4.7 years)

	2020	2021	2022	2023	2024
Average Daily Curtailment Count	459	427	475	486	628
Total Curtailment Count	13,562	12,674	14,240	13,855	18,117
Maximum Daily Curtailment Count	902	857	1,037	941	2063
Maximum Daily Curtailment (Hours)	49.44	38.39	25.85	23.98	43.87
Average Daily Curtailment (Hours)	22.16	16.12	11.18	11.31	11.10
Average Duration of Curtailments (Minutes)	3.08	2.10	1.44	1.42	1.35
Average monthly Total Curtailment Duration (Hours)	640	479	338	297	267
Eagle Images	161,254	300,058	298,232	326,231	426,614
Other Bird Species Images	34,096	69,635	74,531	71,967	111,648
Maximum Eagle Height AGL (m)	1,031	1,011	990	949	1,041
Average Eagle Height (m)	200	216	229	180	202
Total eagle flight time (Hours)	416	750	682	735	1,504

7.3 Sharing Lessons with Industry

During the review period, WCHPL representatives continued to share lessons from operation and maintenance of Identiflight with industry, regulators, and interested parties.

Tours of CHWF and presentations within the review period included:

- Woolnorth Renewables CHWF / IDF tour and Q&A (August 2023)
- Presentation and Tour of IDF with Ark Energy, DCCEEW, and EPA (September 2023)
- Identiflight performance update - Presentation to EPA Tasmania (November 2023)
- Visit to CHWF by IDF founders (June 2024)
- Presentation to Clean Energy Council (July 2024)

Multiple tours were also accommodated by near neighbours and interested parties.

8 Changes to the Activity over the next 12 months

Key activities to be undertaken between 1 July 2024 and 30 June 2025 are shown below:

Operational Activities

- Ongoing inspections and maintenance of wind farm infrastructure
- Ongoing maintenance of SCADA and Communications infrastructure.

IdentiFlight Activities

- Ongoing operation and maintenance of IdentiFlight
- Ongoing tracking and monitoring of IdentiFlight data

Activities required by EPN 10105/2

- Risk and compliance workshop with CHWF service team focussed on EPN 10105/2
- Implementation of the EMP (Operations) required by EPN 10105/2
- Monitoring required by the Bird and Bat Mortality Monitoring Plan
- Monitoring required by the Eagle Nest Productivity Monitoring Plan
- Collection of shooters records required by the Hunting and Culling Management Plan
- Notifications and reporting of incidents as required.

Activities required by EPBC Approval Notice 2009/4839

- Finalisation of the revised Collision Avoidance and Detection Plan (Condition 6c).
- Ongoing implementation of the Weed Management Strategy (Condition 22).
- Ongoing monitoring in accordance with the Flora Offset Management Plan (Condition 23)
- Notifications and Incident Reporting as required.

Other Activities

- Tours, presentations and sharing of lessons with industry and interested stakeholders.
- Ongoing support to local projects via the CHWF Community Fund
- Ongoing tracking of complaints and enquiries

APPENDIX A

Photographs

Photographs taken during review period



Photograph B1: 30m additional IDF station completes commissioning and commences curtailing turbines (October 2023)



Photograph B2: CHWF hosts 'Girls in Power' (March 2024)



Photograph B3 and B4: CHWF Senior Environmental Scientist David Rogers shares lessons from the installation and operation of IdentiFlight with Arc Energy and their consultants, representatives of EPA and DCCEEW, and other environment regulators





Photograph B5: Carlos and Susan, founders of IdentiFlight, visit CHWF ahead of the Tasmania Energy Development Conference (June 2024)



Photograph B6: Waddamana suspension bridge collapses, complicating access to the CHWF at times when the Ouse river is flooded (March 2024)

APPENDIX B

Hazardous Substances Inventory

Hazardous Substances Inventory, CHWF Operations Phase

Chemical Name	Storage QTY	UN No	Haz Chem Code	DG Class	Location
50GM Pressol Graphite	25g	-	-	-	Workshop
Atherton Chemicals Protek Priming Fluid Red	125ml	1193	2YE	3	
Atherton Protek Type N Clear Solvent Cement	125ml	1133	3YE	3	
BASF Storm Secure Wax Block Rodenticide	1.5kg	-	-	-	
Cabac EJCC/220	880g	-	-	-	
ChemTools R28 Nickel Antiseize	500g	-	-	-	
Chemtools SG Silver GAL Aerosol	800g	1950	-	2.1	
Jif – Lemon	500ml	-	-	-	
Citro Clean Multipurpose Cleaner	500ml	1993	3Y	3	
CRC 3013 Soft Seal – Aerosol	400g	1950	-	2.1	Workshop
CRC 3055 808 Silicone Spray	5.2kg	1950	2YE	2.1	
Dow Corning Molykote P-74 Paste	20kg	-	-	-	
Epirez Safe Step100	4L	1263	3Y	3	
Galmet ColdGal Aerosol	400g	1950	-	2.1	
Hogans Tradesman Touch Up Paint	400g	1950	-	2.1	
Inox-mx3	70L	1950	-	2.1	
Liberty Unleaded Petrol	20L	2103	3YE	3	Workshop DG cabinet
Shell Omala S4 GX 150	60L	-	-	-	
Loctite 243	750ml	3082	3Z	9	Workshop
Molykote G-N Paste	10.5kg	3077	-	9	
Total Oil Equivis ZS 32	205L	-	-	-	
WD-40 Aerosol	400g	1950	2YE	2.1	
Petroleum Hydrocarbon	500ml	-	-	-	
PEM Cutting Oil	4L	-	-	-	
Quick Spray	6 cans	1950	2YE	2.1	
Wire Rope & Cable Lubricant	570g	1950	-	2.1	
Wax and Grease Remover	5 litres	1268	3YE	3	
Galmet Ironize	2L	-	-	-	
Diesel	20 litres	3082	3Z	9	
Kerosene	1 pack	2623	1Z	4.1	
Lubricant	1.53kg	-	-	-	
Lubricant	2.4kg	-	-	-	
Bossweld Nozzle Dip Gel	400g	-	-	-	
Acetone		1090	2YE	3	
CRC NF Contact Cleaner	300g	1950	2Y	2.2	
CRC 5.56 Multipurpose	400g	1950	2YE	2.1	
Hunters Settling Day Insect Spray	300g	1950	2YE	2.1	
LB 8060 Silver Grade Anti-seize	20g	1910	-	-	
Anticorrosive Bright Silver Finish	1kg	1950	-	2.1	
Diggers Acetone	7L	1090	2YE	3	
Recochem Acetone	20L	1090	2YE	3	
Isopropanol	14L	1219	2YE	3	
Methylated Spirits	3L	1170	2YE	3	
Petroleum Gas Liquefied	5kg			2	

APPENDIX C

Wedge Tailed Eagle Research Fund 2023 Annual Report (NRM South)

Wedge-tailed Eagle Research Fund 2024 Annual Report



Photo: Dr Adam Cisterne (wedge-tailed eagle nest taken during the fieldwork for the ecotoxins project)

Prepared for Wild Cattle Hill Pty Ltd

Date: 15th August 2024

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Glossary

ANU	Australian National University
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
EMOP	Eagle Mortality Offset Plan
FPA	Forest Practices Authority
NRET	State Department of Natural Resources and Environment Tasmania
TAC	Technical Advisory Committee
UTas	University of Tasmania
WTE	Wedge-tailed Eagle, <i>Aquila audax fleayi</i>

Introduction

This is the fifth Annual Report for the Wedge-tailed Eagle (WTE) Research Fund ('The Fund'). It covers the achievements since the last Annual Report in September 2023.

The Fund has been operating in accordance with requirements and is enabling the support of high-quality research on Tasmanian Wedge-tailed Eagles. It is unlikely this research would have been supported without The Fund. The projects being supported will provide valuable advances in the understanding of the WTE population in Tasmania, which will assist with achieving the conservation outcomes for the subspecies.

Background

The Cattle Hill Wind Farm was approved by Tasmanian State Regulator in 2012 and by the Commonwealth Department of Environment and Energy (now the Department of Climate Change, Energy, the Environment and Water, DCCEEW) in December 2014. A requirement of the approval of the Cattle Hill Wind Farm (as described in the relevant permit conditions) was to develop an offset plan for wedge-tailed eagles (*Aquila audax fleayi*, WTE).

An Eagle Mortality Offset Management Plan (EMOP) was developed and subsequently approved to satisfy these requirements. The EMOP comprises two components, with the second component describing the Tasmanian WTE Research Fund. The EMOP required that The Fund needed to be established and administered by an independent organisation. NRM South was selected as the administering body for The Fund and a Services Agreement was signed between NRM South and Wild Cattle Hill Pty Ltd on 23rd August 2019.

Objective of The Fund

The Fund is designed to offset the impact of WTE mortalities (or injured WTE that cannot be released into the wild) due to collisions with wind turbines at the Cattle Hill Wind Farm. The Fund will only support research relating to the Tasmanian sub-species of WTE and projects based in Tasmania.

The primary purpose of The Fund is to support high quality ecological or other relevant scientific research on Tasmanian WTE, the results of which will assist with the management and protection of the sub-species. The intention is that The Fund continues for the medium term (at least 10 years), hence not all funds will be expended each year. Research will be supported that is scientifically rigorous, conducted by high quality scientists, and which is in accordance with the objectives of the Threatened Tasmanian Eagles Recovery Plan 2006-2010 or any subsequent eagle Recovery Plan.

Priorities for The Fund

Research supported by The Fund will be consistent with the published recovery objectives of the "Threatened Tasmanian Eagles Recovery Plan 2006-2010" or a subsequently approved version of the Recovery Plan. The EMOP notes that DoEE (now DCCEEW) have indicated they require The Fund to support key scientific research on the sub-species and not other activities, although the State component of The Fund may support education activities.

Suitably qualified researchers¹ will be eligible to apply for funds to support relevant research on WTE consistent with the below priorities. Critical research that can demonstrate a sound experimental design and statistical rigour will be viewed most favourably.

The initial priorities for funding support are:

- Demography of the WTE. This could include studies into the size of the state population (such as an evidence-based population census), fecundity, survival of different age classes, and immigration and emigration intra- and inter-state. Such ecological data could be used to update a Population Viability Analysis.
- The collection of data that will allow an evaluation of the sub-species conservation status against IUCN criteria.
- Quantification of anthropogenic impacts to WTE, such as collisions with vehicles, powerlines, shooting or poisoning, and the development of mitigation measures to reduce these impacts. ☐ Disturbance to nesting WTE. This includes studies into determining the anthropogenic factors that impact on breeding, and quantification of these such as the distance, duration and types of factors that result in impacts to breeding success.
- Strategies to monitor nesting behaviour of WTE. Nests are currently very difficult to monitor due to the need to limit disturbance to breeding birds, hence automated strategies to monitor nests without disturbing eagles will be supported.
- Studies into why WTE collide with wind turbines and strategies to reduce collision rates. Published studies indicate WTE actively respond to and avoid wind turbines, but occasionally collide. Any insights into why they occasionally collide may assist with strategies to minimise collisions.
- Other scientific studies where it can be demonstrated that the research will provide a demonstrable benefit to the sub-species.

The priorities for funding support may be revised by the panel following any reviews of the EMOP.

Studies on WTEs required for commercial developments (i.e. conditions of a permit, outside offsets) or studies that are the responsibility of Local, State (including Government Business Enterprises) or Commonwealth Government will not be supported.

Administration of The Fund

NRM South's role is ensure that The Fund is established and administered as described in the Eagle Mortality Offset Plan (EMOP).

Specifically, NRM South's role is to:

- Be responsible for receipt, management and audit of WTE Research Fund.

¹ Must hold a postgraduate degree in science and evidence of the successful publication of relevant, high quality research in peer-reviewed scientific journals or experience and qualifications deemed by the panel to be evidence of equivalent merit. However, proposals to support high quality Honours research will also be considered.

- Assist with the identification and selection of panel members. The Panel members selected will be agreed by the Tasmanian EPA and delegate of the Commonwealth DCCEEW.
- Host, recruit and administer/support a panel, as prescribed by the EMOP, to prioritise, assess and distribute research funds – approximately two meetings per year.
- Administer reimbursement of panel members reasonable travel costs and hourly payment for attendance at annual meetings.
- Advertise, administer and coordinate research applications, and in conjunction with the panel develop and maintain the assessment process.
- Contract and administer the research funds on behalf of the research panel, including coordination of progress and final reports.
- Provide panel advice and reports to Wild Cattle Hill Pty Ltd and any other contributors to The Fund for preparation and submission to the Regulator (if required).

Governance of The Fund

The Fund is overseen by an independent Technical Advisory Committee (TAC, referred to in the EMOP as a “Panel”).

As described in the EMOP, the TAC comprises:

- A representative of the Department of NRET (currently Saint Rooks, Manager, Threatened Species and Conservation Programs, who replaced Dr Davina Gregory-Dunsmuir, who has moved to another section in NRET).
- a representative from the administering body, NRM South (Dr Cindy Hull).
- a representative of the DCCEEW (as an observer, Dr Ivan Lawler), and
- at least two scientists experienced in wildlife ecology, with a strong background in research and publishing (Dr Phil Bell and Dr Sarah Munks, both independent consultants with extensive experience working on eagles). These roles were filled following advertising and a competitive selection process. Both of these independent scientists had completed their first term on the TAC and were offered a second term, which they both accepted.

The role of the Technical Advisory Committee (TAC) is to:

- Review funding applications and select those to be supported.
- Monitor the progress of grant recipients, and
- Determine whether to accept research reports (i.e. whether they fulfill the requirements of support).

Individual members of the Technical Advisory Committee are expected to:

- Actively participate in the review, monitoring and reporting of the Research Fund.
- Attend, either in person or by teleconference, twice annual meetings, and additional meetings, if required.
- Provide reliable, relevant, technical and contemporary advice.
- Comply with relevant NRM South Policies and Procedures, including the Code of Conduct, and any specific requirements of The Fund including Confidentiality; and
- Be an advocate for the research Fund’s outcomes.

NRM South has also now established a Project Governance Steering Committee (PGSC) to oversee externally funded projects. The PGSC serves a crucial function in overseeing projects and providing guidance on best practice project management and governance processes, with recognition of the parameters and processes required by some funding entities. It is responsible for reviewing project progress and providing advice and recommendations on:

- Project performance (e.g. delivery against milestones and budget),
- Project risk (e.g. WHS and compliance) and
- Project management processes (including change, quality and stakeholders)

The Committee is an advisory committee to the NRM South Board (does not have delegated authority) and includes Board representation (through the Committee's Chair). The WTE Research Fund is included in the remit of the PGSC.

Achievements during 2024

The fifth year of The Fund built on the achievements of previous years.

Details of the achievements:

1. The fifth deposit (including the set-up contribution) to The Fund was received from Wild Cattle Hill Pty Ltd On the 11th October 2023.
2. The project "Investigating the spatial ecology and habitat use of Tasmanian wedge-tailed eagles in the Tasmanian Midlands using high-frequency GPS telemetry (Pay, Koch, Cameron, Wiersma, Katzner)" continued. The project will be completed and the final report submitted at the end of August 2024. The final payment will then be made.
3. The project "Comprehensive analysis of the ecotoxin threat to Tasmanian Wedge-tailed Eagles (*Aquila audax fleayi*)" was completed. The TAC reviewed the report and had some questions of the grant recipients. At the request of the TAC, the grant recipients presented the findings of their study and addressed questions from the TAC. The final report was submitted in August 2024. The final payment was made. The findings are detailed below.
4. As discussed in the September 2023 annual report, it was recognised that only some of the objectives of the Fund were not being addressed by grant applicants and that a PhD project would be developed that focussed on some of the other key objectives. In addition, as there had been an additional deposit to the Fund by the Cattle Hill Wind farm due to the triggering of a mortality threshold hold exceeding a morality threshold, it was proposed that this additional payment be used for a PhD stipend. Approval was granted by the TAC (including the State and Commonwealth regulators) that it was appropriate to use the Fund's money in this manner. The project has been budgeted and a Funding Agreement negotiated with UTas. It is hoped a student will commence in September 2024.
5. Due to the negotiations over the PhD scholarship and due to the cost of the 3.5 year stipend, a top up bursary, mandatory payments and field work costs, it will be necessary to use some of the annual grant funds to support the scholarship. For this reason, a grant round was not advertised in the first part of 2024. It is intended that grants will be advertised in later 2024.

Projects supported in 2024

The following projects were completed or due to be completed in 2024:

Midlands GPS tracking

“Investigation the spatial ecology and habitat use of Tasmania wedge-tail eagles in the Tasmanian Midlands using high-frequency GPS telemetry” for full funding from:

- Dr James Pay (UTas) Project Lead.
- Dr Amelia Koch (FPA)
- Prof Elissa Cameron (University of Canterbury)
- Jason Wiersma (FPA) and
- Dr Todd Katzner (USGS).

Summary of findings

As mentioned above, the final report is due at the end of August 2024. The findings below represent the results to date.

Project aims:

The aim of this research is to GPS-track five adult eagles in the Tasmanian Midlands to investigate how they use this region of Tasmania. We will consider the spatial ecology of the birds at two scales. First, we will investigate habitat use at the home-range scale, considering the size and characteristics of areas used. Second, we will model how Tasmanian wedge-tailed eagles select for different habitats depending on the behaviour they are exhibiting.

Field work:

We captured adult Tasmanian wedge-tailed eagles using established techniques (e.g. bow net, net launcher; Bloom et al., 2007) and attached GPS-GSM solar-powered telemetry units (CTT ES-400 transmitters; Cellular Tracking Technologies, Rio Grande, NJ, USA) to each eagle using a Teflon ribbon harness.

We identified potential study areas during Q4 2022 and carried out field work to capture the eagles during April and May 2023. We caught an adult female, “Daisy”, from a site near Conara at 12pm on April 18th. We next caught an adult male, “Winton”, from a site just northwest of Brighton on April 25th. We caught another adult male, “Bow”, from a site at Jericho on April 27th. On May 10th we caught a third adult male, “Julian”, at a site south of Ross, and on May 11th we caught a final adult female, “Emily”, at a site along the western edge of the Midlands study area.

Data summary:

The summaries presented here are based on data collected from the date the GPS-transmitters were attached until August 12th, 2024. During this period, we have collected 900,698 location fixes from the five GPS-tracked eagles.

Two of the GPS-tracked eagles have not transmitted any recent data. This lack of communication could be attributed to one of four potential scenarios:

1. **Signal disruption:** The eagle may have ventured into a region where 3G/4G network coverage is unavailable, preventing data transmission.

2. **Mortality in a no-signal zone:** The eagle may have perished in an area devoid of 3G/4G connectivity, resulting in a cessation of data updates.
3. **Transmitter failure:** There could be a technical issue with the transmitter, leading to a malfunction that stops data relay.
4. **Insufficient power:** The transmitter's battery may not be receiving adequate solar energy to maintain its charge, thus hindering its operation.

Utilisation distributions:

Analysis of the utilisation distributions (UDs) showed some variation in the size of the overall areas used by the eagles. Under the UD model, we consider that the animal's use of space can be described by a bivariate probability density function, which gives the probability to relocate the animal in specific areas (Benhamou, 2011). We can then use this information to infer the home-range size of each bird. For example, the 95% UD corresponds to the smallest area in which the probability to relocate the animal is equal to 0.95 (i.e., there is a 95% chance that the bird is within this area at any given time). We can also use tighter UD thresholds to identify areas of concentrated use within the 95% UD (i.e., the 50% UD can be interpreted as the core home range of the eagle).

The 50% UD (core home range) size was similar across all the eagles (3.05 – 6.29 km²), except for Winton who had the smallest core area (1.61 km²). The mean 50% UD was 3.94 km², which is smaller than the 5.1 km² mean for resident birds we are tracking in other areas of Tasmania. The mean 30% UD was also smaller than the mean recorded for the five birds we are tracking on conservation land (6.7 km²). There was greater variation in the 95% UD. Emily recorded a small 90% UD of 13.18 km², which is smaller than the areas used by most of the other eagles being tracked across Tasmania. Winton and Julian recorded 95% UD similar to the mean we have recorded for resident birds we are tracking across the state (21.8 km²). Daisy recorded a very large 95% UD (92.32 km²), which was driven by the large area she explored during spring 2023. The mean 95% UD for the four eagles in this project that were resident in a territory for the entire tracking period was 21.19 km², which is very close to the 21.8 km² mean for resident birds we are tracking in other areas of Tasmania.

Habitat selection:

We are currently working on combining the data from all the adult eagles we are GPS-tracking into an analysis that will investigate fine-scale behaviour-specific habitat selection using state-space modelling and incorporating a number of habitat variables in a multivariate framework. For this report we have explored how the birds have used different land cover categories using a habitat selection ratio (Manly et al., 2002). This approach compares the proportion of available habitat types to the proportion of time spent in each habitat. We identified the available habitat area for each eagle using the 95% UD described previously and buffering that area by an additional band that added 5% to the total area. The proportion of time spent in each habitat type was measured as the proportion of GPS fixes that fell within each habitat (to reduce spatial autocorrelation, the six second flight mode data was subsampled to 15 minutes). The resulting selection ratios identify which habitats are being selected. As such, selection ratio values < 1 indicate a habitat used proportionally less than its availability, and ratio values > 1 indicate a habitat used proportionally more than its availability (i.e., a selection ratio of 2 indicates a habitat type used twice as much as expected). The

habitat features we considered in this analysis were landcover categories derived from TasVeg (DPIPWE, 2020).

The eagles used habitats non-randomly ($p < 0.001$) in relation to land cover categories. There was a lot of variation in how the eagles selected for different land cover categories, particularly non-native vegetation (Julian and Daisy selected strongly for this habitat type, whereas Bow strongly avoided it). Native grassland, cleared land, and dry eucalypt and non-eucalypt forests were generally used by the eagles proportional to their availability.

Extra-urban areas, including residential and commercial buildings, were strongly avoided by all eagles. There was also a slight avoidance of agricultural areas, although Daisy was an exception, using agricultural land more than would be expected based on its availability. Notably, plantations were the only land cover category with a significantly positive selection ratio, as both the upper and lower confidence intervals were above zero. However, this positive selection result is likely due to the scarcity of plantation habitats in the available areas, with data from only two eagles (Daisy and Emily) used to calculate this odds ratio.

There are some differences in how Tasmanian wedge-tailed eagles tracked in the Midlands selected habitats compared to those tracked on conservation land. All conservation eagles avoided non-native vegetation, whereas the Midlands eagles exhibited more variability in their use of this land cover type. Additionally, the conservation eagles demonstrated a stronger preference for non-eucalypt forests.

Flight behaviour:

To carry out some preliminary exploration of the flying behaviour of the birds, we subset all the GPS-fixes recorded whilst the birds were flying. We then segmented this data by individual flight. In total the birds have completed 9,759 flights, flying for a total duration of 105,678 minutes. The mean duration of a flight was 12.04 minutes, which is almost twice the mean flight duration (6.86 minutes) recorded for five birds GPS tracked on reserved land. The mean flight duration was also longer than the mean (9.94 minutes) recorded for birds in other areas of Tasmania, suggesting that wedge-tailed eagles in the Midlands spend longer in flight when compared to other areas of the state. Most GPS fixes recorded during flights were <250 m altitude over ground level.

Ecotoxins

“Comprehensive analysis of the ecotoxin threat to Tasmanian Wedge-Tail Eagles” from:

- Dr De Stojanovic (ANU)
- Dr James Pay (UTas)
- Dr Catherine Young (ANU), and
- Adam Cistern (ANU).

Findings

Project aims:

1. Determine how prevalent eco-toxin exposure is across the Tasmanian Wedge-tailed Eagle population.

2. Estimate how severe eco-toxin accumulation is relative to background levels in areas frequented by eagles.
3. Investigate whether eco-toxin exposure is attributable to environmental features (e.g. proximity to anthropogenic disturbance).
4. Investigate the demographic impact of ecotoxins.

Ecotoxin results:

- None of the eight anticoagulant rodenticides tested were detected within the material collected below wedge-tailed eagle nests.
- Lead concentrations were low overall but were highest in soil below wedge-tailed eagle nests.
- Zinc concentrations were lower in soil collected directly under wedge-tailed eagle nests compared to background concentrations.
- The results suggest that the method described within may be useful for detecting high lead exposure in wedge-tailed eagles.
- Given the very small differences between nest and background concentrations of lead, a larger sample size should be analysed to validate the current results.

Demographic results:

- Sensitivity analyses demonstrated that final population sizes were driven by reproductive output (brood size), juvenile and adult survival rates. Population growth, however, was driven by the survival of adults and older pre-adult birds.
- In simulations of ecotoxin exposure scenarios, Tasmanian wedge-tailed eagle population sizes were significantly decreased when both mortality of adults and sub-adults was impacted.

Conclusions and recommendations

1. Our preliminary results that lead levels under Tasmanian wedge-tailed eagle nests are higher than background levels – these indicative results supported our expectations, but the small sample size of accessible nests necessitates cautious interpretation.
2. Confirmatory research to support our findings should be implemented, with an aim to increasing spatial coverage and the overall sample size of eagle nests.
3. Our sensitivity analysis shows that mortality rates are highly influential on population viability of Tasmanian wedge-tailed eagles, but the relationship between ecotoxin exposure and mortality remains unclear and should be a priority for further research.
4. We found no evidence of elevated zinc levels under eagle nests.
5. The source of lead under eagle nests remains unknown and should be a priority for further research.

6. Quantifying the extent to which hunting with lead bullets occurs in the vicinity of nest sites may help explain variation in lead levels among nests, but there remain serious logistical challenges of quantifying hunting rates within eagle territories.

PhD project

“How is TWTE habitat selection affected by human activities and land-use intensity?”

The project will be housed in the School of Natural Sciences at Utas, and supervised by:

- Dr James Pay, University of Tasmania (Supervisor)
- Professor Chris Johnson, University of Tasmania (Supervisor)
- Associate Professor Chris Burridge, University of Tasmania (Supervisor)
- Dr Catherine Young, NRM South (Advisor) – to ensure the project remains focussed on the WTE Research Fund objectives.

The funding covers a 3.5 year stipend, plus top up bursary, mandatory paid leave, relocation allowance and fieldwork costs.

This project has not yet commenced. A student had been offered the scholarship and support but decided not to take up the offer. A new student will be identified by advertising the position and selecting from the pool of applicants. The funding agreement with Utas will be signed once a student is identified. The scholarship will be paid in 4 stages, commencing upon the enrolment of the student.

Brief project outline

This PhD project will investigate how TWTEs respond to a range of human activities. The project will have a particular focus on using existing datasets (including GPS-tracking data from 41 adult and 25 pre-adult TWTEs) as well as carrying out field experiments to assess effects of disturbance on behaviour and breeding success of eagles.

The project will aim for a broad understanding of the ways in which eagles respond to human activities and a variety of land uses. In doing so it will answer several questions relating to specific disturbances that are most likely to be influential. The list of questions the project could address includes:

1. **How is TWTE habitat selection affected by human activities and land-use intensity?**
Including:
 - **How does operation of helicopters affect the behaviour of TWTEs?**
 - **How is the behaviour of TWTEs, including time spent at the nest during breeding, affected by vehicle traffic?**
2. **What is the relationship between nest attendance, revealed by GPS tracking, and nest success?**

A summary of the context for each question, along with potential strategies for addressing them, is included below. Outputs from each of these project components can be synthesised using a vulnerability analysis to discover what levels of disturbance could be sufficient to cause population-level effects.

Summary of proposed project components

LITERATURE REVIEW: What are the current methods available for monitoring wildlife disturbance?

During the first year of the PhD program, the candidate will conduct a comprehensive review of the contemporary literature on monitoring wildlife disturbance. This review will encompass an exploration of the latest technologies currently at our disposal and update information provided in previous reviews on the topic (e.g., Cox et al., 2012; Cutler and Swann, 1999; Preisler et al., 2006). Conclusions from this review may offer innovative ideas and strategies for subsequent inclusion in the data chapters of the PhD thesis.

1. How is TWTE habitat selection affected by human activities?

Human activities can change the way animals use the landscape. For example, at a fine-scale animals can avoid anthropogenic activities (Barker et al., 2023; Suraci et al., 2019), or at a broadscale anthropogenic activities could increase or reduce the size of the area used by individuals (Perona et al., 2019). Understanding these dynamics has relevance to conservation management. The increasing temporal resolution of modern GPS-tracking technologies, together with advances in statistical techniques, are facilitating a more detailed understanding of animal behaviour alongside habitat use. By incorporating spatial information on human activities, modern habitat selection modelling methods can provide insight into how human activities affect wildlife movement. The project can incorporate the GPS data collected from TWTEs into models that assess how particular sources of human disturbance (for which spatial data are available, e.g., roads, land use change, fuel reduction burns) affect the spatial ecology of TWTEs.

○ How does operation of helicopters affect the behaviour of TWTEs?

Aerial nest surveys are carried out by a number of industries in Tasmania, both to search areas for TWTE nests and to check if TWTE nests are being used in any given breeding season. Furthermore, helicopter traffic associated with various other purposes is also commonplace across the state (e.g., fire management, tourism, construction work, infrastructure surveys). There is little information on how the behaviour of TWTEs is affected by these aircraft. Helicopter flight path data are recorded by industries, which includes information on the time, location, altitude, and speed of the aircraft. These data include flights that have been carried out across territories where adult eagles were being GPS-tracked over the last four years. By combining these existing datasets, the project can investigate this question by assessing if and how eagle flight behaviour and nest attendance is affected by helicopter flights, and how any affects are linked to the flight path characteristics of the aircraft (e.g., speed, altitude, direction).

○ How is the behaviour of TWTEs, including time spent at the nest during breeding, affected by vehicle traffic?

A large number of TWTE nests are situated within 1 km of roads or vehicle tracks. Current guidelines, adapted from forestry practices (limiting activities within 500 m - 1 km line-of-sight), are employed to mitigate potential impacts from road-based vehicle use during the breeding season. However, there is a lack of information regarding how TWTEs respond to vehicle traffic at the distances of current recommendations. Consequently, it is uncertain whether these guidelines need adjustment, either to enhance conservation or to reduce industry costs. The project can use traffic counters to

assess how the frequency and type of vehicle movements affects the behaviour of breeding GPS-tracked TWTEs (e.g., time spent at the nest). This could also include an experimental component, whereby vehicle movements are introduced at sites where breeding TWTEs are being monitored.

2. What is the relationship between nest attendance, revealed by GPS tracking, and nest success?

GPS-tracking can be used to provide valuable information on the breeding behaviour of birds (Murgatroyd et al., 2023; Schreven et al., 2021). However, it is essential to align GPS-derived movement data, such as nest visit durations, with on-site nest surveys for validation. This validation ensures that conclusions drawn from GPS data regarding breeding season timing and nest outcomes are substantiated. By comparing survey data with GPS data from breeding TWTEs, the project can obtain information on how movement characteristics relate to observed breeding events. This will provide an assessment of the utility and limitations of movement data for monitoring TWTE breeding behaviour. Results will contribute to existing work on the TWTE aiming to use GPS-data to inform population models and assess the impacts of disturbance during breeding.

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Next stage in The Fund

The next round of grants is expected to be advertised in later 2024, and new projects will be identified.

Financial statement

A summary of the financial statement is provided below:

Details	September 2023 - August 2024	
	Contribution	Costs
Funds received (incl. GST)	\$106,260	-
Bank interest	\$1,484.71	-
Ongoing administration (8%)	-	\$7,728
Advertising	-	-
Contractor costs (TAC)	-	\$550
Carried forward	\$181,737.49	-
Final Milestone payment - Ecotoxins	-	\$17,990.60
Funds retained for final Milestone payment – Midlands GPS tracking	-	\$16,372.40
Funds retained for PhD stipend	-	\$176,166.00
Total	\$289,482	\$218,807

Any residual funds will be allocated to future grant rounds.

Appendix 1

Projects awarded support by the Fund - completed

- 2020: Investigating the spatial ecology and habitat use of the Tasmanian wedge-tailed eagle in unmodified landscapes using high-frequency GPS telemetry (Cameron, Pay, Katzner, Koch, Wiersma).
- 2021: Estimating the population size of the Tasmanian wedge-tailed eagle (*Aquila audax fleayi*) using modern genetic techniques (Stojanovic, Cistern, Pay, Burridge, Young, Clarke and Butler).
- 2021: Monitoring wedge-tailed eagle population trends (Hawkins and Potts).
- 2023: Comprehensive analysis of the ecotoxin threat to Tasmanian Wedge-Tail Eagles (Stojanovic, Pay, Cistern).

Projects awarded support by the Fund – underway

- 2022: Investigation the spatial ecology and habitat use of Tasmania wedge-tail eagles in the Tasmanian Midlands using high-frequency GPS telemetry (Pay, Koch, Cameron, Wiersma, Katzner).

Projects awarded support by the Fund – to commence

PhD project

