



St Patricks Plains Wind Farm **Draft Offset Strategy**

17th April 2025

For Ark Energy
PAS115



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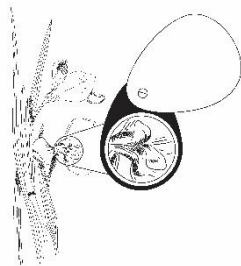
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EXECUTIVE SUMMARY

Project background

Ark Energy proposes to develop a wind farm on the St Patricks Plains area on the eastern Central Plateau in Tasmania. The wind farm will comprise 47 wind turbine generators (WTGs) with a proposed maximum generating capacity of 300 megawatts (MW), including ancillary infrastructure, a new access track network, electrical infrastructure, and an operations facility (the Project). Power generated will be exported via the existing TasNetworks transmission lines onto the Tasmania grid. The construction of the Project will result in a maximum disturbance footprint of up to 481.13 hectares.

The project (EPBC 2019/8497) was referred under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) to the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW). On the 8 October 2019, the project was deemed a controlled action to be assessed under the bilateral agreement with the Tasmanian Environmental Protection Authority (EPA). The Project was assessed as a Class 2C assessment by the Tasmanian EPA under the Tasmanian *Environmental Management and Pollution Control Act 1994* (EMPC Act). The Project obtained approval from the EPA in July 2024, with a financial offset condition for any wedge-tailed eagle collisions with WTGs and for any Tasmanian devil roadkill on surrounding roads. Preliminary assessment of the environmental impacts of the Project by DCCEEW determined that it is likely to result in a Significant Residual Impact (SRI) to six MNES and that an offset may be required under the EPBC Act. As a result of this, DCCEEW requested further information (RFI) to review the quantum of impact to the six MNES.

Offset overview

The RFI received from DCCEEW in July 2024 identified that significant residual impacts were likely to a number of MNES. Subsequently, the significant impact assessments (SIA) detailed in the Environmental Impact Assessment¹ (EIS) were revised and impact reassessed. The revised SIAs² determined that an SRI to six MNES was still unlikely to occur; however, DCCEEW have assessed the impact as significant, and thus require an offset, and they have accepted the revised quantum of impact justified in the revised SIA documentation³. On the basis of this assessment, DCCEEW have indicated that an offset is required for the following six (6) MNES:

- Tasmanian devil (*Sarcophilus harrisi*);
- Eastern quoll (*Dasyurus viverrinus*);
- Spotted-tail quoll (*Dasyurus maculatus maculatus*);
- Tasmanian masked owl (*Tyto novaehollandiae castanops*);
- Tasmanian wedge-tailed eagle (*Aquila audax fleayi*); and
- Ptunarra brown butterfly (*Oreixenica ptunarra*).

This offset strategy has been developed in accordance with the principles and requirements of the Commonwealth *EPBC Act Environmental Offsets Policy 2012* (the Policy).

Offset area

A total of 4,036 ha has been made available for consideration; however, the maximum offset required as per OAG calculations is 764 ha, made up of 436 ha, which is the required Offset area for the eastern quoll and Tasmanian devil (Offsets for the Tasmanian masked owl, and Tasmanian wedge-tailed eagle will be stacked within this Offset area) and 328 ha, which is the required Offset area for the ptunarra brown butterfly (Table S1). The potential Offset land supports a mix of vegetation communities that provide suitable habitat for the relevant MNES. The potential Offset land is part of a large, contiguous

¹ ERA Planning and Environment (2023)

² North Barker Ecosystem Services (2025)

³ North Barker Ecosystem Services (2025)



corridor of habitat, and is connected to several protected areas, including several conservation covenants and informal reserves, and a State reserve. It is also close to the Impact area, being approximately 40 m away at its closest point. As such, the offset supports the same populations of relevant MNES as those being impacted, while also having a buffer from any potential indirect impacts.

Offset approach

The offset will be entirely land-based, secured by a conservation covenant under the Tasmanian *Nature Conservation Act 2002* (NC Act). Consideration of connectivity, availability of habitat, and on-site threats has influenced the current potential Offset land design.

The offset must comply with the State legislation in order to achieve the conservation gains required by the Policy. This presents some challenges with regard to particular management actions which are considered effective under Commonwealth advice but may not be permitted under State legislation. The management actions provided in this OS are designed to provide conservation gains for the species in accordance with the Policy, whilst conforming to the limitations of the requirements of the State under a conservation covenant.

Suitability and condition

The potential Offset land has been subject to historic impacts and ongoing degradation and threatening processes. Field surveys identified habitat degradation, selective logging, cattle and sheep grazing, replacement of the ground layer with pasture grass species, extensive weed infestations in areas, and occurrence of pest species such as fallow deer and feral cats. Ecological field surveys have been completed to assess habitat quality within the potential Offset land. Habitat quality was scored in accordance with the *EPBC Act Offsets Assessment Guide*⁴, using the TASVEG VCA method. The potential Offset land ranges from a score of 7 to a score of 8 out of 10.

Management actions

The overall objective of this OS is to provide a conservation gain for the MNES impacted by the Project, which will in turn provide a benefit to the ecological character of the broader region.

The desired conservation outcome is to protect and restore habitat, increase habitat extent, resources and patch connectivity, and reduce threats so that viable populations for the relevant MNES can be sustained. This will be achieved through specific completion criteria by year 20, with some conservation gains anticipated to be achieved within 5-10 years. Achievement of proposed completion criteria is expected to result in improved ecosystem function and result in greater resilience, whereby beyond the duration of the offset (i.e. 20 years or until the completion criteria are achieved, whichever is longer) general land management obligations will be sufficient to maintain the completion criteria.

Management actions have been developed with reference to the key habitat requirements of the relevant MNES to improve the quality of their habitat within the Offset area. Key management actions include:

- Formal protection;
- Population monitoring;
- Vehicle collision minimisation (roadkill);
- Unregulated culling, poaching, and persecution control;
- Feral animal control (including fallow deer, cats, and European wasps);
- Weed control to improve habitat and maintain prey populations; and
- Fire management.

⁴ Department of Sustainability, Environment, Water, Population and Communities (2012b)



Offset acquittal

The Offset area required to acquit the predicted impacts to the relevant MNES have been calculated using the Offset Assessment Guide⁵ (OAG) with the quantum of required land presented in Table S1.

Table S1: Summary of Offset area requirements

Scientific name	Common name	EPBC Act	TSP Act	Impact area	Required offset area
<i>Sarcophilus harrisi</i>	Tasmanian devil	E	E	91.08 ha	436 ha
<i>Dasyurus viverrinus</i>	Eastern quoll	V	R	91.08 ha	436 ha
<i>Dasyurus maculatus maculatus</i>	Spotted-tail quoll	E	-	91.08 ha	332 ha
<i>Tyto novaehollandiae castanops</i>	Tasmanian masked owl	V	E	46.89 ha	174 ha
<i>Aquila audax fleayi</i>	Tasmanian wedge-tailed eagle	E	E	41.30 ha	224 ha
<i>Oreixenica ptunarra</i>	Ptunarra brown butterfly	E	E	61.84 ha	328 ha

EPBC Act – Commonwealth Environmental Protection and Biodiversity Conservation Act 1999; TSP Act – Tasmanian Threatened Species Protection Act 1995; E – Endangered, V – Vulnerable, R – Rare

Additionality & legal security

A land-based offset will be legally secured through a fixed-term conservation covenant under the Tasmanian *Nature Conservation Act 2002*. A conservation covenant provides a means to manage defined areas for nature conservation and can be used to secure areas of land to satisfy statutory offset requirements. The conservation covenant is legally binding and will exist for the life of the EPBC Act approval and will provide commensurate protection of the Offset area.

Active and targeted management measures (refer to Section 7) that are above any current obligation present on the land and will result in improved habitat condition and reduction in threats, which have been identified as key threats to the species.

⁵ Department of Sustainability, Environment, Water, Population and Communities (2012c)

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1. INTRODUCTION

1.1. BACKGROUND

Ark Energy proposes to develop a wind farm on the St Patricks Plains area on the eastern Central Plateau in Tasmania (Figure 1). The wind farm will comprise 47 wind turbine generators (WTGs) with a proposed maximum generating capacity of 300 megawatts (MW), including ancillary infrastructure, a new access track network, electrical infrastructure, and an operations facility (the Project). Power generated will be exported via the existing TasNetworks transmission lines onto the Tasmania grid. The construction of the Project will result in a maximum disturbance footprint of up to 481.13 hectares.

The project (EPBC 2019/8497) was referred under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) to the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW). On the 8 October 2019, the project was deemed a controlled action to be assessed under the bilateral agreement with the Tasmanian Environmental Protection Authority (EPA). The Project was assessed as a Class 2C assessment by the Tasmanian EPA under the Tasmanian *Environmental Management and Pollution Control Act 1994* (EMPC Act). The Project obtained approval from the EPA in July 2024, with a financial offset condition for any wedge-tailed eagle collisions with WTGs and for any Tasmanian devil roadkill on surrounding roads. Preliminary assessment of the environmental impacts of the Project by DCCEEW determined that it is likely to result in a Significant Residual Impact (SRI) to six MNES and that an offset may be required under the EPBC Act.

1.2. PURPOSE OF THIS DOCUMENT

This Offset Strategy presents Ark Energy's proposed approach to offsetting Project impacts to MNES to support Project assessment and approval. This Offset Strategy (OS) has been developed in accordance with the EPBC Act Environmental Offsets policy⁶ (the Policy), giving consideration to the Policy and requirements outlined by DCCEEW in a Request for Information (RFI) received on 31 July 2024.

This Offset Strategy includes the following:

- A summary of the significant residual impacts to MNES;
- Identification and quantification of offset obligations;
- Demonstration of alignment with the Policy and relevant offset principles;
- Description of the proposed offset and how it compensates for significant residual impacts;
- Demonstration of suitability and feasibility of the offset and the conservation gain achieved;
- Demonstrate acquittal of the calculated offset requirement, based on the anticipated SRI from the Project; and
- Consideration of the risks associated with achieving the offset through a detailed risk assessment.

1.3. KEY TERMS

The key reference terms used throughout this document are presented below and are consistent with terms and definitions supplied in all documentation for this project. A list of key acronyms and definitions is provided in Table 1.

- The **Survey area** is the area surveyed as part of the ecological studies for the project.
- The **Project area** is defined by the cadastral margins of the participating properties, totalling 10,043 ha. An internal forest reserve (~275 ha) has been excluded from consideration and investigation by the proponent (Figure 1).
- The **Project footprint** is the full extent of the area required for the Project, including both temporary and permanent disturbance.

⁶ Department of Sustainability, Environment, Water, Population and Communities (2012a)

- The **Impact area** is the maximum extent of the permanent impact to habitat from the Project.
- The **Offset area** is the calculated quantum of land required to achieve the offset.
- The **potential Offset land** is the extent of the land that landholders have made available for consideration as offset sites. The Offset area will be contained within this potential Offset land. Further detail of the potential offset land and relevant applicable MNES is in Section 7 and presented in Figure 1.

Table 1: Acronyms and definitions

Term	Definition
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
EPA	Environment Protection Authority (Tasmania)
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
FPA	Forest Practices Authority
FPP	Forest Practices Plan
HCSS	Habitat Critical to the Survival of the Species
HQ	Habitat Quality
LGA	Local Government Area
NBES	North Barker Ecosystem Services
NRE	Tasmanian Department of Natural Resources and Environment
OAG	Offset Assessment Guide
OAMP	Offset Area Management Plan
PTR	Private Timber Reserve
Relevant MNES	The Matters of National Environment Significance being offset under this Offset Strategy
RFA	Regional Forests Agreement
RoL	Risk of Loss
SIA	Significant Impact Assessment
SRI	Significant Residual Impact
STDP	Save the Tasmanian Devil Program
TASVEG	The Digital Vegetation Map of Tasmania
the Policy	EPBC Act Environmental Offset Policy 2012
the Project	St Patricks Plains Wind Farm
TSP Act	Tasmanian <i>Threatened Species Protection Act 1995</i>
WTG	Wind Turbine Generator

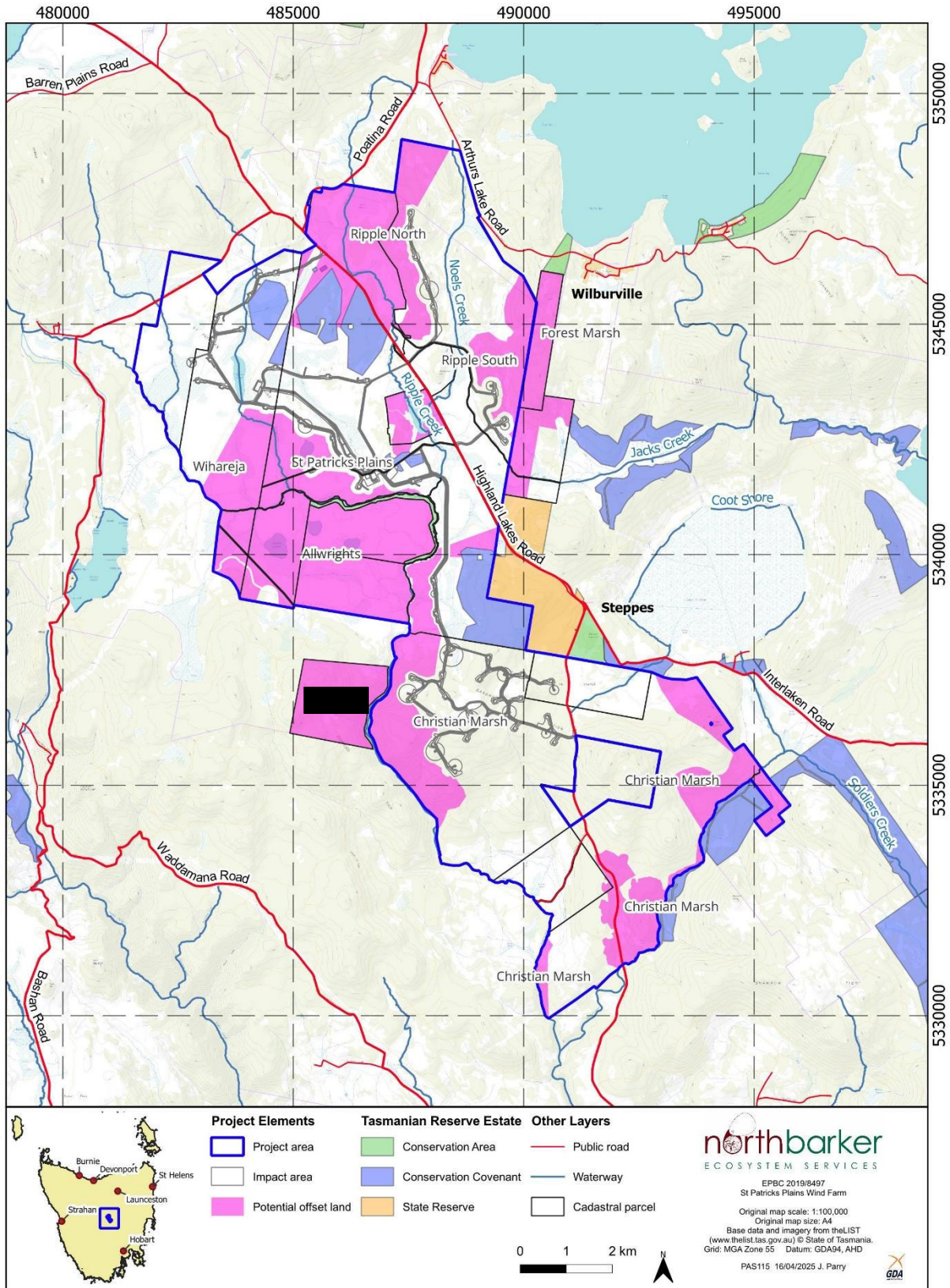


Figure 1: Location of the potential Offset land

2. REGULATORY FRAMEWORK

2.1. ENVIRONMENTAL PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

The EPBC Act *Environmental Offsets Policy*⁷ outlines the Commonwealth's approach to the use of environmental offsets and the requirements for a suitable offset package. The offset package can include a combination of direct (land-based) offsets and other compensatory measures. Direct offsets are those actions that provide a measurable *conservation gain* for an impacted protected matter. They typically require the identification of an area of land that is protected under a legally binding mechanism and the implementation of measurable improvements to the quality of the area through offset management activities. Under the Policy, conservation gains as part of a direct offset may be achieved by:

- Improving existing habitat;
- Creating new habitat;
- Reducing threats;
- Increasing the value of a heritage place; and/or
- Averting loss.

Other compensatory measures are measures that do not directly offset the impact but are related to, and anticipated to lead to benefits for, the impacted matter. They typically include funding for research or educational programs. Other compensatory measures were initially included as a component of the offsets package; however, have subsequently been removed after consultation with DCCEEW. As the impacts relate to disturbance to habitat the offset focuses on a direct, land-based offset.

The following key documents have guided the development of this Offset Strategy, in accordance with the EPBC Act:

- **Environmental Offsets Policy**⁸ (the Policy): The Policy outlines the Commonwealth's approach to the use of offsets. It includes offset principles, guidance and outlines how offsets must be delivered.
- **Offsets Assessment Guide**⁹ (OAG): The OAG uses a balance sheet approach to determine offset requirements and is a key decision support tool for the regulator assessing offset proposals. The tool can be used to inform proponents on likely offset requirements and demonstrates when 100% acquittal has been achieved by an offset. The tool relies on several site-specific inputs that must be supported with evidence.
- **How to use the Offsets assessment guide**¹⁰ (the Guide): This document provides additional support on how to use the OAG, providing further clarification and examples on the specific inputs into the OAG. It is a key document utilised by the regulator when assessing OAG inputs and offset proposals.
- **DCCEEW listing advice, conservation advice and recovery plans:** These species-specific documents detail the species ecology, key threats, and guide recovery planning. They identify actions required for conservation and recovery of the species, assisting in identifying appropriate offset activities.

The Policy identifies eight policy principles that must be achieved by offsets proposed under the EPBC Act. These principles are identified in Table 2, along with an explanation of how this OS aligns with each principle.

⁷ Department of Sustainability, Environment, Water, Population and Communities (2012a)

⁸ Department of Sustainability, Environment, Water, Population and Communities (2012a)

⁹ Department of Sustainability, Environment, Water, Population and Communities (2012b)

¹⁰ Department of Sustainability, Environment, Water, Population and Communities (2012c)

Table 2: Achievement of EPBC Offsets Policy Principles

Policy Principle	Alignment
1. Suitable offsets must deliver an overall conservation outcome that improves or maintains the viability of the protected matter.	The proposed offset is a direct, land-based offset. The land-based offset is like-for-like, comprising the same functional habitat components for the MNES, commensurate with the habitat impacted. The land-based offset will be protected through a conservation covenant and will be actively managed to maintain the viability of the MNES, informed by the key threats and requirements of each species.
2. Suitable offsets must be built around direct offsets but may include other compensatory measures.	The proposed offset is a direct, land-based offset and does not include any other compensatory measures. Refer to Section 4 for more details.
3. Suitable offsets must be in proportion to the level of statutory protection that applies to the protected matter.	Four species are listed as endangered, and two species are listed as vulnerable under the EPBC Act. The current listing status of each MNES under the EPBC Act has informed the Offset area requirements. The EPBC Act status has been used to calculate the annual probability of extinction in the OAG. As such, the proposed offset is in proportion to the level of statutory protection of the species. OAG assessments for each species are provided in their respective sections within Section 7.
4. Suitable offsets must be of a size and scale proportionate to the residual impacts on the protected matter.	The offset strategy has used the OAG to determine the size of offset required and is based on the maximum SRI anticipated to occur due to Project activities. The anticipated SRIs are summarised in Section 3.2. These impacts are fully acquitted by the proposed offset as outlined in Section 4.6.
5. Suitable offsets must effectively account for and manage the risks of the offset not succeeding.	This Offset Strategy includes a detailed risk assessment to account for and manage the risks that could cause the offset to not succeed. The risk assessment is discussed in Section 10 and provided in Table 20. Additionally, an Offset Area Management Plan (OAMP) will be developed and will include a revised risk assessment.
6. Suitable offsets must be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs.	The offset has been developed due to anticipated Project impacts and is additional to what is already required by law. The potential Offset land is privately owned and will be formally and legally secured. Offset management will be species-specific and appropriate to achieve positive outcomes for each MNES. Additionality is addressed in Section 9.
7. Suitable offsets must be efficient, effective, timely, transparent, scientifically robust and reasonable.	The offset is governed by this Offset Strategy and the supporting OAMP, which will be assessed by DCCEEW. The offset documents provide transparency around offset delivery and demonstration that the offset is efficient, effective, timely, transparent, scientifically robust and reasonable. The OAMP will include detailed management requirements and a monitoring and reporting program. The approach proposed is informed by species-specific requirements and supported by available scientific literature. The OAMP will be developed following the EPBC Act approval. This provides for timely commencement of offset activities. Therefore, the offset proposal is considered to be efficient, effective, timely, transparent, scientifically robust and reasonable.
8. Suitable offsets must have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.	The proposed offset will be governed by this Offset Strategy and the OAMP. Each of these documents will be submitted to DCCEEW for approval. The OAMP will include measurable offset activities, and a monitoring and auditing schedule.

2.2. STATE REGULATORY REQUIREMENTS

Offsets are an anticipated requirement under the EPBC Act only and must achieve alignment with the Policy in the first instance. While a land-based offset is not a requirement under State legislation (noting financial offsets for eagle and devil mortalities have been included in the EPA conditions), State guidance has been considered in the development of the offset approach (where available), with the aim of seeking alignment with State requirements, regional priorities and approaches where possible. Approval of this offset strategy from the Tasmanian Environmental Protection Agency (EPA) is not required.

3. PROJECT IMPACTS

3.1. MITIGATION HIERARCHY

The mitigation hierarchy has been implemented as part of the planning and design phase to avoid, minimise and mitigate impacts to MNES.

Avoidance of habitat and ecological values was undertaken during the planning and design phase through the use of desktop mapping and field investigations. Desktop mapping primarily used TASVEG and NVA record data to enable avoidance of known conservation significant values with the preliminary proposed layout, including designated exclusion areas based on the presence of ecological values. This was supplemented with field investigation data (NBES) to further avoid ground-truthed ecological values known to occur within the proposed layout and assist in minimisation measures prior to the proposed layout being finalised.

The project has committed to mitigation and management measures to further reduce the impact of the project's construction and operation on MNES. The management measures and approval permit requirements are further detailed in the EIS¹¹, the Supplement to the EIS¹², and the EPA Environmental Assessment Report¹³. Several mitigation measures have been committed to by the project to further reduce impacts to ecological values, these include general mitigation measures and species-specific measures, with the numbers in brackets pertaining to the EPA condition numbers (not a comprehensive list):

- Micro-siting for final design (CN1);
- Design report (CN2);
- Noise mitigation measures to be implemented during construction, including traffic noise and mitigation of noise impacts to fauna (as a component of CN3);
- Tasmanian devil and quoll den management plan (FF11, CN3);
- Eagle nest searches and activity checks (FF1);
- Exclusion zones – eagle nests (FF2);
- Eagle Monitoring and Management Plan – Operation (FF3);
- Pre-construction survey for hollow-bearing trees and nest disturbance minimisation measures. This is to inform micro-siting of infrastructure and avoidance of blasting within 1 km of a nest within the breeding season (FF4, CN3):
 - For hollow-bearing trees without evidence of current occupancy, a Hollow-Bearing Tree Management Protocol will be implemented if avoidance is not feasible. This protocol, prepared by a qualified professional, will be submitted to the EPA prior to construction
- Adaptive management measures (FF5);
- Avian mortality monitoring as a component of a bird and bat management plan (FF6);
- Pre-construction survey for threatened fauna (FF10, CN3);
- Roadkill monitoring and adaptive management plan (FF13);

¹¹ ERA Planning and Environment (2023)

¹² ERA Planning and Environment (2024)

¹³ Environment Protection Authority (2024)

- Rehabilitation of temporarily disturbed habitat (CN4);
- Ptunarra Brown Butterfly Management and European Wasp Control Plan (FF14);
- Weed and disease management plan (FF16);
- Minimising impact of vegetation maintenance, with regard to nesting disturbance (OP1); and
- Native Vegetation Management Plan – Operation (OP2).

3.2. SIGNIFICANT IMPACT ASSESSMENTS

Detailed significant impact assessments (SIAs) were undertaken for MNES as part of the natural values assessment for the Project¹⁴. SIAs concluded that significant residual impacts (SRIs) to MNES were unlikely. However, the RFI received from DCCEEW in July 2024 identified that significant residual impacts were likely to a number of MNES. Subsequently, the SIAs were revised and impact reassessed. The revised SIAs¹⁵ determined that an SRI to six MNES was still unlikely to occur; however, DCCEEW have assessed the impact as significant, and thus require an offset, although they have accepted the quantum of impact justified in the SIA documentation¹⁶. A summary of the revised SRIs is provided in Table 3.

Table 3: MNES SRI summary

Scientific name	Common name	EPBC Act	TSP Act	Likelihood of occurrence	Habitat type	Total
<i>Sarcophilus harrisii</i>	Tasmanian devil	E	E	Known	Denning	91.08 ha*
<i>Dasyurus viverrinus</i>	Eastern quoll	E	-	Known	Denning	91.08 ha*
<i>Dasyurus maculatus maculatus</i>	Spotted-tail quoll	V	R	Known	Denning	91.08 ha*
<i>Tyto novaehollandiae castanops</i>	Tasmanian masked owl	V	E	Potential	Nesting	46.89 ha
<i>Aquila audax fleayi</i>	Tasmanian wedge-tailed eagle	E	E	Known	Nesting	41.30 ha
<i>Oreixenica ptunarra</i>	Ptunarra brown butterfly	E	E	Known	N/A	61.84 ha

EPBC Act – Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999*; TSP Act – Tasmanian *Threatened Species Protection Act 1995*; E – Endangered, V – Vulnerable, R – Rare

* The final area of SRI has been determined as the total of all optimal and suboptimal habitat within the permanent impact footprint (102.79 ha) as detailed in the SIA¹⁷, minus the entire quantum of modified land (11.71 ha)

4. OFFSET OVERVIEW

4.1. OFFSET AREA REQUIREMENTS

The quantum of land required to acquit SRIs to the relevant MNES has been calculated using the EPBC Act OAG¹⁸. The OAG is a publicly available tool developed by DCCEEW for quantifying impacts and offsets in accordance with the Policy. The OAG is designed to capture the different types of conservation gain identified in the Policy and determine the total area of a land-based offset. The specific inputs used in the OAG along with a justification is provided in the species-specific sections, as detailed below:

- Tasmania devil – Section 7.1;
- Eastern quoll – Section 7.2;
- Spotted-tail quoll – Section 7.3;
- Tasmania masked owl – Section 7.4;
- Tasmania wedge-tailed eagle – Section 7.5; and
- Ptunarra brown butterfly – Section 7.6.

¹⁴ North Barker Ecosystem Services (2023); North Barker Ecosystem Services (2024)

¹⁵ North Barker Ecosystem Services (2025)

¹⁶ North Barker Ecosystem Services (2025)

¹⁷ North Barker Ecosystem Services (2025)

¹⁸ Department of Sustainability, Environment, Water, Population and Communities (2012b)

A summary of the anticipated Offset area requirements is provided in Table 4.

Table 4: Summary of Offset area requirements

Scientific name	Common name	EPBC Act	TSP Act	Impact area	Required offset area
<i>Sarcophilus harrisii</i>	Tasmanian devil	E	E	91.08 ha	436 ha
<i>Dasyurus viverrinus</i>	Eastern quoll	E	-	91.08 ha	436 ha
<i>Dasyurus maculatus maculatus</i>	Spotted-tail quoll	V	R	91.08 ha	332 ha
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<i>Aquila audax fleayi</i>	Tasmanian wedge-tailed eagle	E	E	41.30 ha	224 ha
<i>Oreixenica ptunarra</i>	Ptunarra brown butterfly	E	E	61.84 ha	328 ha

EPBC Act – Commonwealth Environmental Protection and Biodiversity Conservation Act 1999; TSP Act – Tasmanian Threatened Species Protection Act 1995; E – Endangered, V – Vulnerable, R – Rare

4.2. SITE SELECTION

The properties that interact with the Project were initially selected as a preferred offset site due to their large size, proximity to the impact area, location largely within the existing Project area, and the presence of suitable habitat values. An analysis was undertaken of the properties to determine broad suitability and identify which areas could be targeted for offset delivery. The analysis considered the species-specific requirements, the nature of the predicted impacts, and the requirements of the Policy.

The analysis showed that the types of vegetation communities are largely contiguous with the impact areas or were anticipated to hold similar habitat values where not in contiguous patches and are in a similar condition to that within the impact area. The field survey confirmed broadly suitable habitat and opportunities for conservation gains through offset delivery (refer Section 5).

The properties support five broad land categories that generally align with those found in the broader region:

- Mature native forest vegetation with little room for structural improvement, but with opportunities for improvements in condition and reduction of threats;
- Less mature forest vegetation with some room for structural improvements and with opportunities for improvements in condition and reduction of threats;
- Heavily disturbed native forest vegetation with room for structural improvements and with opportunities for improvements in condition and reduction of threats;
- Native grassland and sedgeland with scope for functional improvements and opportunities for improvements in condition and reduction of threats; and
- Completely cleared land with few habitat elements.

Cleared land is highly valued for agricultural activities in the region and presents a higher risk of offset failure. As these areas are not available for offsetting, they were not considered further (Figure 1).

The portions selected were considered most suitable, given:

- They represent suitable or potentially suitable habitat for the relevant MNES.
- There is high connectivity to habitat in the broader landscape.
- There are opportunities for habitat quality improvements.
- There are relevant species records within or in close proximity.
- They are close to the impact area.
- They provide sufficient area to deliver on anticipated offset size requirements.

4.3. OFFSET APPROACH

The overall objective of this OS is to provide a conservation gain for the MNES DCCEEW considers to have SRIs from the Project, which will in turn provide a benefit to the ecological character of the broader region.

The offset will be entirely land-based, secured by a conservation covenant under the Tasmanian *Nature Conservation Act 2002* (NC Act). Consideration of connectivity, availability of habitat, and on-site threats has influenced the current potential Offset land design.

The offset must comply with the State legislation in order to achieve the conservation gains required by the Policy. This presents some challenges with regard to particular management actions which are considered effective under Commonwealth advice but may not be permitted within a conservation covenant under State legislation. The management actions provided in this OS are designed to provide conservation gains for the species in accordance with the Policy, whilst conforming to the limitations of the requirements of the State under a conservation covenant.

4.4. OFFSET JUSTIFICATION

The offset is a 100 percent land-based offset being delivered within a defined area close to the St-Patricks Plain Wind Farm. The offset will deliver three types of conservation gains, in accordance with the Policy:

- Improvement in habitat;
- Reduction of threats; and
- Averted loss.

Following identification of priority potential offset locations, surveys were undertaken to verify the suitability for the target MNES and capture detailed information to inform offset development. Field survey effort is summarised in Section 5.1.

The offset has been tailored to the specific MNES being impacted. An assessment of the species ecology, habitat requirements, key threats, and the condition of the potential Offset land, was undertaken to determine the potential for improvement and to develop the offset approach. This process identified the key actions or activities that will be incorporated into the offset to benefit the species. Detail regarding the ecology, habitat requirements, threats, and offset suitability is provided in Section 7.

The relevant conservation advice, listing advice, guidelines and published literature were consulted to identify key threats and recovery actions. Collectively, the recognised threats and recovery actions support a focus on monitoring and protecting populations, managing threats, engaging with stakeholders, and supporting recovery programs. Additionally, each species' recovery plan or conservation advice identifies an overarching objective or goal, shown in Table 5. The recovery actions for each species have been reviewed and summarised in Table 6.

Table 5: Summary of recovery objectives

Source	Overall recovery objective	Offset outcome
Draft Recovery Plan for the Tasmanian devil (<i>Sarcophilus harrisi</i>) ¹⁹	"...manage devil facial tumour disease (DFTF) in the wild, eradicate foxes, and manage other threats if required, as indicated by monitoring."	Identified optimal and suboptimal Tasmanian devil habitat within the Offset area will be formally protected, conserved and enhanced with ongoing vegetation management efforts. The protection and enhancement of this habitat will ensure populations of the Tasmanian devil have protected areas for breeding, foraging

¹⁹ Department of Primary Industries, Parks, Water and Environment (2010)

Source	Overall recovery objective	Offset outcome
		<p>and sheltering to make sure the population remains viable in the region in the future.</p> <p>Proposed management measures are detailed in Section 7.1.5.</p>
<p>Conservation Advice for the Eastern Quoll (<i>Dasyurus viverrinus</i>)²⁰</p>	<p>No listed outcome, however, the overall conservation objective is to ensure the long-term survival of the eastern quoll by addressing the threats to its habitat and populations and promoting recovery efforts in areas where the species has declined.</p>	<p>Identified eastern quoll habitat within the Offset area will be protected, conserved and enhanced with ongoing vegetation management efforts. The protection and enhancement of this habitat will ensure populations of the eastern quoll have protected areas for breeding, foraging and sheltering to make sure the population remains viable in the region in the future.</p> <p>The application of the offset will contribute to promoting recovery of the species through the formal protection of habitat, and management of threats applicable to the Offset area.</p> <p>Proposed management measures are detailed in Section 7.2.5.</p>
<p>National Recovery Plan for the Spotted-tail Quoll (<i>Dasyurus maculatus</i>)²¹</p>	<p>"...reduce the rate of decline of the spotted-tail quoll and ensure that viable populations remain throughout its current range in eastern Australia."</p>	<p>Identified spotted-tail quoll habitat within the Offset area will be protected, conserved and enhanced with ongoing vegetation management efforts. The protection and enhancement of this habitat will ensure populations of the spotted-tail quoll have protected areas for breeding, foraging and sheltering to make sure the population remains viable in the region in the future.</p> <p>Proposed management measures are detailed in Section 7.3.5.</p>
<p>Conservation Advice for the Tasmanian masked owl (<i>Tyto novaehollandiae castanops</i>)²²</p>	<p>No listed objectives, however, the overall conservation objective is to ensure the species' long-term survival by securing its habitat, reducing threats, and promoting effective management practices to safeguard its population.</p>	<p>The Offset area will be formally protected, with prohibitions on habitat clearing and poaching/culling/persecution, and management measures will be applied to reduce other threats applicable to the Offset area.</p> <p>Proposed management measures are detailed in Section 7.4.5.</p>
<p>National Recovery Plan 2006 – 2010 for the Tasmanian wedge-tailed eagle (<i>Aquila audax fleayi</i>)²³</p>	<p>"...increase the breeding success of both eagle species by protecting nesting habitat from destruction, modification and disturbance and by minimising both the modification of foraging habitat and the occurrence of human-related mortality with the ultimate goal of an increase in the population size and stability of both species."</p>	<p>The Offset area will be formally protected, with prohibitions on habitat clearing and poaching/culling/persecution, and management measures will be applied to reduce other threats applicable to the Offset area.</p> <p>Ongoing development of feral animal controls that reduce the risk of secondary poisoning and</p>

²⁰ Threatened Species Scientific Committee (2015)

²¹ Department of Environment, Land, Water and Planning (2016)

²² Department of the Environment, Water, Heritage and the Arts (2010)

²³ Threatened Species Section (2006)

Source	Overall recovery objective	Offset outcome
		human-induced mortality will be investigated as a component of the offset. Proposed management measures are detailed in Section 7.5.5
National Recovery Plan 1998 – 2003 for the Ptunarra brown butterfly (<i>Oreixenica ptunarra</i>) ²⁴ Listing Statement for <i>Oreixenica ptunarra</i> (ptunarra brown butterfly) ²⁵	“...achieve down listing of <i>O. ptunarra</i> to a Lower Risk category within five years based on the IUCN (1994) criteria of population size and trends, area of occupancy and security of habitat.” “to decrease the risk of extinction by maintaining the quality of habitat at known sites through appropriate land management and reducing the risk posed by European wasp predation.”	Ptunarra brown butterfly habitat within the Offset area will be protected, conserved and enhanced with ongoing vegetation management efforts. The protection and enhancement of this habitat will ensure populations of the Ptunarra brown butterfly have protected areas for breeding, foraging and sheltering to make sure the population remains viable in the region in the future. The presence and severity of European wasps in the Offset area will be monitored and ongoing wasp management implemented. Proposed management measures are detailed in Section 7.6.5.

Table 6: Summary of recovery actions

Action	Tasmanian devil	Eastern quoll	Spotted-tail quoll	Tasmanian masked owl	Tasmanian wedge-tailed eagle	Ptunarra brown butterfly
Population management (including managing ‘insurance populations’)	✓	✓	✓	✓	✓	✓
Disease management	✓					
Population monitoring	✓	✓	✓	✓	✓	✓
Disease investigation in the wild	✓	✓				
Predation/threat management	✓	✓	✓	✓	✓	✓
Research into disease prevention	✓	✓	✓		✓	
Recovery program	✓	✓	✓	✓	✓	
Stakeholder engagement and community education	✓	✓	✓	✓	✓	✓
Habitat management and protection		✓	✓	✓	✓	✓
Climate change research		✓	✓		✓	

✓ Listed in the conservation advice threat table or mentioned in the recovery plan

²⁴ Bell (1998)

²⁵ Threatened Species Section (2022)

4.5. POTENTIAL OFFSET AREA

4.5.1. Location

The potential Offset land (4,036.18 ha) is located primarily within the existing Project area (Figure 1), with potential Offset land split across the multiple landholders, as detailed in Table 7. Two additional properties considered as part of the potential Offset land are located outside of, but immediately adjacent to the Project area (Figure 1). All properties within the potential Offset land have allowed a minimum 40 m buffer from the disturbance footprint to avoid any potential indirect impacts within the potential Offset land. The final quantum of land required to achieve the offset, as determined by OAG calculations, will be contained within the potential Offset land.

4.5.2. Landscape context

The potential Offset land is located in the Tasmanian Central Highlands bioregion, and located between Poatina/Waddamana Road in the north, and Blackburn Creek in the south, broadly following Highland Lakes Road (Figure 1). The nearest locality is Steppes (adjacent to Project area), and nearest populated centre is Wilburville (approximately 1 km northeast of the Project area).

The Project area is adjacent to the Steppes State Reserve, and the potential Offset land is adjacent to numerous existing NC Act conservation covenants and informal reserves.

The Project area is largely flat in the north where open dry forest makes way for exposed subalpine grasslands and sedgeland. Occasional forested rises and ridges occur in the northern extent of the Project area. The southern extent of the Project area is predominantly forested, with steep slopes in places across Diamond and Bakers Tiers. The Shannon River forms a steep ravine along the western edge of the southern extent of the Project area and potential Offset land (Figure 1).

4.5.3. Existing uses and threats

The threats identified in the DCCEEW conservation advice and/or recovery plans are summarised in Table 8, along with an assessment of the severity of each threat, reflective of the threat severity identified in each of these documents. The key threats relevant to each species and the Offset area will be managed as part of offset delivery (to be included in an OAMP), and include management measures to mitigate the risk of clearing, collisions, culling and introduced predators.

The Project area and potential Offset land are subject to ongoing disturbances. Non-forest areas have been grazed (sheep and cattle) for generations, and forested areas have been selectively logged across several decades. Large areas in the south of the Project area have been clear-felled, with some areas converted to silvicultural plantations.

The potential Offset land has experienced historical disturbances and supports several threatening processes relevant to each offset matter. These threats are discussed in further detail specific to each MNES in Section 7.

Table 7: Potential Offset land particulars. All areas are in hectares

Title reference number(s)	Lot / plan	Property ID	Tenure	Property address	Property area	Potential offset land	Existing land use	Relevant MNES
182189 182190	1	5000165	Private Freehold [REDACTED]	'St Patricks Plains' 6011 Highland Lakes Rd, Steppes, Tasmania, 7030	112.14 1,954.63	75.06 431.66	Grazing Hunting	Dasyurids Ptunarra brown butterfly
156999	1	2813013	Private Freehold [REDACTED]	'Wihareja' 4244A Waddamana Rd, Steppes, Tasmania, 7030	923.04	214.86	Grazing Hunting	Dasyurids Ptunarra brown butterfly
205991 100080 100081	1 2 65	5010136	Private Freehold [REDACTED]	'Allwrights Lagoons' Penstock Rd, Shannon, Tasmania, 7030	312.76 373.59 306.22	312.76 351.64 306.22	Grazing Hunting	Ptunarra brown butterfly
126982	1	7936127	Private Freehold [REDACTED]	'The Ripple' (North) 6300 Highland Lakes Rd, Steppes, Tasmania, 7030	387.13	376.15	Grazing Hunting	Dasyurids Masked owl Wedge-tailed eagle
126983	1	1780918	Private Freehold [REDACTED]	'The Ripple' (South) Highland Lakes Rd, Steppes, Tasmania, 7030	1,413.48	437.36	Grazing Hunting Selective Logging	Dasyurids Masked owl Wedge-tailed eagle
33301 247812	1 2	3250881	Private Freehold [REDACTED]	'Forest Marsh' 5814 Highland Lakes Rd, Steppes, Tasmania, 7030	246.49 149.16	136.82 149.16	Grazing Hunting Selective Logging	Dasyurids Masked owl Wedge-tailed Eagle
148905 241119	1	5000093	Private Freehold [REDACTED]	'Christian Marsh' 5057 Highland Lakes Rd, Steppes, Tasmania, 7030	262.24 3,085.13	4.08 944.90	Commercial Logging Selective Logging	Dasyurids Masked owl Wedge-tailed eagle
230540	1	5010152	Private Freehold [REDACTED]	Penstock Rd, Shannon, Tasmania, 7030	295.82	295.51	Selective Logging	Dasyurids Masked owl Wedge-tailed eagle
Total					9,821.83	4,036.18		

Table 8: Relevant threats

Threat	Tasmanian devil	Eastern quoll	Spotted-tail quoll	Tasmanian masked owl	Tasmanian wedge-tailed eagle	Ptunarra brown butterfly
Disease	✓	✓				
Collisions (vehicles, powerlines, fences, WTGs)	✓	✓	✓	✓	✓	
Culling and/or non-targeted poisoning	✓	✓	✓	✓	✓	
Competition or predation by introduced predators	✓	✓	✓			✓
Climate change		✓	✓			
Habitat clearing, modification and fragmentation			✓	✓	✓	✓
Timber harvesting			✓			
Inappropriate fire regimes			✓			✓
Loss of nesting habitat (dieback), hollow competition and/or nest disturbance				✓	✓	

✓ Listed in the conservation advice recovery plan, colour codes represent threat severity: **red** denotes very high risk, **orange** denotes moderate risk, **yellow** denotes low risk, **green** denotes very low risk.

4.6. STATEMENT OF EXPECTED OUTCOMES

The offset will safeguard and enhance habitat for the offset matters. This will be achieved by:

- Improving the existing habitat for the six offset MNES;
- Reducing threats relevant to each offset MNES; and
- Averting loss of habitat for the six offset MNES.

Specific outcomes have been identified for each matter in Section 7 and Section 8.1. The Offset area will be improved by a single point for each MNES, calculated using the OAG. Current habitat quality scores are detailed in Section 6.2. Offset outcomes will be assessed based on overall habitat quality improvements, threat management, and mitigation measures, including:

- **Legal security**
 - Formal protection will prevent any broadscale or selective clearing.
- **Governance**
 - Governance arrangements including the requirements of the OAMP, will reduce any intentional culling, target and non-target poisoning and vehicle collisions through establishment of clear rules and ongoing monitoring.
- **Introduced predators**
 - Management of invasive species (i.e. fallow deer, feral dog, feral cat) will reduce predation risk and competition for resources.
 - The regulation of livestock (cattle and sheep) grazing will reduce habitat degradation and allow for habitat quality improvements through other management activities.
- **Appropriate land management**

- Appropriate land management in accordance with State legislation applicable to conservation covenants will ensure the Offset area is managed in a manner that is not deleterious to the offset MNES.
- **Habitat regeneration**
 - Natural canopy regeneration in cleared areas will enhance habitat availability for MNES.
- **Fire**
 - Implementing suitable fire regimes will reduce risk of high-intensity bushfire across the Offset area.
 - Controlled, mosaic burns will restore structural complexity of habitat and support weed management.
- **Weeds**
 - Removing weed infestations will improve movement opportunities for fauna.
 - Management of weeds will reduce fuel loads reducing the risk of high-intensity bushfires.
 - Reduction of weeds will bolster native species recruitment and restore habitat complexity.

5. FIELD SURVEYS

5.1. SURVEY EFFORT

Initial site scoping was undertaken by the proponent in liaison with landowners with potentially suitable land available within the Project area. Additional parcels outside the Project area were later added to ensure adequate land was open for investigation in the event that additional land for the purpose of offsets was required. An initial reconnaissance of one of the additional parcels was undertaken in December 2024, with two targeted surveys, one within the Project footprint and one within the potential Offset land to determine the condition metric (to input in the OAG calculations), conducted in January and March 2025. Numerous additional targeted surveys for the relevant MNES have been conducted within the Project area as part of the natural values assessments²⁶ (NBES 2023, 2024), EIS²⁷ (and Supplement²⁸), and SIA assessment²⁹. A summary of these surveys is outlined in Table 9.

Table 9: Field survey effort

Date	Type	Further information	Personnel
10-11/03/2020 17/03/2020 24/03/2020	Targeted ptunarra brown butterfly surveys	NBES 2023 ERA 2023	3x NBES ecologists 2x external specialists
22/07/2019 – 14/02/2022	General flora and fauna investigations. Conducted across nine separate visits	NBES 2023 ERA 2023	6x NBES ecologists
27-29/04/2020	Masked owl call-back surveys	NBES 2024 ERA 2023	1x NBES ecologist
20/12/2019 – 14/04/2020 15/01/2020 – 14/04/2020 20/04/2020 – 01/05/2020	Masked owl passive acoustic monitoring surveys	NBES 2024 ERA 2023	1x NBES bioacoustics analyst

²⁶ North Barker Ecosystem Services (2023); North Barker Ecosystem Services (2024)

²⁷ ERA Planning and Environment (2023)

²⁸ ERA Planning and Environment (2024)

²⁹ North Barker Ecosystem Services (2025)

Date	Type	Further information	Personnel
February 2019 06-16/04/2020 06/06/2024	Eagle nest search (ground) Eagle nest search (ground) Eagle nest search (aerial)	NBES 2024 ERA 2023	Wildspot Consulting Pty Ltd 2x NBES ecologists 2x NBES ecologists & 1x external ecologist
August 2019 – April 2021	Eagle utilisation surveys	NBES 2024 ERA 2023	16x NBES ecologists
10-13/12/2024	Hollow-bearing tree surveys	NBES 2025	3x NBES ecologists
13/12/2024	Offset site reconnaissance	This document	1x NBES ecologist
28-31/01/2025	Vegetation condition assessment surveys – Impact areas	This document	4x NBES ecologists
17-20/03/2025	Vegetation condition assessment surveys – potential Offset land	This document	3x NBES ecologists

5.2. SPECIES PRESENCE

The presence of each species and/or its habitat, determined through targeted ecological investigations are provided in the species-specific sections in Section 7.

5.3. VEGETATION AND HABITAT VALUES

There are large areas of habitat suitable for all relevant MNES across the potential Offset land. Vegetation across the potential Offset land is a mix of dry eucalypt forest, dominated either by *Eucalyptus delegatensis*, *E. dalrympleana*, *E. pauciflora*, or *E. rodwayi*, (suitable denning and nesting habitat for dasyurids, masked owls, and wedge-tailed eagles) and native grassland and grassy sedgeland (the preferred habitat for the ptunarra brown butterfly) dominated by *Poa gunnii*, *P. clivicola*, and *Baloskion australe* and *Empodisma minus*.

Structural complexities such as natural rock features and fallen trees and limbs provide excellent habitat for the Tasmanian devil, eastern quoll, and spotted-tail quoll across all forested areas of the potential Offset land. Burrows suitable for denning were observed across the potential Offset land, and a number of features such as hollow logs, basal tree hollows, and dense shrub cover provide suitable lay-up and shelter opportunities for these species.

Large hollow-bearing trees (and large trees with high likelihood of forming hollows in the future) are present across all forested areas in the potential Offset land. These may provide nesting habitat for the Tasmania masked owl. Wedge-tailed eagle nesting habitat is present on steep gullies and ridgelines, including two potential offset land areas containing a confirmed nest, and one other containing a historical nest record (but was not relocated in 2024 surveys). A further three confirmed nests occur within 200 m of the potential Offset land, and two additional records that were not relocated during 2024 nest searches.

Non-forest areas at the Allwrights, St Patricks Plains, and Wihareja potential offset land areas contain large tracts of habitat suitable for the ptunarra brown butterfly but provide limited habitat for other MNES. All three of these properties are known locations of the ptunarra brown butterfly and contain large areas of verified moderate and high-quality butterfly habitat.

Table 10: Vegetation units within the Impact area and potential Offset land

TASVEG Unit	Description	Extent in Impact area	Extent in potential Offset land	Applicable MNES
AHF Freshwater aquatic herbland	This vegetation community occurs in lagoons on the Allwrights and St Patricks Plains property. This wetland community may provide dispersal and foraging habitat for all MNES when not fully inundated.	0 ha	44.20 ha	Nil
AHL Lacustrine herbland	This vegetation community occurs on the Allwrights property. This ephemeral wetland community may provide dispersal and foraging habitat for all MNES when not inundated.	0 ha	2.13 ha	Nil
DAD <i>Eucalyptus amygdalina</i> forest and woodland on dolerite	<p>This vegetation community occurs in the south of the potential Offset land on the Christian Marsh property. Evidence of historical selective logging was observed across this vegetation type.</p> <p>Denning features recorded within survey plots, and ample habitat suitable for denning present throughout with structurally complex vegetation and landscape features abundant.</p> <p>Large trees with potential to contain hollows are present but not recorded within survey plots.</p>	0 ha	235.47 ha	Dasyurids Masked owl Wedge-tailed eagle
DDE <i>Eucalyptus delegatensis</i> forest and woodland	<p>Widespread in the southern portion of the potential Offset land. This forest type has been subject to selective logging across most occurrences of the vegetation community in the Project area.</p> <p>Denning features were recorded within multiple survey plots, and ample habitat suitable for denning present throughout, with structurally complex vegetation and landscape features abundant.</p> <p>Large hollow-bearing trees were abundant in one survey plot but were absent in all others. Hollow-bearing trees are scattered throughout the broader landscape, as have been recorded in previous site investigations.</p>	63.73 ha	527.90 ha	Dasyurids Masked owl Wedge-tailed eagle
DDP <i>Eucalyptus dalrympleana</i> forest and woodland	<p>This vegetation type is present in the northwest area of Christian Marsh, and the low-lying areas on [REDACTED] and is widespread across forested areas of the Ripple South property.</p> <p>Denning features were recorded within one survey plot, and ample habitat suitable for denning present throughout, with structurally complex vegetation and landscape features abundant.</p> <p>Large trees with potential to contain hollows are occasionally present in the landscape but not recorded within survey plots.</p> <p>Eagle nesting habitat is present where this community occurs on steep slopes, particularly along the Shannon River where an existing nest record occurs (although not relocated in 2024 nest surveys). A verified eagle nest is also present in the potential Offset land in this vegetation community in the east of Ripple South.</p>	46.91 ha	364.08 ha	Dasyurids Masked owl Wedge-tailed eagle

TASVEG Unit	Description	Extent in Impact area	Extent in potential Offset land	Applicable MNES
DGW <i>Eucalyptus gunnii</i> woodland	This woodland community occurs on the St Patricks Plains property. This community occurs as an component of a larger patch that occurs on the property, much of which is reserved in a conservation covenant to protect the EPBC Act / TSP Act endangered <i>Eucalyptus gunnii</i> subsp. <i>divaricata</i> .	0 ha	7.17 ha	Dasyurids Masked owl Wedge-tailed eagle
DPD <i>Eucalyptus pauciflora</i> forest and woodland	This vegetation is one of the dominant forest types across the potential Offset land, although it was not recorded on the [REDACTED] property. Denning features were recorded within multiple survey plots, and ample habitat suitable for denning present throughout, with structurally complex vegetation and landscape features abundant. Large hollow-bearing trees were abundant in several survey plots as well as being abundant throughout the broader landscape, as has been recorded in previous site investigations. Eagle nesting habitat is present where this community occurs on steep slopes, particularly along the Shannon River. A verified eagle nest is also present in the potential Offset land in this vegetation community in the far eastern extent of Christian Marsh.	42.92 ha	724.62 ha	Dasyurids Masked owl Wedge-tailed eagle
DRO <i>Eucalyptus rodwayi</i> forest and woodland	This forest community occurs predominantly as small riparian remnants, largely in the south of the Christian Marsh property. Denning features were recorded within multiple survey plots, and ample habitat suitable for denning present throughout, with structurally complex vegetation and landscape features abundant. Large hollow-bearing trees were abundant in multiple survey plots as well as being scattered throughout the broader landscape, as has been recorded in previous site investigations.	0.85 ha	73.88 ha	Dasyurids Masked owl Wedge-tailed eagle
NLE <i>Leptospermum</i> forest	This vegetation community is mapped at two locations on the banks of Blackburn Creek in the south of the potential Offset land. Offset site investigations did not record this community at this location, with emergent eucalypts present, and forest structure more akin to the adjacent eucalypt forests. Habitat features match the descriptions in the DAD and DRO vegetation communities.	1.10 ha	0 ha	Dasyurids
GPH Highland <i>Poa</i> grassland	Grasslands across the potential Offset land are largely confined to an area adjacent to the Shannon River. These occur in two distinct condition classes – grasslands dominated by a tall shrub layer, and open grasslands with scattered low shrubs.	181.58 ha	1,305.85 ha	Ptunarra brown butterfly

TASVEG Unit	Description	Extent in Impact area	Extent in potential Offset land	Applicable MNES
	The potential Offset lands all contain verified butterfly habitat and either contain or are in close proximity to verified observation points.			
MGH Highland grassy sedgeland	Grassy sedgelands occur within a mosaic with native grasslands, largely in the vicinity of the Shannon River. This vegetation type contains short tussock grasses and medium rushes, with very little shrub cover in most instances. The potential Offset lands all contain verified butterfly habitat and either contain or are in close proximity to verified observation points.	47.82	375.97 ha	Ptunarra brown butterfly
FAC Improved pasture with native tree canopy	Agricultural land with native tree canopy predominantly used for sheep and cattle grazing. Although potential nesting habitat may be present, this vegetation unit is unlikely suitable for inclusion in the final Offset area due to State requirements for vegetation within a conservation covenant.	0.01 ha	17.40 ha	Masked owl
FAG Agricultural land	Agricultural land predominantly used for sheep and cattle grazing. Not suitable for inclusion in the final Offset area.	23.52 ha	305.15 ha	N/A
FPH Plantations for silviculture – hardwood	Eucalyptus plantation. Provides optimal habitat for devils and quolls; however, this vegetation unit is unlikely suitable for inclusion in the final Offset area due to State requirements for vegetation within a conservation covenant.	34.32 ha	30.96 ha	Dasyurids
FRG Regenerating cleared land	Land that has been historically cleared and is regenerating to native vegetation. This vegetation unit may provide foraging habitat for dasyurids, masked owls, and wedge-tailed eagles; however, this vegetation unit is unlikely suitable for inclusion in the final Offset area due to State requirements for vegetation within a conservation covenant.	37.50 ha	9.03 ha	Dasyurids Masked owl Wedge-tailed eagle
FUM Extra-urban miscellaneous	Associated with modified verges on Highland Lakes Road. Not suitable for inclusion in the final Offset area.	0.86 ha	2.07 ha	N/A
OAQ Water	Farm dam with no habitat values for the relevant MNES. Not suitable for inclusion in the final Offset area.	0 ha	10.07 ha	N/A
Total		481.13 ha	4,035.95*	

*Total area varies slightly to potential offset land areas (Table 7) due to low cadastral parcel accuracy.

5.4. BROAD CONDITION

The condition of the vegetation and habitat present varies across the various potential Offset lands, influenced largely by the historical management practices at each site.

Forest and woodland vegetation is generally in good condition, with a high level of species diversity, recruitment, and is largely free of introduced species. Tree canopy cover is sparse due to selective logging over numerous generations, and large trees are sparsely distributed across forest patches.

Non-forest vegetation within the potential Offset land is largely confined to three properties (Allwrights, St Patricks Plains, and Wihareja). These properties contain extensive areas of native grassland and grassy sedgeland. The native grassland at these sites varies in condition from high-quality open grassland to lower quality shrub invaded grassland, which is a result of infrequent fire and lack of grazing to suppress shrub growth. Detailed habitat quality scores are provided in Section 7 and Appendix B.

Habitat quality across both the Impact footprint and the potential Offset land were calculated as an aggregate of condition scores across the relevant habitats for the MNES (Table 7). Although condition of forested communities varies slightly across the Project area, largely due to tree canopy cover, the aggregate score is representative of the general condition of the site. Survey coverage and vegetation condition classes are displayed in Figure 3 and Figure 4.

Several processes on site may represent threats to MNES included in this OS. Current land use for agriculture, livestock grazing and timber harvesting may contribute to habitat loss or disrupt important ecological processes such as breeding. Presence of weeds and introduced species may further degrade quality of habitat or threaten species through predation or competition. Recreational hunting and vehicles on site can have direct (vehicle collisions, direct culling) or indirect (secondary poisoning) effects on threatened species present in the potential Offset land. Detailed consideration of threatening processes is covered in Section 7.

6. HABITAT QUALITY

6.1. METHOD

Habitat quality (HQ) measures how well a site supports a particular threatened species and contributes to its ongoing viability³⁰. HQ is scored out of 10 across three components that contribute to the calculation of the overall score, being site condition, site context and species stocking rate. These are defined in the Guide³¹ document (Figure 2) as:

- **Site condition** – This is the condition of a site in relation to the ecological requirements of a threatened species or ecological community. This includes considerations such as vegetation condition and structure, the diversity of habitat species present, and the number of relevant habitat features.
- **Site context** – This is the relative importance of a site in terms of its position in the landscape, considering the connectivity needs of a threatened species or ecological community. This includes considerations such as movement patterns of the species, the proximity of the site in relation to other areas of suitable habitat, and the role of the site in relation to the overall population or extent of a species or community.
- **Species stocking rates** – This is the usage and/or density of a species at a particular site. The principle acknowledges that a particular site may have a high value for a particular threatened species, despite appearing to have poor condition and/or context. It includes considerations such as survey data for a site of a particular species population or, in the case of a threatened ecological community this may be a number of different populations. It also includes

³⁰ Department of Sustainability, Environment, Water, Population and Communities (2012c)

³¹ Department of Sustainability, Environment, Water, Population and Communities (2012c)

consideration of the role of the site population in regard to the overall species population viability or community extent.

The significance to each component is dependent on the ecological requirements of the impacted species or ecological community. For example, for some threatened species the most important consideration is the location of a site in the landscape, whereas for others the presence of important habitat features on the site itself may be the most important influencing factor³².

There are no prescriptive guides for developing and measuring the habitat quality score and there are no Commonwealth species-specific guides to measuring habitat quality for a given species. Additionally, there is no State-based procedure to determine habitat quality for offsets in Tasmania, nor any species-specific habitat quality advice. Therefore, the species-specific approach to habitat quality, as well as the method for data collection and scoring, needed to be developed for the Project, in line with the EPBC policy.

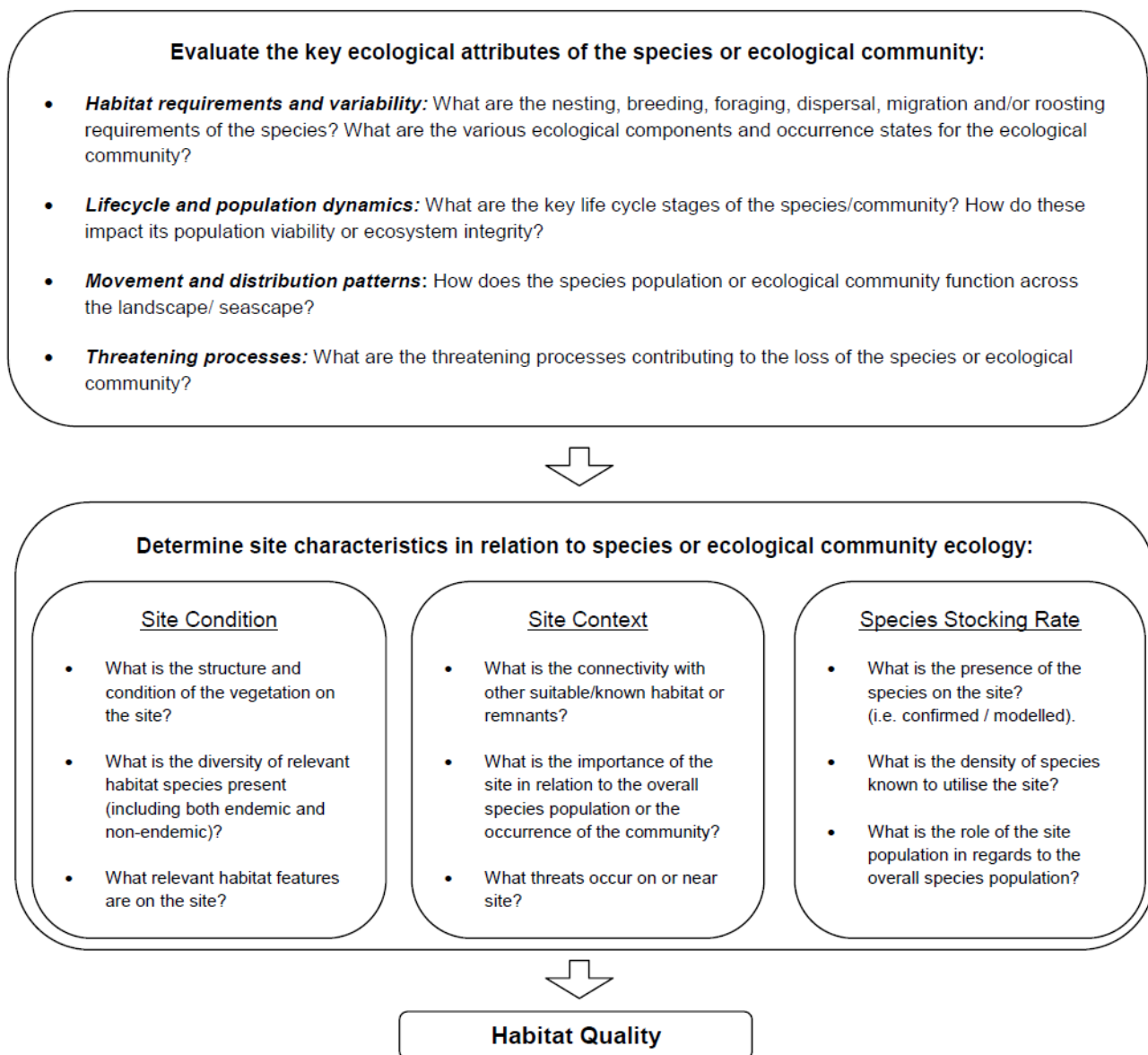


Figure 2: Key considerations in determining the quality of threatened species habitat³³

³² Department of Sustainability, Environment, Water, Population and Communities (2012c)

³³ Department of Sustainability, Environment, Water, Population and Communities (2012c)

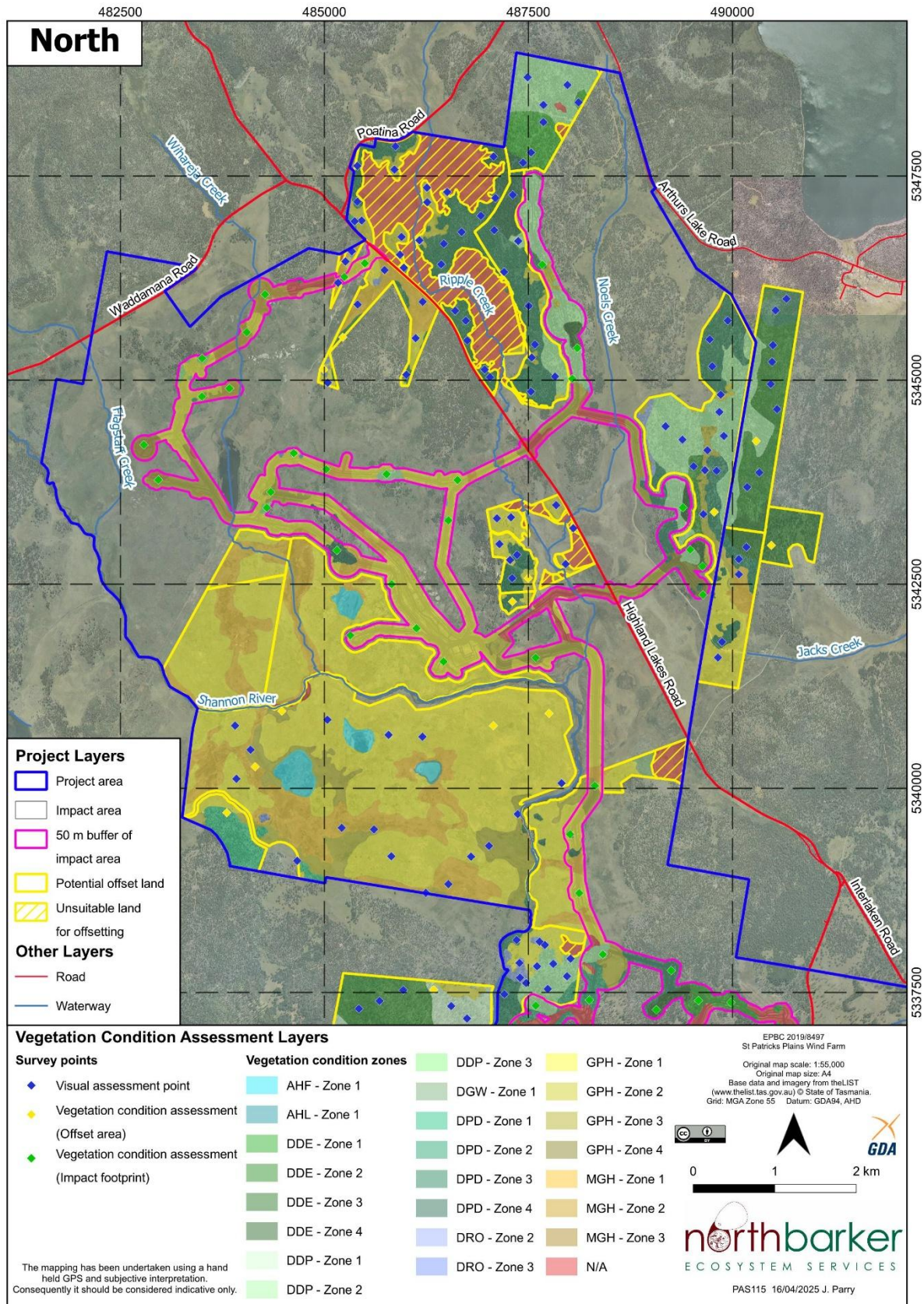


Figure 3: Vegetation condition zones and survey points in the northern potential Offset land area

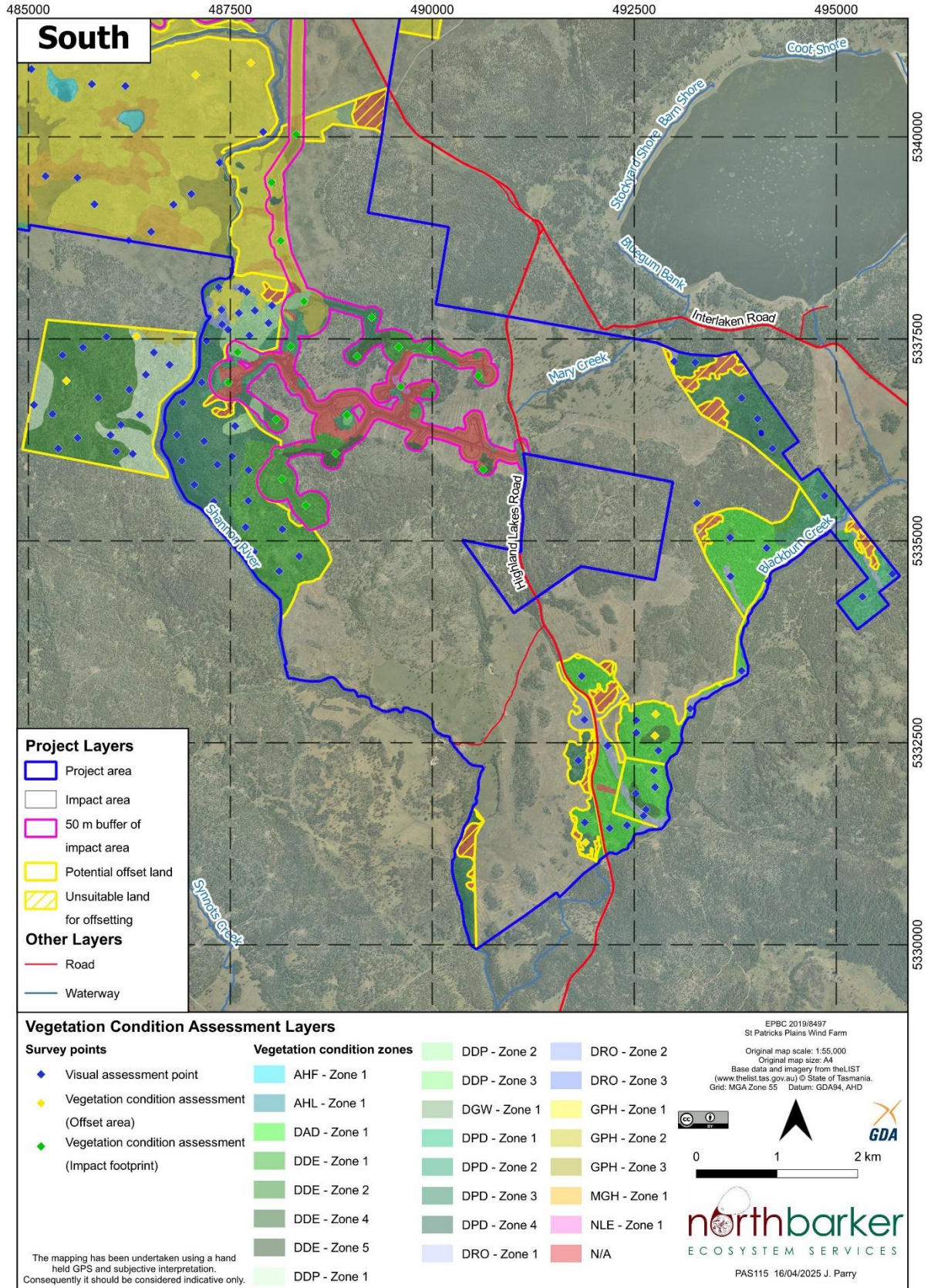


Figure 4: Vegetation condition zones and survey points in the southern offset potential Offset land area

The development of an approach to HQ for the offset matters included a review of the requirements of the Guide, existing methods of measuring habitat quality, previous examples for other species, and of habitat requirements for each of the offset matters. This included the review and consideration of any published condition assessment methodologies in Tasmania and in other states and included the following sources:

- Environmental Offsets Policy³⁴;
- How to use the Offsets Assessment Guide³⁵;
- Commonwealth Listing Advice on *Sarcophilus harrisi*³⁶;
- Approved Conservation Advice for *Sarcophilus harrisi* (Tasmanian Devil)³⁷;
- Approved Conservation Advice for *Oreixenica ptunarra* (Ptunarra brown butterfly)³⁸;
- Approved Conservation Advice for *Tyto novaehollandiae castanops* (Tasmanian Masked Owl)³⁹;
- Commonwealth Listing Advice on *Dasyurus maculatus maculatus* (Spot-tailed Quoll, Spotted-tailed Quoll, Tiger Quoll)⁴⁰;
- Threatened Tasmanian Eagles Recovery Plan 2006-2010⁴¹;
- Conservation Advice *Dasyurus viverrinus* eastern quoll⁴²;
- TASVEG VCA Manual: A manual for assessing vegetation condition in Tasmania (Version 2.0)⁴³; and
- Literature review of scientifically published journal articles.

The TASVEG VCA Manual (the Manual) offers a detailed and verified method for assessing the condition of vegetation communities in Tasmania. As such, it was utilised as the primary resource for assessing the aligned components of HQ in the Guide. In particular, two subcomponents of site condition (vegetation structure and composition and habitat species diversity) and one component of site context (connectivity) were determined to align entirely with metrics provided in the Manual.

The remaining HQ subcomponents including habitat features, site importance to the population, threats and all metrics in the species stocking rate subcomponent were developed in accordance with habitat requirements for offset matters derived from journal articles, Commonwealth SPRAT⁴⁴, recovery plans, approved conservation advice, and listing advice.

A summary of each of the HQ metrics and the relative weighting of the three HQ components that have been developed for the Project are summarised in Table 11. The full HQ scoring methodology and justification is provided in Appendix A. A description of the HQ metric development, scoring methodology and relative weighting are provided for each HQ component in Sections 6.1.1 (site condition), 6.1.2 (site context) and 6.1.3 (species stocking rate).

³⁴ Department of Sustainability, Environment, Water, Population and Communities (2012a)

³⁵ Department of Sustainability, Environment, Water, Population and Communities (2012c)

³⁶ Threatened Species Scientific Committee (2009)

³⁷ Department of the Environment, Water, Heritage and the Arts (2009)

³⁸ Department of the Environment (2014)

³⁹ Department of the Environment, Water, Heritage and the Arts (2009)

⁴⁰ Threatened Species Scientific Committee (2004)

⁴¹ Threatened Species Section (2006)

⁴² Threatened Species Scientific Committee (2015)

⁴³ Michaels *et al.* (2020)

⁴⁴ Available at <https://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>

Table 11: Summary of habitat quality scoring – all species

HQ component & weighting	HQ subcomponent	HQ metric	Maximum score	
Site condition (weighted 5/10)	Vegetation structure and composition	Forest Large trees (%)	10	
		Forest Tree canopy cover (%)	5	
		Non-forest Dominant life form cover (%)	15	
		Forest and non-forest Lack of weeds (%)	15	
		Forest and non-forest Organic litter (%)	5	
		Forest Logs (%)	5	
	Habitat species diversity	Forest and non-forest Understorey life forms	25	
		Non-forest Persistence potential	10	
		Forest Recruitment	10	
	Habitat features	Forest and non-forest Availability of suitable microhabitat features (denning, hollow bearing trees)	25	
	Forest subtotal (raw score)			/ 100
	Weighted forest total (converted to a score out of 5)			/ 5
	Non-forest subtotal (raw score)			/ 95
	Weighted non-forest total (converted to a score out of 5)			/ 5
Site context (weighted 3/10)	Connectivity	Patch size (ha)	10	
		Neighbourhood (%)	10	
		Distance to core area (km)	5	
		Species mobility capacity	25	
	Site importance to the population or occurrence in the community	Functional habitat types	25	
		Habitat complexity *	25	
	Threats	Threat 1	Species specific	
		Threat 2	Species specific	

HQ component & weighting	HQ subcomponent	HQ metric	Maximum score
		Threat 3	Species specific
		Threat 4	Species specific
		Threat 5	Species specific
	Subtotal (raw score)		Species specific
	Weighted total (converted to a score out of 3)		/ 3
Species stocking rate (weighted 2/10)	Species presence	Species presence within or adjacent to site	10
	Species density	N/A	N/A
	Role of the site population in the overall species population	Key population for breeding	5
		Key population for dispersal	5
		Necessary for maintaining genetic diversity	5
		Near the limit of the species range	5
	Subtotal (raw score)		/ 30
Weighted total (converted to a score out of 2)		/ 2	
HQ total (forest) (raw score)			Species specific
HQ total (non-forest) (raw score)			Species specific
HQ weighted total (converted to a score out of 10)			/ 10

* - Not included for the Ptunarra brown butterfly

6.1.1. Site condition

As per the Guide, site condition has three subcomponents: 'vegetation structure and composition', 'habitat species diversity' and 'habitat features'. The site condition HQ metrics and scoring were largely designed as per the Guide using the Manual. The scoring and metrics in the Manual were considered commensurate with the HQ subcomponents 'vegetation structure and composition' and 'habitat species diversity'. It provides a well-established method for measuring vegetation condition against relevant benchmarks. However, the Manual does not include metrics commensurate with the 'habitat features' subcomponent and this was developed based on known habitat requirements and ecology for the offset matters.

Site condition was weighted to contribute 50 % to the final habitat quality score, to be weighted as a maximum score of 5 out of 10 (Table 11). Note that the Tasmanian devil, eastern quoll, spotted-tail quoll, Tasmanian masked owl and Tasmanian wedge-tailed eagle were all scored against forest HQ metrics and the Ptunarra brown butterfly was scored against non-forest HQ metrics.

Habitat features

The purpose of this metric is to be able to score the value of a site to each of the species independently of the vegetation condition score derived from the Manual. This is because some vegetation communities may naturally be low in microhabitat values for the species (e.g. naturally lacking logs or hollow bearing trees in communities that do not contain trees) and therefore may still score highly under vegetation structure and composition HQ sub-component. The suitable microhabitat features include all known microhabitat features that are known to have been utilised by each species from the literature. This metric was collected as a qualitative measure as part of the site condition assessment. The more habitat features present in the potential Offset land, the higher the score.

6.1.2. Site context

As per the Guide, site context has three subcomponents broadly summarised as ‘connectivity’, ‘site importance’ and ‘threats’. The site context HQ metrics and scoring were largely designed using the Manual. The scoring and metrics in the Manual were considered commensurate with the ‘connectivity’ subcomponent. Other subcomponents of ‘connectivity’ as well as ‘site importance’ and ‘threats’ were tailored for the offset matters based on known habitat requirements and ecology as the Manual does not include metrics for these subcomponents.

Site context is weighted to contribute 30 % to the final habitat quality score, to be weighted as a maximum score of 3 out of 10 (Table 11).

Connectivity

The connectivity subcomponent is supplemented with species mobility capacity. This subcomponent was developed to quantify the restriction of movement in a site (fences, roads, impenetrable weeds etc.). This metric will be measured as the proximity of a site to a structure that could impose mobility (proposed or erected) that cannot be traversed by the species. The closer the structure is to the site, the lower the score as it’s considered unfavourable for a site to be near a structure that impacts mobility as it restricts the movement of animals.

Site importance

Site importance include two metrics, functional habitat types and habitat complexity. These metrics are both indications that the offset species are not evenly distributed across the potential Offset land and that they preference certain areas. For example, some species, e.g. the Tasmanian devil, appear to preference areas of greater complexity and areas with numerous functional habitat components. As such, the functional habitat types at the site and the complexity of habitat types within 5 km of a site will be assessed through mapping based on field verified habitat mapping.

The ‘functional habitat types’ metric was collected in the field as a qualitative assessment based on the presence of microhabitat features (e.g. denning habitat materials such as logs and burrows, hollow bearing trees, eagle nests etc.) The higher the presence and area of each functional habitat type, the higher the score.

The ‘habitat complexity mosaic’ is collected through satellite imagery and corroborating with field verified habitat and vegetation mapping to count the number of habitat types within a 5 km radius of the site. The eastern quoll has a radius of 1 km as it is known to have a smaller home range than other dasyurids. The more functional habitat types present, the higher the score. Note this metric is only relevant for the Tasmanian devil, eastern quoll, spotted-tail quoll, Tasmanian wedge-tailed eagle and Tasmanian masked owl. The Ptunarra brown butterfly has a smaller area of occupancy, and it is not

known to benefit from habitat complexity mosaics and therefore habitat complexity is not useful indicator of habitat quality for this species.

6.1.2.1. Threats

The species-specific threats relevant to the potential Offset land as identified in Table 12, are individually scored per threat and species and the average score used. This is to ensure each threat is weighted per species based on the degree or importance of that threat per species as shown in Table 8. The lower the likelihood that a threat impacts a species in the potential Offset land, the higher the score. Threats that pose a higher risk can receive higher maximum scores than threats that are a lower risk per species.

Table 12: Site context - threat habitat quality raw scoring

Threat	Maximum score					
	Tasmanian devil	Eastern quoll	Spotted-tail quoll	Tasmanian masked owl	Tasmanian wedge-tailed eagle	Ptunarra brown butterfly
Motor vehicle strike	15	10	15	10	15	-
Culling/non-targeted poisoning	10	15	15	15	20	-
Predation and competition from introduced predators	10	15	15	-	-	20
Inappropriate fire regimes	10	10	10	-	-	15
Habitat loss / modification / degradation	-	-	20	20	20	20
Loss of nesting habitat (natural), hollow competition and/or nest disturbance	-	-	-	20	15	-

6.1.3. Species stocking rate

Species stocking rate is the third component of HQ and is often the most difficult to measure. All of the species stocking rate subcomponents, including 'species density', 'species presence' and 'role of the site in the overall species population' were tailored based on known habitat requirements and ecology as the Manual does not include metrics for these subcomponents.

Species stocking rate is weighted to contribute 20 % to the final habitat quality score, to be weighted as a maximum score of 2 out of 10 (Table 11).

6.1.3.1. Species presence

The presence of each species within the potential Offset land is critical to informing how suitable the potential Offset land is for each species. Species presence has been qualitatively assessed in the field through historical records, anecdotal field records, habitat mapping, presence of habitat features and modelling. This mapping and records is used to determine an estimate of species presence for each species. The higher the species presence is or is modelled to be in the potential Offset land, the higher the score.

6.1.3.2. Species density

Similarly to species presence, the density of individual animals of each species is scored based on historical records, anecdotal field records, habitat mapping, presence of habitat features and modelling. The higher the species density in the potential Offset land, the higher the score.

6.1.3.3. Role of the site population in the overall species population

The role of the site population relative to the overall species population is scored based on each species occurrence in the area together assessed with the likelihood of relevant threats. For example, for the Tasmanian devil, the likelihood of Devil Facial Tumour Disease (DFTD) establishing in the population on site relative to other populations of devils not associated with the potential Offset land is scored. For the Tasmanian wedge-tailed eagle, the likelihood of culling and/or non-targeted poisoning is scored in the context of the potential Offset land, relatively to other known populations. If threats are less likely to occur for the populations of the offset species in the potential Offset land, the higher the scores will be.

6.2. SCORES

Habitat quality have been assessed in the impact and potential Offset land using the above method. A summary of the HQ scores are provided in Table 13 below. The scores are an average for the entire impact and potential Offset land. The detailed scoring results are provided in Appendix B.

Table 13: Habitat quality scoring summary

Species	Site condition		Site context		Species stocking rate		Overall HQ score	
	Impact	Offset	Impact	Offset	Impact	Offset	Impact	Offset
Tasmanian devil								
Raw score	65.9	70.5	89.9	94.0	20	20	175.8	184.5
Weighted score	3.3	3.5	2.2	2.4	1.3	1.3	7.0	7.4
Eastern quoll								
Raw score	65.9	70.5	89.9	94	10	10	165.8	174.5
Weighted score	3.3	3.5	2.2	2.3	0.7	0.7	6.5	6.8
Spotted-tail quoll								
Raw score	65.9	70.5	104.9	109	5	5	175.8	184.5
Weighted score	3.3	3.5	2.1	2.2	0.3	0.3	6.3	6.6
Tasmanian masked owl								
Raw score	65.9	70.5	94.9	109	10	10	170.8	189.5
Weighted score	3.3	3.5	2.0	2.3	0.7	0.7	6.3	7.0
Tasmanian wedge-tailed eagle								
Raw score	65.9	70.5	99.9	114	10	10	175.8	194.5
Weighted score	3.3	3.5	2.1	2.4	0.7	0.7	6.4	7.1
Ptunarra brown butterfly								
Raw score	60.7	71.4	64	63	25	25	149.7	159.4
Weighted score	3.2	3.8	1.8	1.8	1.7	1.7	6.5	6.9

6.3. CONSERVATION GAINS

The primary conservation gains delivered by the offset are habitat improvement and reductions of threats. Through the offset management actions, we anticipated an improvement in the habitat quality score of a single point for each species. These improvements will largely be observed in the following metrics:

- Threats
 - Reduce the likelihood of predation and competition from introduced predators;
 - Reduce the frequency and likelihood of motor vehicle strikes;
 - Reduce the likelihood of culling / non-targeted poisoning; and
 - Remove the risk of habitat loss / modification / degradation to species habitat.
- Vegetation structure and composition
 - Prevent the removal of large trees from logging practices;
 - Increase the tree canopy cover due to prevention of logging; and
 - Increase the ability of vegetation recruitment.
- Averted loss
 - Remove the risk of loss of habitat through formal protection.

7. MNES ASSESSMENT

7.1. TASMANIAN DEVIL

7.1.1. Ecology

The Tasmanian devil is a wide-ranging carnivore, occurring in almost all habitat types in Tasmania including disturbed environments such as forestry plantation and agricultural areas. The Tasmanian devil is an opportunistic scavenger, with foraging locations largely driven by prey occurrences. Open forests and woodlands are preferred, particularly where a mosaic of woodlands and cleared agricultural fields occurs, providing both high prey densities and denning habitat⁴⁵. Devils den in burrows, dense riparian vegetation, grass tussocks and caves and may occupy several dens within their home range, which can be between 4–27 km² ⁴⁶.

The Tasmanian devil breeds once a year between February and June, with reproductive success being high in wild, non-diseased populations. Although devils from north-western Tasmania are genetically distinct from those found across the rest of the State, due to the species' generalist habitat preferences, large home-range size and dispersal activity, local populations are connected across the entire State.

The primary threat to the Tasmanian devil is DFTD, an infectious and transmissible cancer. Widespread disease has caused widespread decline in populations of the Tasmanian devil across approximately 51% of the species range⁴⁷. In DFTD affected areas, impacts from other threats can be compounded due to low population sizes. Female Tasmanian devils in areas where DFTD is present typically only have one or two litters per lifetime, therefore direct loss of individuals or loss or disturbance of maternal dens has the potential to impact the breeding success of the local population. It is likely that DFTD reached the project area in the early to mid-2000's⁴⁸.

The species is also at risk of vehicle strike as roadkill provides a source of carcasses for foraging. Approximately 2-4% of the total population are killed on roads each year⁴⁹. Other threatening process identified for the Tasmanian devil include deliberate culling by humans and habitat modification⁵⁰. Fire

⁴⁵ Department of Primary Industries, Parks, Water and Environment (2010); Threatened Species Scientific Committee (2009)

⁴⁶ Department of the Environment (2025a)

⁴⁷ Department of the Environment (2025a)

⁴⁸ Cunningham *et al.* (2021)

⁴⁹ Department of the Environment (2025a)

⁵⁰ Department of the Environment (2025a); Threatened Species Scientific Committee (2009)

or controlled burning is an additional potential threat, as inappropriate fire regimes have potential to reduce site condition through destruction of den sites, particularly when denning in log piles or hollow logs. Fires can also reduce the microhabitat complexity of breeding habitat. Fire can also displace or increase the risk of mortality or injury to breeding females and their denning young⁵¹.

7.1.2. Presence in the potential Offset land

Tasmanian devils are known to occur within the region from records on the Natural Values Atlas (Natural Values Atlas data as at 02/04/2025), and presence in the potential offset land was confirmed during surveys in the form of (suspected) scats (at two locations), bones (at one location with a skull), an audible individual within a den (at one location), and camera sightings (at two locations). Further records from ground surveys, camera surveys, landholder/resident accounts within the adjacent Project area demonstrate that the species is widespread throughout the region. Signs of occupancy by devils are generally conspicuous, with abundant scats and frequent camera sightings observable in higher density populations. Although most areas of suitable habitat in the potential offset land are likely to be occupied, it was determined that the low frequency of observations indicate the species is unlikely to be abundant⁵².

7.1.3. Offset Suitability

The potential Offset land contains suitable habitat for the Tasmanian devil, with selected areas supporting large patches of dry eucalypt woodland and forest within a mosaic of native grassland and sedgeland as well as pasture. These open forests and woodlands support high densities of prey to facilitate hunting, and the connectivity with other forest habitat in the regional landscape represents suitable dispersal habitat with no barriers to movement, supporting foraging and dispersal for the species. Numerous vehicle tracks are also present within the potential Offset land, providing effective dispersal corridors for Tasmanian devils.

Suitable denning opportunities are present throughout the potential Offset land in the form of rock piles, fallen trees and burrows. During field surveys in the potential Offset land, 56 wombat burrows were identified as suitable for devils, with an additional 58 identified within the adjacent Project area⁵³. The broader landscape supports patches of rocky habitat suitable for denning, as well as hollow logs within forested areas.

Denning stratification modelling shows that potential Offset land supports large areas of potential denning habitat, with much of this qualifying as optimal (Figure 5, Figure 6). Systematic den searches and habitat suitability modelling were not undertaken in potential Offset land outside of the Project area, and suitability has been extrapolated from modelling and survey results in adjacent properties. The two properties (Forest Marsh and ██████████ that were not previously included in modelling consist predominantly of dry eucalypt forest and woodland (optimal), with areas of adjacent native grassland with shrub cover (optimal) and exposed native grassland and sedgeland (suboptimal). Due to the proximity and similarity to surveyed areas, additional suitable denning opportunities are likely to be present throughout.

7.1.4. Threats within the potential Offset land

Current land use of potential Offset land presents ongoing disturbance to occupying devils. Existing threats within the potential Offset land include the following:

- Devil facial tumour disease – Modelling of the spread of DFTD suggests that it is likely that DFTD reached the Project area in the early to mid-2000's⁵⁴.

⁵¹ Threatened Species Section (2025)

⁵² North Barker Ecosystem Services (2023)

⁵³ North Barker Ecosystem Services (2023)

⁵⁴ Cunningham *et al.* (2021)

- Avian flu – A new H5N1 strain of bird flu has been spreading rapidly across the globe, although has not yet been detected in Australia. It is predicted to arrive through migratory birds. Dead birds can remain a source of infection for weeks, thus presenting a threat to scavengers such as the Tasmanian devil⁵⁵.
- Habitat clearance, including:
 - 38.07 % of the total quantum of land within the potential Offset land is within a private timber reserve (PTR). These reserves are administered under the Tasmanian *Forest Practices Act 1985*, with clearance of forest managed through a Forest Practices Plan (FPP) which is regulated by the Forest Practices Authority (FPA). A single FPP is current within one of the potential Offset land areas (GEW0583), which is issued to Submutica Forestry Pty Ltd and is in effect until 31/12/2026, indicating an imminent threat to this area.
 - Clearance and conversion to hardwood monoculture can result in permanent loss of both denning and foraging habitat⁵⁶.
 - Illegal (and legal) firewood collection (often referred to as 'wood-hooking') is a recognized problem in Tasmania⁵⁷. This activity can have adverse effects on threatened species and their habitat, as well as increasing additional threats such as the presence of predators (such as dogs) and the increased risk of vehicle collisions.
- Stock grazing – Grazing animals compete with native herbivores, a primary prey source for devils. Grazing predominantly occurs in non-forest areas, however this forms part of the foraging and dispersal range for this species.
- Unregulated and illegal hunting (poaching) may have similar impacts to that of firewood collection, such as the presence of predators and the increased risk of vehicle collisions, as well as non-target mortality.
- Vehicle strike – This is particularly a threat where potential Offset lands are immediately adjacent to Highland Lakes Road. This road has a speed limit of 100 km/h and presents a high level of threat to Tasmanian devils as they may be struck either while dispersing across the area; or while feeding on carcasses that are left on the road.

7.1.5. Management actions

The primary threats to the Tasmanian devil are disease (DFTD) and vehicle strike. The land-based offset is unlikely to be able to meaningfully contribute to a reduction of these two key threats. However, some controls can be put in place to lessen the risk of these threats in the Offset area. As the impact relates to habitat modification, the offset will primarily focus on improving habitat function and condition. The below management actions proposed in the Offset area are anticipated to improve overall habitat condition for the Tasmanian devil:

Formal protection: the Offset area will be formally protected and deleterious activities within the Offset area will be strictly prohibited. This will retain areas of natural vegetation, to ensure adequate habitat for the Tasmanian devil and its prey.

Population monitoring: A monitoring program to provide visibility on the health of the population within the Offset area. While the threat of disease may not be able to be directly managed, this will provide insights into the presence and severity of DFTD (and potentially avian flu) over time, as well as ongoing data on the population size and health.

Vehicle control: Speed limits and vehicle exclusion areas will be established in the Offset area, to reduce the risk of vehicle strikes as part of offset management. This will reduce the availability of carcasses

⁵⁵ Invasive Species Council (2024)

⁵⁶ Jones *et al.* (2023)

⁵⁷ Abdu *et al.* (2022)

known to attract Tasmanian devils, thereby reducing risk of vehicle-related mortality to the Tasmanian devils themselves⁵⁸.

Poaching/culling: Unregulated poaching, culling, and persecution of native wildlife will be strictly prohibited in the Offset area, enforced through signage and ongoing monitoring. Any animal (native and non-native) control will include strict limitations and requirements for control methods to avoid any non-target poisoning of Tasmanian devils (which may occur through lead shot poisoning, or through baiting). This will reduce human-induced mortality.

Animal control (feral and native): Annual monitoring and control (if required as an outcome of monitoring activities) of feral animals (ie fallow deer, feral cats, wild dogs) and native browsers (ie wallabies, possums etc.) will be undertaken within the Offset area. This will reduce any competition by introduced predators such as cats, reduce predation by alpha predators (such as wild dogs), and decrease the risk of vehicle strike in the region due to reduced opportunity for vehicle collision with native browsers and introduced species which Tasmanian devils may opportunistically forage on.

Weed control: Active control of invasive weeds will be undertaken throughout the life of the offset. Weed management will improve the overall habitat quality condition of the Offset area. Although this measure may not directly affect devils, weed control may help promote healthy populations of prey items such as small marsupials and rodents, thereby indirectly benefiting the Tasmanian devil.

Fire management: Fire restrictions and a controlled burn program will be implemented in the Offset area. These will be strategically implemented to avoid destruction of den sites and injury to pregnant females, where possible.

Management of habitat through controlled burning assists in maintaining structural complexity, while also minimising the risk of catastrophic wildfires that may impact individuals and degrade habitat quality.

7.1.6. Habitat Quality

Habitat quality scores have been informed by detailed field surveys of both the Impact and potential Offset land. The Impact area score for the Tasmanian devil is 7 out of 10 and the start score of the potential Offset land is also 7 out of 10. The habitat quality method is provided in Section 6 and the species-specific metrics are provided in Appendix A. Detailed habitat quality scoring is provided in Appendix B.

7.1.7. OAG Calculations

The total quantum or area of offset required for the Tasmanian devil has been assessed using the OAG. The calculation of the Offset area, achieving 100 % of the required offset with supporting information for the development of each OAG input is provided in Table 14.

⁵⁸ Department of the Environment, Water, Heritage and the Arts (2009)

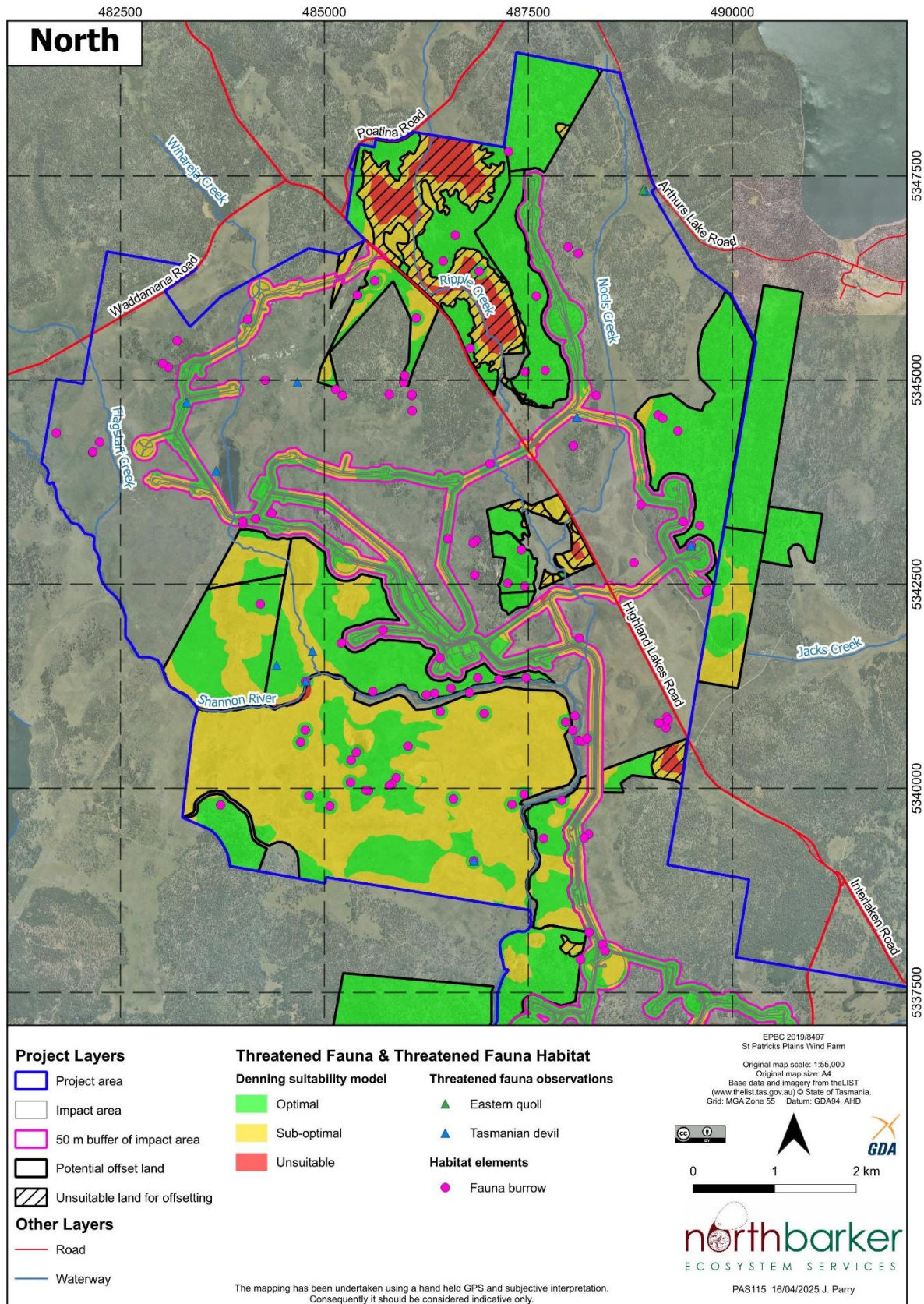


Figure 5: Dasyurid denning habitat and recorded denning features in the northern potential Offset land area

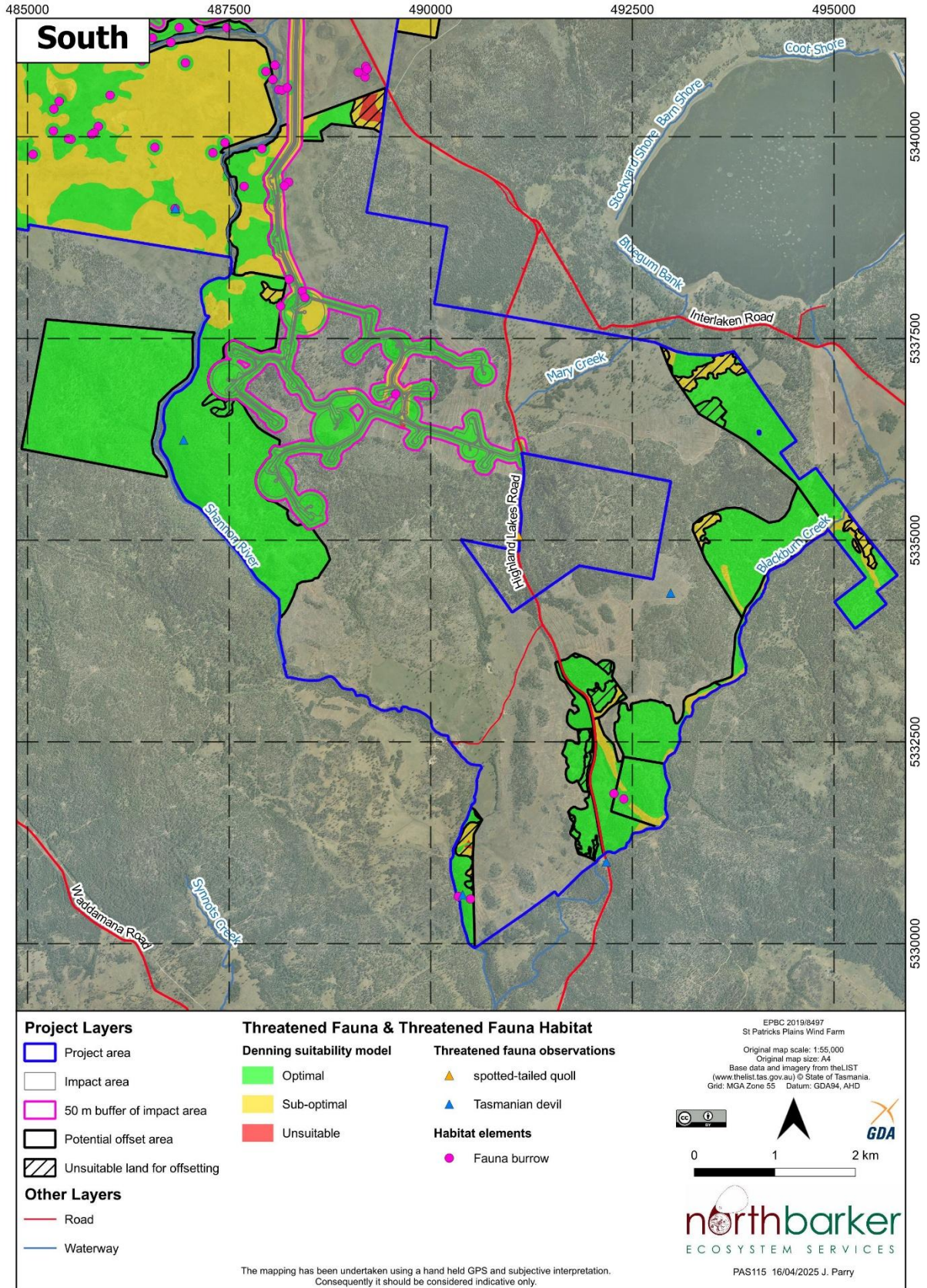


Figure 6: Dasyurid denning habitat and recorded denning features in the southern potential Offset land area

Table 14: Tasmanian devil OAG calculations

OAG Field	Input	Justification
MNES		
Name	Tasmanian devil	
EPBC Act Status	Endangered	
Annual probability of extinction	1.2 %	Calculated by OAG.
Impact calculator		
Impact area	91.08 ha	The final area of SRI has been determined as the total of all optimal and suboptimal habitat within the permanent impact footprint (102.79 ha) as detailed in the SIA ⁵⁹ , minus the entire quantum of modified land (11.71 ha).
Impact quality	7	The habitat quality of the Impact area is seven (7), calculated using the method outlined in Section 6 and presented in Table 11 and Appendix B, informed by field validated information.
Total quantum of impact	63.76 ha	Adjusted impact area as per the OAG (70 % of the Impact area).
Offset calculator		
Time over which loss is averted	20 years	Duration of the risk mitigation actions to be taken, or 20 years, whichever is shorter.
Time until ecological benefit	10 years	This is the estimated time for habitat quality improvement outcomes of the offset to be realised. An estimate of 10 years has been used, based upon the timeframes of which the proposed management actions will provide benefit to the species. This captures both shorter-term and longer-term benefits likely to be realised through delivering the offset.
Risk of loss (%) without offset	5 %	Risk of Loss (RoL) generally represents the percentage chance that the habitat in the potential Offset land would be completely lost (no longer hold any value for the protected matter) over 20 years, as per the OAG. The RoL without the offset is conservatively predicted to be 5 %. This number is partially derived from a study ⁶⁰ that assessed the background rate of loss across all Local Government Areas, including the Central Highlands LGA, which provides a value of 0.06 %. In addition to the background rate of loss in the Central Highlands LGA, a number of other threatening processes are present within the potential Offset land; thus increasing the RoL at this site, including:

⁵⁹ North Barker Ecosystem Services (2025)

⁶⁰ Maseyk *et al.* (2017)

OAG Field	Input	Justification
		<ul style="list-style-type: none"> The potential Offset land are zoned as Rural under the Tasmanian Planning Scheme and are privately owned. This zoning provides no formal protection for threatened natural values, including Tasmanian devil habitat. Section 38 of the EPBC Act provides that forestry operations conducted in relation to land covered by the Tasmanian Regional Forest Agreement (RFA) (and not prohibited by the RFA) are exempt from the assessment and approval requirements of Part 3 of the EPBC Act (except for any forestry operations in World Heritage properties or Ramsar wetland sites). With this in mind, land clearing for forestry under this scenario would be exempt from assessment under the EPBC Act, thus placing any potential property at a high risk due to a lack of legislative protection. 38.07 % of the total quantum of land within the potential Offset land is within a PTR. These reserves are administered under the Tasmanian <i>Forest Practices Act 1985</i>, with clearance of forest managed through a FPP which is regulated by the FPA. While this mechanism provides protection against conversion of forest to agricultural land (and other conversions); it does not prevent against modification of habitat to Tasmanian devils. Natural and assisted regeneration may occur, but restoration to the original state will take several decades. <p>A single FPP is current within one of the potential Offset land areas (GEW0583), which is issued to Rubmatsca Forestry Pty Ltd and is in effect until 31/12/2026, indicating an imminent threat to this area. A further 8 FPP's have been issued within the potential Offset land, with 1 having expired within the last 3 years. The remaining 7 expired more than 3 years ago. Within 5 km of the potential Offset land there are 125 FPPs (18 active, 11 expired within the last 3 years, and 96 expired more than 3 years ago). The volume of FPPs in the region provides an indication of the level of forestry activity in the St Patricks Plains region.</p> <p>Over recent years, there has been a level of concern from Private Forests Tasmania (PFT) regarding the number of PTR revocations, with anecdotal reports indicating that most common conversion post-revocation was to pasture/agricultural land (pers comm. Rob Smith – PFT). In the 2019-2024 period, approximately 18,012 ha of PTR were revoked across Tasmania, with high proportions of this land converted to pasture/agricultural land in recent times⁶¹. The total area of PTRs revoked in the 2023-24 period is 1,845 ha, and the progressive total since 1988-89 is 93,060 ha⁶².</p> <ul style="list-style-type: none"> Activities that are unregulated and/or conducted illegally in the area include firewood and other resource collection, hunting, and general vandalism. <p>Illegal firewood collection can have adverse effects on threatened species and their habitat, as well as increasing additional threats such as the presence of predators (such as dogs) and the increased risk of vehicle collisions.</p> <p>The most common hunting target species in Tasmania include fallow deer, wallaby, and duck, all of which require a hunting permit and firearms licence, as well as landowner permission. The most likely target species in the vicinity of the offset property are</p>

⁶¹ Private Forests Tasmania (2020); Private Forests Tasmania (2024)

⁶² Private Forests Tasmania (2024); Forest Practices Authority (2024)

OAG Field	Input	Justification
		<p>wallabies and deer. Unregulated and illegal hunting may have similar impacts to that of firewood collection, such as the presence of predators and increase risk of vehicle collisions, as well as non-target mortality.</p> <p>Consistent with the approved DCCEEW advice, the measured background rate of loss, and the existing threatening processes in the potential Offset land, 5 % is considered an appropriate representation of RoL.</p>
Risk of loss (%) with Offset	0 %	<p>With the offset in place, the RoL is reduce to zero (0). The RoL with the offset has been predicted based on:</p> <ul style="list-style-type: none"> Protecting the Offset area through a legal mechanism (a conservation covenant under the Tasmanian NC Act) to prevent any further habitat modification / degradation for the duration of the offset; Establishment of an ongoing monitoring program; and Establishment of adaptive management strategies in an approved OAMP.
Confidence in result (%) – risk of loss	90 %	The high confidence reflects the very low RoL used, which is grounded in a detailed regional analysis and reflective of evidenced changes in the region.
Start quality	7	The habitat quality of the potential Offset land is seven (7), calculated using the method outlined in Section 6 and presented in Table 11 and Appendix B, informed by field validated information.
Future quality without offset	6 (-1)	<p>Without the offset, future habitat quality is predicted to decline by one-point. This decline is anticipated based on the continued degradation and proliferation of existing threats identified within the potential Offset land, including:</p> <ul style="list-style-type: none"> Habitat clearance through forest clearance; and Unregulated and illegal activities such as hunting (poaching) and wood hooking.
Future quality with offset	8 (+1)	Through the application of management activities, the future habitat quality is predicted to increase by one-point across the Offset area through the management actions described in Section 7.1.5.
Confidence in result (%) Change in Quality	70 %	<p>A high confidence in the habitat quality result is predicted, noting that detailed habitat quality surveys have been undertaken using a prescribed method and a modest score improvement is predicted. There is a high confidence in the management actions proposed as they:</p> <ul style="list-style-type: none"> Build on and improve existing habitat; Utilise well established measures; and Avoid approaches that carry higher risks of delivery.
Total quantum of land required to achieve offset	436 ha	Considering all variables within the OAG, the total quantum of land required to achieve 100 % of the offset for the Tasmanian devil is 436 hectares.
% of impact offset	100.12 %	The calculated values result in 100 % of the offset being obtained.

7.2. EASTERN QUOLL

7.2.1. Ecology

The eastern quoll is a small carnivore, previously widespread throughout south-eastern Australia but now restricted to Tasmania⁶³. The species occurs throughout most parts of Tasmania although is recorded only infrequently in the wetter western third of the state (Natural Values Atlas data as at 02/04/2025). Eastern quolls utilise a range of vegetation types including open grassland (including farmland), tussock grassland, grassy woodland, dry eucalypt forest, coastal scrub and alpine heathland, but is typically absent from large tracts of wet eucalypt forest and rainforest⁶⁴. The species is commonly associated with ecotones between forest and dry grassland or buttongrass moorland, and within forest mosaics bounded by agricultural land, with these landscapes offering both shelter for denning and open grasslands rich with invertebrate prey species.

Eastern quolls den in fallen logs, under rocks or in burrows, generally requiring some overstorey cover in denning locations⁶⁵. They forage in open woodland, grassland and pasture with their diet predominantly consisting of invertebrates, including common pasture grubs such as corbie grubs, as well as rodents, small reptiles and some plant material⁶⁶. Eastern quolls are solitary, but not territorial, and the home ranges of many individuals may overlap. The species is declining at a population level but can be locally abundant, being found at high densities in highly suitable habitat⁶⁷.

One of the primary threats to eastern quolls is climate change, with rapid declines historically having been linked to sustained periods of unfavourable weather⁶⁸. The species' distribution is positively associated with areas of low rainfall and cold winter minimum temperatures. Changed temperatures, and increased frequency and intensity of extreme rainfall, may also reduce suitable habitat required by the quolls⁶⁹. Disease is a potentially severe threat, particularly in isolated populations, due to low genetic diversity in these high-density populations. Eastern quolls may also be subject to non-target poisoning associated with rodent control measures. Predation by feral cats and red foxes have been identified as moderate threats⁷⁰ and although currently populations of these predators are not high enough to be a major causal factor in decline, predation by feral cats may be a compounding factor in low-density quoll populations in the presence of other threatening processes⁷¹.

7.2.2. Presence in the potential Offset land

Eastern quolls are known to occur within the region from records on the Natural Values Atlas (Natural Values Atlas data as at 02/04/2025), and presence in the adjacent Project area was confirmed during surveys. Observations of the species were limited to trail camera footage at a single location near Arthurs Lake Road, 1.2 km from a potential Offset land area. An eastern quoll was detected over multiple nights and is suspected to be a single individual. Detection of eastern quolls in non-targeted surveys is generally patchy, due to their relatively small home ranges and selective habitat use, and camera locations were not sufficient to definitively discern presence or absence of the species. Based on habitat and environmental suitability, and known abundance in nearby reserves, it can be expected that the species is widespread across the potential Offset land, and it may be locally abundant in highly suitable habitat.

⁶³ Threatened Species Scientific Committee (2015)

⁶⁴ Threatened Species Scientific Committee (2015)

⁶⁵ Wilson *et al.* (2024)

⁶⁶ Threatened Species Scientific Committee (2015)

⁶⁷ Threatened Species Scientific Committee (2015)

⁶⁸ Threatened Species Scientific Committee (2015)

⁶⁹ Fancourt (2015a); Fancourt *et al.* (2015a)

⁷⁰ Threatened Species Scientific Committee (2015)

⁷¹ Fancourt (2016)

7.2.3. Offset Suitability

The potential Offset land contains suitable habitat for the eastern quoll, with selected areas supporting large patches of dry eucalypt woodland and forest within a mosaic of native grassland and sedgeland as well as pasture. Grasslands and sedgelands support high densities of invertebrate prey species, and adjacent forest provides shelter and denning opportunities for the species. Despite the low number of observations within potential Offset land, connectivity with known populations in the regional landscape is likely, with contiguous adjacent habitat supporting dispersal for the species. Numerous vehicle tracks are also present within the potential Offset land, providing effective dispersal corridors for eastern quolls.

Suitable denning opportunities are present throughout the potential Offset land in the form of rock piles, fallen trees and burrows. During field surveys in the potential Offset land, 56 wombat burrows were identified as suitable for quolls, with an additional 58 identified within the adjacent Project area⁷². The broader landscape supports patches of rocky habitat suitable for denning, as well as hollow logs within forested areas.

Denning stratification modelling shows that the potential Offset land supports large areas of potential denning habitat, with much of this qualifying as optimal (Figure 5, Figure 6). Systematic den searches and habitat suitability modelling were not undertaken in potential Offset lands outside of the Project area, and suitability has been extrapolated from modelling and survey results in adjacent properties. The two properties (Forest Marsh and ██████████) that were not previously included in modelling consist predominantly of dry eucalypt forest and woodland (optimal), with areas of adjacent native grassland with shrub cover (optimal) and exposed native grassland and sedgeland (suboptimal). Due to the proximity and similarity to surveyed areas, additional suitable denning opportunities are likely to be present throughout.

7.2.4. Threats within the potential Offset land

Current land use of potential Offset land presents ongoing disturbance to eastern quolls. Existing threats within the potential Offset land includes the following:

- Habitat clearance, including:
 - 38.07 % of the total quantum of land within the potential Offset land is within a PTR. These reserves are administered under the Tasmanian *Forest Practices Act 1985*, with clearance of forest managed through a FPP which is regulated by the FPA. A single FPP is current within one of the potential offset potential Offset land areas (GEW0583), which is issued to Rubmatsca Forestry Pty Ltd and is in effect until 31/12/2026, indicating an imminent threat to this area.
 - Clearance and conversion to hardwood monoculture can result in permanent loss of both denning and foraging habitat⁷³.
 - Illegal (and legal) firewood collection (often referred to as 'wood-hooking') is a recognized problem in Tasmania⁷⁴. This activity can have adverse effects on threatened species and their habitat, as well as increasing additional threats such as the presence of predators (such as dogs) and the increased risk of vehicle collisions.
- Stock grazing –Grazing predominantly occurs in non-forest areas, however this forms part of the foraging and dispersal range for this species. Overgrazing may deplete habitat viability for invertebrates (and other prey), which are a primary food source for the eastern quoll⁷⁵.

⁷² North Barker Ecosystem Services (2023)

⁷³ Jones *et al.* (2023)

⁷⁴ Abdu *et al.* (2022)

⁷⁵ North Barker Ecosystem Services (2023)

- Unregulated and illegal hunting (poaching) may have similar impacts to that of firewood collection, such as the presence of predators and the increase in the risk of vehicle collisions, as well as non-target mortality.
- Vehicle strike – particularly where potential Offset lands are immediately adjacent to Highland Lakes Road. This road has a speed limit of 100 km/h and presents a high level of threat to eastern quolls as they may be struck either while dispersing across the area; or while feeding on carcasses that are left on the road.
- Feral cats in Tasmania both compete for resources with, and directly predate upon quolls⁷⁶, particularly where devil populations are low. Studies in disease affected populations of Tasmanian devils show that devil declines influence both abundance of feral cats⁷⁷, as well as feral cat activity times, with cats being more active at night when devil populations are low⁷⁸. This increase in abundance and shift toward nocturnal hunting strategies has been implicated in the suppression of eastern quoll populations, with temporal overlaps in quoll and cat activity increasing potential of predation of juvenile quolls by feral cats⁷⁹. Maintenance of healthy devil populations, or management of feral cats is therefore likely to reduce negative interactions between native carnivores and feral cats⁸⁰.

7.2.5. Management actions

The primary threat to the eastern quoll is climate change, with disease and predation being potentially severe threats⁸¹. The land-based offset is unlikely to be able to meaningfully contribute to a reduction of the risk of climate change and disease. However, some controls can be put in place to lessen the risk of these threats in the potential Offset land. As the impact relates to habitat modification, the offset will primarily focus on habitat function and condition. The below management actions proposed in the Offset area are anticipated to improve overall habitat condition for the eastern quoll:

Formal protection: the Offset area will be formally protected and deleterious activities within the Offset area will be strictly prohibited. This will retain areas of natural vegetation, to ensure adequate habitat and refuge for the species.

Population monitoring: A monitoring program to provide visibility on the health of the population within the Offset area. While the threat of disease may not be able to be directly managed, this will provide insights into the presence and severity of disease (if present) and novel pathogens over time, as well as ongoing data on the population size and health.

Vehicle control: Speed limits and vehicle exclusion areas will be established in the Offset area, to reduce the risk of vehicle strikes as part of offset management. This will reduce the availability of carcasses known to attract eastern quolls, thereby reducing risk of vehicle-related mortality to the eastern quoll. Prohibiting night-driving will help to prevent direct mortality since quolls are most active at night.

Non-target poisoning: Pest animal (ie fallow deer, feral cats, wild dogs) control measures will include strict limitations and requirements for control methods to avoid any non-target poisoning of Eastern quolls.

Feral animal control: Annual monitoring and control (if required as an outcome of monitoring activities) of feral animals (ie fallow deer, feral cats, wild dogs) and native browsers (ie wallabies, possums etc.) will be undertaken within the Offset area. This will reduce any competition by introduced predators such as cats, reduce predation by alpha predators (such as wild dogs), and decrease the risk of vehicle

⁷⁶ Glen & Dickman (2008); Fancourt *et al.* (2015); Cunningham *et al.* (2022)

⁷⁷ Cunningham *et al.* (2020)

⁷⁸ Fancourt *et al.* (2015)

⁷⁹ Fancourt *et al.* (2015); Cunningham *et al.* (2022)

⁸⁰ Cunningham *et al.* (2020); Department of the Environment (2015)

⁸¹ Threatened Species Scientific Committee (2015)

strike in the region due to reduced opportunity for vehicle collision with native browsers and introduced species which eastern quolls may opportunistically forage on.

Feral animal control effort may be higher in the summer when feral cats are most active, thereby enhancing the protection afforded to juvenile quolls who are also more active during this time. Targeted control of feral cats may also reduce the incidence of *Toxoplasma gondii* infections in eastern quolls, thereby minimising the risk of disease spread⁸².

Weed control: Active control of invasive weeds will be undertaken throughout the life of the offset. Weed management will improve the overall habitat quality condition of the Offset area. Although this measure may not directly affect eastern quolls, weed control and vegetation improvement may help promote healthy populations of prey items such as invertebrates, frogs, and small reptiles, thereby indirectly benefiting the eastern quoll.

Fire management: Fire restrictions and a controlled burn program will be implemented in the Offset area. Fire is not a listed threat to the species⁸³; however, inappropriate fire regimes have potential to reduce site condition through destruction of den sites and displace or increase the risk of mortality or injury to breeding females and their denning young, as well as reducing the availability of prey items such as invertebrates.

Management of habitat through controlled burning assists in maintaining structural complexity, while also minimising the risk of catastrophic wildfires that may impact individuals and degrade habitat quality.

7.2.6. Habitat quality

Habitat quality scores have been informed by detailed field surveys of both the Impact and potential Offset land. The Impact area score for the eastern quoll is 7 out of 10 and the start score of the potential Offset land is also 7 out of 10. The habitat quality method is provided in Section 6 and the species-specific metrics are provided in Appendix A. Detailed habitat quality scoring is provided in Appendix B.

7.2.7. OAG Calculations

The total quantum or area of offset required for the eastern quoll has been assessed using the OAG. The calculation of the Offset area, achieving 100 % of the required offset with supporting information for the development of each OAG input is provided in Table 15.

⁸² Department of Climate Change, Energy, the Environment and Water (2024)

⁸³ Threatened Species Scientific Committee (2015)

Table 15: Eastern quoll OAG calculations

OAG Field	Input	Justification
MNES		
Name	Eastern quoll	
EPBC Act Status	Endangered	
Annual probability of extinction	1.2 %	Calculated by OAG.
Impact calculator		
Impact area	91.08 ha	The final area of SRI has been determined as the total of all optimal and suboptimal habitat within the permanent impact footprint (102.79 ha) as detailed in the SIA ⁸⁴ , minus the entire quantum of modified land (11.71 ha).
Impact quality	7	The habitat quality of the Impact area is seven (7), calculated using the method outlined in Section 6 and presented in Table 11 and Appendix B, informed by field validated information.
Total quantum of impact	63.76 ha	Adjusted impact area as per the OAG (70 % of the Impact area).
Offset calculator		
Time over which loss is averted	20 years	Duration of the risk mitigation actions to be taken, or 20 years, whichever is shorter.
Time until ecological benefit	10 years	This is the estimated time for habitat quality improvement outcomes of the offset to be realised. An estimate of 10 years has been used, based upon the timeframes of which the proposed management actions will provide benefit to the species. This captures both shorter-term and longer-term benefits likely to be realised through delivering the offset.
Risk of loss (%) without offset	5 %	Risk of loss generally represents the percentage chance that the habitat in the potential Offset land would be completely lost (no longer hold any value for the protected matter) over 20 years, as per the OAG. The RoL without the offset is conservatively predicted to be 5 %. This number is partially derived from a study ⁸⁵ that assessed the background rate of loss across all Local Government Areas, including the Central Highlands LGA, which provides a value of 0.06 %. In addition to the background rate of loss in the Central Highlands LGA, a number of other threatening processes are present within the potential Offset land; thus, increasing the RoL at this site, including:

⁸⁴ North Barker Ecosystem Services (2025)

⁸⁵ Maseyk *et al.* (2017)

OAG Field	Input	Justification
		<ul style="list-style-type: none"> The potential Offset lands are zoned as Rural under the Tasmanian Planning Scheme and are privately owned. This zoning provides no formal protection for threatened natural values, including eastern quoll habitat. Section 38 of the EPBC Act provides that forestry operations conducted in relation to land covered by the Tasmanian RFA (and not prohibited by the RFA) are exempt from the assessment and approval requirements of Part 3 of the EPBC Act (except for any forestry operations in World Heritage properties or Ramsar wetland sites). With this in mind, land clearing for forestry under this scenario would be exempt from assessment under the EPBC Act, thus placing any potential property at a high risk due to a lack of legislative protection. 38.07 % of the total quantum of land within the potential Offset land is within a PTR. These reserves are administered under the Tasmanian <i>Forest Practices Act 1985</i>, with clearance of forest managed through a FPP which is regulated by the FPA. While this mechanism provides protection against conversion of forest to agricultural land (and other conversions); it does not prevent against modification of habitat to Tasmanian devils. Natural and assisted regeneration may occur, but restoration to the original state will take several decades. A single FPP is current within one of the potential Offset land areas (GEW0583), which is issued to Rubmatsca Forestry Pty Ltd and is in effect until 31/12/2026, indicating an imminent threat to this area. A further 8 FPP's have been issued within the potential Offset land, with 1 having expired within the last 3 years. The remaining 7 expired more than 3 years ago. Within 5 km of the potential Offset land there are 125 FPPs (18 active, 11 expired within the last 3 years, and 96 expired more than 3 years ago). The volume of FPPs in the region provides an indication of the level of forestry activity in the St Patricks Plains region. Over recent years, there has been a level of concern from PFT regarding the number of PTR revocations, with anecdotal reports indicating that most common conversion post-revocation was to pasture/agricultural land (pers comm. Rob Smith – PFT). In the 2019-2024 period, approximately 18,012 ha of PTR were revoked across Tasmania, with high proportions of this land converted to pasture/agricultural land in recent times⁸⁶. The total area of PTRs revoked in the 2023-24 period is 1,845 ha, and the progressive total since 1988-89 is 93,060 ha⁸⁷. Activities that are unregulated and/or conducted illegally in the area include firewood and other resource collection, hunting, and general vandalism. Illegal firewood collection can have adverse effects on threatened species and their habitat, as well as increasing additional threats such as the presence of predators (such as dogs) and the increased risk of vehicle collisions. The most common hunting target species in Tasmania include fallow deer, wallaby, and duck, all of which require a hunting permit and firearms licence, as well as landowner permission. The most likely target species in the vicinity of the offset property are

⁸⁶ Private Forests Tasmania (2020); Private Forests Tasmania (2024)

⁸⁷ Private Forests Tasmania (2024); Forest Practices Authority (2024)

OAG Field	Input	Justification
		<p>wallabies and deer. Unregulated and illegal hunting may have similar impacts to that of firewood collection, such as the presence of predators and increase risk of vehicle collisions, as well as non-target mortality.</p> <p>Consistent with the approved DCCEEW advice, the measured background rate of loss, and the existing threatening processes in the potential Offset land, 5 % is considered an appropriate representation of RoL.</p>
Risk of loss (%) with Offset	0 %	<p>With the offset in place, the RoL is reduce to zero (0). The RoL with the offset has been predicted based on:</p> <ul style="list-style-type: none"> Protecting the Offset area through a legal mechanism (a conservation covenant under the Tasmanian NC Act) to prevent any further habitat modification / degradation for the duration of the offset; Establishment of an ongoing monitoring program; and Establishment of adaptive management strategies in an approved OAMP.
Confidence in result (%) – risk of loss	90 %	The high confidence reflects the very low RoL used, which is grounded in a detailed regional analysis and reflective of evidenced changes in the region.
Start quality	7	The habitat quality of the potential Offset land is seven (7), calculated using the method outlined in Section 6 and presented in Table 11 and Appendix B, informed by field validated information.
Future quality without offset	6 (-1)	<p>Without the offset, future habitat quality is predicted to decline by one-point. This decline is anticipated based on the continued degradation and proliferation of existing threats identified within the potential Offset land, including:</p> <ul style="list-style-type: none"> Habitat clearance through forest clearance; and Unregulated and illegal activities such as hunting (poaching) and wood hooking.
Future quality with offset	8 (+1)	Through the application of management activities, the future habitat quality is predicted to increase by one-point across the Offset area through the management actions described in Section 7.2.5.
Confidence in result (%) Change in Quality	70 %	<p>A high confidence in the habitat quality result is predicted, noting that detailed habitat quality surveys have been undertaken using a prescribed method and a modest score improvement is predicted. There is a high confidence in the management actions proposed as they:</p> <ul style="list-style-type: none"> Build on and improve existing habitat; Utilise well established measures; and Avoid approaches that carry higher risks of delivery.
Total quantum of land required to achieve offset	436 ha	Considering all variables within the OAG, the total quantum of land required to achieve 100 % of the offset for the eastern quoll is 436 hectares.
% of impact offset	100.12 %	The calculated values result in 100 % of the offset being obtained.

7.3. SPOTTED-TAIL QUOLL

7.3.1. Ecology

The spotted-tail quoll is a medium-sized carnivorous marsupial, dependent on forests and occupying a variety of habitats. Their habitat is characterised by high annual rainfall and predictable rain patterns, including rainforests, wet and dry sclerophyll forests, coastal heathlands, scrub and dunes, woodlands, swamp forests, mangroves, on beaches and sometimes in grassland or pastoral areas adjacent to forests. Prey density and den availability are key factors determining habitat use⁸⁸.

Spotted-tail quolls forage on farmland and pasture and may travel up to 20 km at night, sheltering in logs, rocks or thick vegetation. They hunt primarily on the ground, with some arboreal behaviour observed, feeding on mammals, birds, reptiles and invertebrates. Much of the species' arboreal mammalian prey relies on tree hollows and shelter for breeding. In Tasmania, predation on domestic poultry and scavenging on roadkill has also been reported. Typically solitary, spotted-tail quolls have an extensive home range, and use multiple dens, consisting of rock crevices, hollow logs, hollow tree buttresses, tree hollows, windrows, clumps of vegetation, caves, boulder tumbles, under buildings, and in the dens of rabbits and wombats. Females produce an annual litter of five young, although breeding may not occur in successive years⁸⁹.

The Tasmanian population of spotted-tail quolls has experienced declines, but the driver of these declines has not yet been quantified. Habitat loss and modification is widely accepted as the primary threat to spotted-tail quolls, with logging activities having removed 50% of their core range in Tasmania⁹⁰. Forestry practices remove or reduce prey or critical denning habitat (including trees with hollows, hollow logs and complex vegetation structure), thereby reducing the amount of suitable habitat. Habitat fragmentation further isolates populations that are already subject to inherent difficulties in locating breeding partners, since spotted-tail quolls naturally occur in low densities. Feral cats, dogs, and red foxes pose a threat to spotted-tail quolls through interspecific competition for prey items; however, fox competition (and predation) is not likely to be relevant for the Tasmanian subpopulation as there has been no recent credible fox sightings in Tasmania. Spotted-tail quolls are also subject to human interactions, via deliberate killing due to their predation on domestic poultry, and vehicle strikes⁹¹.

7.3.2. Presence in the potential Offset land

Spotted-tail quolls are known to occur within the region from records on the Natural Values Atlas (Natural Values Atlas data as at 02/04/2025), and presence in the adjacent Project area was confirmed during surveys. Observations of the spotted-tail quoll were limited to a road-killed individual on Highland Lakes Road, and a skull found in forest/plantation mosaic. Both were found between multiple potential Offset land areas, ~1.5–2.5 km to the east, west and south. It is possible the species is widespread across the potential Offset land, but available records suggest it likely only persists at very low densities in the region⁹².

7.3.3. Offset Suitability

The potential Offset land contains suitable habitat for the spotted-tail quoll, with selected areas supporting large patches of dry eucalypt woodland and forest within a mosaic of native grassland and sedgeland as well as pasture. These open forests and woodlands support high densities of prey to facilitate hunting, and the connectivity with other forest habitat in the regional landscape represents

⁸⁸ Department of Environment, Land, Water and Planning (2016)

⁸⁹ Department of Environment, Land, Water and Planning (2016)

⁹⁰ Jones & Rose (1996)

⁹¹ Department of Environment, Land, Water and Planning (2016)

⁹² North Barker Ecosystem Services (2023)

suitable dispersal habitat with no barriers to movement, supporting foraging and dispersal for the species. Numerous vehicle tracks are also present within the potential Offset land, providing effective dispersal corridors for spotted-tail quolls.

Suitable denning opportunities are present throughout the potential Offset land in the form of rock piles, fallen trees and burrows. During field surveys in the potential Offset land, 56 wombat burrows were identified as suitable for quolls, with an additional 58 identified within the adjacent Project area⁹³. The broader landscape supports patches of rocky habitat suitable for denning, as well as hollow logs within forested areas.

Denning stratification modelling shows that the potential Offset land supports large areas of potential denning habitat, with much of this qualifying as optimal (Figure 5, Figure 6). Systematic den searches and habitat suitability modelling were not undertaken in potential Offset lands outside of the Project area, and suitability has been extrapolated from modelling and survey results in adjacent properties. The two properties (Forest Marsh and ██████████) that were not previously included in modelling consist predominantly of dry eucalypt forest and woodland (optimal), with areas of adjacent native grassland with shrub cover (optimal) and exposed native grassland and sedgeland (suboptimal). Due to the proximity and similarity to surveyed areas, additional suitable denning opportunities are likely to be present throughout.

7.3.4. Threats within the potential Offset land

Current land use of potential Offset land presents ongoing disturbance to spotted-tail quolls. Existing threats within the potential Offset land includes the following:

- Habitat clearance, including:
 - 38.07 % of the total quantum of land within the potential Offset land is within a PTR. These reserves are administered under the Tasmanian *Forest Practices Act 1985*, with clearance of forest managed through a FPP which is regulated by the FPA. A single FPP is current within one of the potential Offset land areas (GEW0583), which is issued to Rubmatsca Forestry Pty Ltd and is in effect until 31/12/2026, indicating an imminent threat to this area.
 - Clearance and conversion to hardwood monoculture can result in permanent loss of both denning and foraging habitat⁹⁴.
 - Illegal (and legal) firewood collection (often referred to as 'wood-hooking') is a recognized problem in Tasmania⁹⁵. This activity can have adverse effects on threatened species and their habitat, as well as increasing additional threats such as the presence of predators (such as dogs) and the increased risk of vehicle collisions.
- Stock grazing –Grazing animals compete with native herbivores, a primary prey source for spotted-tail quolls. Grazing predominantly occurs in non-forest areas, however this forms part of the foraging and dispersal range for this species.
- Unregulated and illegal hunting (poaching) may have similar impacts to that of firewood collection, such as the presence of predators and the increase in the risk of vehicle collisions, as well as non-target mortality.
- Vehicle strike – particularly where potential Offset lands are immediately adjacent to Highland Lakes Road. This road has a speed limit of 100 km/h and presents a high level of threat to spotted-tail quolls as they may be struck either while dispersing across the area; or while feeding on carcasses that are left on the road.

⁹³ North Barker Ecosystem Services (2023)

⁹⁴ Jones *et al.* (2023)

⁹⁵ Abdu *et al.* (2022)

- Feral cats in Tasmania both compete for resources with, and directly predate upon quolls⁹⁶, particularly where devil populations are low. Studies in disease affected populations of Tasmanian devils show that devil declines influence both abundance of feral cats⁹⁷, as well as feral cat activity times, with cats being more active at night when devil populations are low⁹⁸. Maintenance of healthy devil populations, or management of feral cats is therefore likely to reduce negative interactions between native carnivores and feral cats⁹⁹.

7.3.5. Management actions

The primary threats to the spotted-tail quoll are habitat loss and modification and climate change¹⁰⁰. The land-based offset is unlikely to be able to meaningfully contribute to a reduction of the risk of climate change. However, the offset will protect and enhance habitat for this species, therefore targeting a key threat. As the impact relates to habitat loss, the offset will primarily focus on habitat function and condition. Other threats include vehicle strike, culling or poisoning, and competition from introduced predators. The below management actions proposed in the Offset area are anticipated to improve overall habitat condition for the Spotted tail-quoll:

Formal protection: the Offset area will be formally protected and deleterious activities within the Offset area will be strictly prohibited. This will retain areas of natural vegetation, to ensure adequate habitat and refuge for the species.

Vehicle control: Speed limits and vehicle exclusion areas will be established in the Offset area, to reduce the risk of vehicle strikes as part of offset management. This will reduce the availability of carcasses known to attract spotted-tail quolls, thereby reducing risk of vehicle-related mortality to the spotted-tail quoll. Prohibiting night-driving will help to prevent direct mortality since quolls are most active at night.

Poaching/culling: Unregulated poaching, culling, and persecution of native wildlife will be strictly prohibited in the Offset area, enforced through signage and ongoing monitoring. Any animal (native and non-native) control will include strict limitations and requirements for control methods to avoid any non-target poisoning of spotted-tail quolls (which may occur through lead shot poisoning, or through baiting). This will reduce human-induced mortality.

Feral animal control: Annual monitoring and control (if required as an outcome of monitoring activities) of feral animals (ie fallow deer, feral cats, wild dogs) and native browsers (ie wallabies, possums etc.) will be undertaken within the Offset area. This will reduce any competition by introduced predators such as cats, reduce predation by alpha predators (such as wild dogs), and decrease the risk of vehicle strike in the region due to reduced opportunity for vehicle collision with native browsers and introduced species which spotted-tail quolls may opportunistically forage on.

Feral animal control effort may be higher in the summer when feral cats are most active, thereby enhancing the protection afforded to juvenile quolls who are also more active during this time. Targeted control of feral cats may also reduce the incidence of *Toxoplasma gondii* infections in eastern quolls, thereby minimising the risk of disease spread¹⁰¹.

Weed control: Active control of invasive weeds will be undertaken throughout the life of the offset. Weed management will improve the overall habitat quality condition of the Offset area.

Active control of invasive weeds will be undertaken throughout the life of the offset. Weed management will improve the overall habitat quality condition of the Offset area. Although this measure may not

⁹⁶ Glen & Dickman (2008); Fancourt *et al.* (2015); Cunningham *et al.* (2022)

⁹⁷ Cunningham *et al.* (2020)

⁹⁸ Fancourt *et al.* (2015)

⁹⁹ Cunningham *et al.* (2020); Department of the Environment (2015)

¹⁰⁰ Department of Environment, Land, Water and Planning (2016)

¹⁰¹ Department of Climate Change, Energy, the Environment and Water (2024)

directly affect spotted-tail quolls, weed control and vegetation improvement may help promote healthy populations of prey items such as small mammals, reptiles, and invertebrates, thereby indirectly benefiting the spotted-tail quoll.

Fire management: Fire restrictions and a controlled burn program will be implemented in the Offset area. Inappropriate fire regimes have potential to reduce site condition through destruction of den sites and displace or increase the risk of mortality or injury to breeding females and their denning young, as well as reducing the availability of prey items such as small mammals, reptiles, and invertebrates.

Management of habitat through controlled burning assists in maintaining structural complexity, while also minimising the risk of catastrophic wildfires that may impact individuals and degrade habitat quality.

7.3.6. Habitat quality

Habitat quality scores have been informed by detailed field surveys of both the impact and potential Offset land. The Impact area score for the spotted-tail quoll is 6 out of 10 and the start score of the potential Offset land is 7 out of 10. The habitat quality method is provided in Section 6 and the species-specific metrics are provided in Appendix A. Detailed habitat quality scoring is provided in Appendix B.

7.3.7. OAG Calculations

The total quantum or area of offset required for the spotted-tail quoll has been assessed using the OAG. The calculation of the Offset area, achieving 100 % of the required offset with supporting information for the development of each OAG input is provided in Table 16.

Table 16: Spotted-tail quoll OAG calculations

OAG Field	Input	Justification
MNES		
Name	Spotted-tail quoll	
EPBC Act Status	Vulnerable	
Annual probability of extinction	0.2 %	Calculated by OAG.
Impact calculator		
Impact area	91.08 ha	The final area of SRI has been determined as the total of all optimal and suboptimal habitat within the permanent impact footprint (102.79 ha) as detailed in the SIA ¹⁰² , minus the entire quantum of modified land (11.71 ha).
Impact quality	6	The habitat quality of the Impact area is six (6), calculated using the method outlined in Section 6 and presented in Table 11 and Appendix B, informed by field validated information.
Total quantum of impact	54.65 ha	Adjusted impact area as per the OAG (60 % of the Impact area).
Offset calculator		
Time over which loss is averted	20 years	Duration of the risk mitigation actions to be taken, or 20 years, whichever is shorter.
Time until ecological benefit	10 years	This is the estimated time for habitat quality improvement outcomes of the offset to be realised. An estimate of 10 years has been used, based upon the timeframes of which the proposed management actions will provide benefit to the species. This captures both shorter-term and longer-term benefits likely to be realised through delivering the offset.
Risk of loss (%) without offset	5 %	Risk of loss generally represents the percentage chance that the habitat in the potential Offset land would be completely lost (no longer hold any value for the protected matter) over 20 years, as per the OAG. The RoL without the offset is conservatively predicted to be 5 %. This number is partially derived from a study ¹⁰³ that assessed the background rate of loss across all Local Government Areas, including the Central Highlands LGA, which provides a value of 0.06 %. In addition to the background rate of loss in the Central Highlands LGA, a number of other threatening processes are present within the potential Offset land; thus, increasing the RoL at this site, including:

¹⁰² North Barker Ecosystem Services (2025)

¹⁰³ Maseyk *et al.* (2017)

OAG Field	Input	Justification
		<ul style="list-style-type: none"> The potential Offset lands are zoned as Rural under the Tasmanian Planning Scheme and are privately owned. This zoning provides no formal protection for threatened natural values, including eastern quoll habitat. Section 38 of the EPBC Act provides that forestry operations conducted in relation to land covered by the Tasmanian RFA (and not prohibited by the RFA) are exempt from the assessment and approval requirements of Part 3 of the EPBC Act (except for any forestry operations in World Heritage properties or Ramsar wetland sites). With this in mind, land clearing for forestry under this scenario would be exempt from assessment under the EPBC Act, thus placing any potential property at a high risk due to a lack of legislative protection. 38.07 % of the total quantum of land within the potential Offset land is within a PTR. These reserves are administered under the Tasmanian <i>Forest Practices Act 1985</i>, with clearance of forest managed through a FPP which is regulated by the FPA. While this mechanism provides protection against conversion of forest to agricultural land (and other conversions); it does not prevent against modification of habitat to Tasmanian devils. Natural and assisted regeneration may occur, but restoration to the original state will take several decades. <p>A single FPP is current within one of the potential Offset land areas (GEW0583), which is issued to Rubmatsca Forestry Pty Ltd and is in effect until 31/12/2026, indicating an imminent threat to this area. A further 8 FPP's have been issued within the potential Offset land, with 1 having expired within the last 3 years. The remaining 7 expired more than 3 years ago. Within 5 km of the potential Offset land there are 125 FPPs (18 active, 11 expired within the last 3 years, and 96 expired more than 3 years ago). The volume of FPPs in the region provides an indication of the level of forestry activity in the St Patricks Plains region.</p> <p>Over recent years, there has been a level of concern from PFT regarding the number of PTR revocations, with anecdotal reports indicating that most common conversion post-revocation was to pasture/agricultural land (pers comm. Rob Smith – PFT). In the 2019-2024 period, approximately 18,012 ha of PTR were revoked across Tasmania, with high proportions of this land converted to pasture/agricultural land in recent times¹⁰⁴. The total area of PTRs revoked in the 2023-24 period is 1,845 ha, and the progressive total since 1988-89 is 93,060 ha¹⁰⁵.</p> <ul style="list-style-type: none"> Activities that are unregulated and/or conducted illegally in the area include firewood and other resource collection, hunting, and general vandalism. These activities are considered a threat to the efficacy of the offset. <p>Illegal firewood collection can have adverse effects on threatened species and their habitat, as well as increasing additional threats such as the presence of predators (such as dogs) and the increased risk of vehicle collisions.</p> <p>The most common hunting target species in Tasmania include fallow deer, wallaby, and duck, all of which require a hunting permit and firearms licence, as well as landowner permission. The most likely target species in the vicinity of the offset property are</p>

¹⁰⁴ Private Forests Tasmania (2020); Private Forests Tasmania (2024)

¹⁰⁵ Private Forests Tasmania (2024); Forest Practices Authority (2024)

OAG Field	Input	Justification
		<p>wallabies and deer. Unregulated and illegal hunting may have similar impacts to that of firewood collection, such as the presence of predators and increase risk of vehicle collisions, as well as non-target mortality.</p> <p>Consistent with the approved DCCEEW advice, the measured background rate of loss, and the existing threatening processes in the potential Offset land, 5 % is considered an appropriate representation of RoL.</p>
Risk of loss (%) with Offset	0 %	<p>With the offset in place, the RoL is reduce to zero (0). The RoL with the offset has been predicted based on:</p> <ul style="list-style-type: none"> Protecting the Offset area through a legal mechanism (a conservation covenant under the Tasmanian NC Act) to prevent any further habitat modification / degradation; Establishment of an ongoing monitoring program; and Establishment of adaptive management strategies in an approved OAMP.
Confidence in result (%) – risk of loss	90 %	The high confidence reflects the very low RoL used, which is grounded in a detailed regional analysis and reflective of evidenced changes in the region.
Start quality	7	The habitat quality of the potential Offset land is seven (7), calculated using the method outlined in Section 6 and presented in Table 11 and Appendix B, informed by field validated information.
Future quality without offset	6 (-1)	<p>Without the offset, future habitat quality is predicted to decline by one-point. This decline is anticipated based on the continued degradation and proliferation of existing threats identified within the potential Offset land, including:</p> <ul style="list-style-type: none"> Habitat clearance through forest clearance; and Unregulated and illegal activities such as hunting (poaching) and wood hooking.
Future quality with offset	8 (+1)	Through the application of management activities, the future habitat quality is predicted to increase by one-point across the Offset area through the management actions described in Section 7.3.5.
Confidence in result (%) Change in Quality	70 %	<p>A high confidence in the habitat quality result is predicted, noting that detailed habitat quality surveys have been undertaken using a prescribed method and a modest score improvement is predicted. There is a high confidence in the management actions proposed as they:</p> <ul style="list-style-type: none"> Build on and improve existing habitat; Utilise well established measures; and Avoid approaches that carry higher risks of delivery.
Total quantum of land required to achieve offset	332 ha	Considering all variables within the OAG, the total quantum of land required to achieve 100 % of the offset for the spotted-tail quoll is 332 hectares.
% of impact offset	100.22 %	The calculated values result in 100 % of the offset being obtained.

7.4. TASMANIAN MASKED OWL

7.4.1. Ecology

The Tasmanian masked owl is endemic to Tasmania and inhabits forests, woodlands, and agricultural and forest mosaics. Forests with open understoreys adjoining open or cleared land are favoured¹⁰⁶. The species has large home ranges of >1,000 ha, particularly in highly modified landscapes. The Tasmanian masked owl is a nocturnal predator and primarily feeds on introduced rodents and rabbits on agricultural land, marsupials, mammals and birds in less disturbed habitats. The species nests in large tree hollows of dead or living trees and is known to roost in dense foliage, tree hollows, caves or rock crevices. Breeding is highly seasonal, with females typically laying two to four eggs in mid-October to early November¹⁰⁷.

Several threats to the species have been identified. Habitat clearing and fragmentation (from agriculture, forestry and residential development) has resulted in loss of nesting habitat and degradation of foraging habitat. Nesting habitats are also reduced by rural tree diebacks; the continuing loss of nesting habitats results in increasing competition for large tree hollows between the Tasmanian masked owl and other hollow-dependent species. Their association with forest and woodland edges, and modified landscapes such as paddocks results in this species being susceptible to collisions with vehicles and artificial structures like powerlines. Additionally, Tasmanian masked owls are vulnerable to secondary poisoning by preying on animals that may have consumed rodenticides or other pest control poisons¹⁰⁸.

7.4.2. Presence in the potential Offset land

Available published records show that the Tasmanian masked owl has not been recorded in the potential Offset land or Project area since 1981 (Natural Values Atlas as of 2/04/2025) and was not detected on site during targeted call-back surveys and passive acoustic monitoring undertaken in 2020 (Table 9). However, the species was recorded during surveys within 5 km of the Project area, with several recordings on acoustic monitoring devices and positive field identifications around the Lagoon of Islands¹⁰⁹.

NBES determined that the species may be present at low densities across the region, although it is likely that only a few pairs of birds occur within 5 km of the Project area, considering the large home range of the species (>1,000 ha) and the amount of suboptimal or non-core habitat in the area¹¹⁰. No targeted surveys have been conducted for the species in the potential Offset land, but due to the proximity and habitat continuity between verified potential nesting habitat, presence within the potential Offset land is expected to be consistent with predicted presence in the Impact area and the wider region.

7.4.3. Offset Suitability

The potential Offset land contains suitable habitat for the Tasmanian masked owl, with selected areas supporting large patches of mature dry eucalypt woodland and forest (Figure 7, Figure 8). Patches of mature forest are highly connected to surrounding mature forest, and are located within a heterogeneous landscape of forest, grassland and agricultural land that supports high densities of prey species.

Suitable nesting opportunities are likely abundant throughout the potential Offset land. Areas of mature *Eucalyptus dalrympleana*, *Eucalyptus delegatensis* and *Eucalyptus pauciflora* forest (TASVEG DDP/DDE/DPD) contain large mature trees with potential to contain large hollows suitable for

¹⁰⁶ Department of the Environment, Water, Heritage and the Arts (2010)

¹⁰⁷ Department of the Environment, Water, Heritage and the Arts (2010); Threatened Species Scientific Committee (2010)

¹⁰⁸ Department of the Environment, Water, Heritage and the Arts (2010); Threatened Species Scientific Committee (2010)

¹⁰⁹ North Barker Ecosystem Services (2024)

¹¹⁰ North Barker Ecosystem Services (2024); North Barker Ecosystem Services (2025)

Tasmanian masked owls¹¹¹. The FPA mature habitat availability mapping¹¹² was used to predict the likelihood of hollow-bearing trees in the potential Offset land, with a number of areas identified as high and medium mature habitat availability. Ground surveys of adjacent habitat in the Project area verified that similar patches of high and medium forest maturity contained large mature *Eucalyptus* trees >100 cm DBH, and approximately 10-20 % of these mature trees contained hollows with entrances large enough for roosting masked owls¹¹³. Large hollow bearing trees were also identified throughout habitat mapped as low maturity, and the inclusion of less mature forest in the potential Offset land will allow for future increase of available habitat with forest maturation.

7.4.4. Threats within the potential Offset land

Current land use of potential Offset land presents ongoing disturbance to the Tasmanian masked owl. Existing threats within the potential Offset land includes the following:

- Habitat clearance, including:
 - 38.07 % of the total quantum of land within the potential Offset land is within a PTR. These reserves are administered under the Tasmanian *Forest Practices Act 1985*, with clearance of forest managed through a FPP which is regulated by the FPA. A single FPP is current within one of the potential Offset land areas (GEW0583), which is issued to Rubmatsca Forestry Pty Ltd and is in effect until 31/12/2026, indicating an imminent threat to this area.
 - Ongoing selective logging primarily removes mature trees, which can reduce canopy cover, patch sizes, and prevent recruitment of future nesting trees, reducing suitability for Tasmanian masked owls. Clearance within nearby low maturity forests or conversion to silviculture may also reduce breeding success through direct disturbance, decreasing suitability of nesting trees through isolation or exposure, or by increasing competition from other hollow dependent species¹¹⁴.
 - Illegal (and legal) firewood collection (often referred to as 'wood-hooking') is a recognized problem in Tasmania¹¹⁵. This activity can have adverse effects on threatened species and their habitat, as well as increasing additional threats such as the presence of predators (such as dogs) and the increased risk of vehicle collisions.
- Vehicle strike – particularly where potential Offset lands are immediately adjacent to Highland Lakes Road. This road has a speed limit of 100 km/h and presents a high level of threat to masked owls as they may be struck either while dispersing across the area; or while feeding on carcasses that are left on the road.

7.4.5. Management actions

The primary threats to the Tasmanian masked owl are habitat clearing and loss of nesting habitat. The land-based offset will include controls to directly target these two key threats. As the impact relates to habitat clearing, the offset will primarily focus on habitat function and condition.

Offsets will also consider the value of reservation of adjacent low maturity forest to preserve habitat values within mature forest patches. Management of the Offset area for Tasmanian masked owls will mitigate direct impacts of removal of potential nesting trees, and minimise disturbance caused by nearby forestry and agricultural operations.

The below management actions proposed in the Offset area are anticipated to improve overall habitat condition for the Tasmanian masked owl:

¹¹¹ Forest Practices Authority (2014a)

¹¹² Forest Practices Authority (2016)

¹¹³ North Barker Ecosystem Services (2025)

¹¹⁴ Department of the Environment, Water, Heritage and the Arts (2010)

¹¹⁵ Abdu *et al.* (2022)

Formal protection: The Offset area will be formally protected and unregulated clearing within the Offset area will be strictly prohibited. This will prevent any commercial logging activities and retain areas of natural vegetation to ensure potential nesting trees and adequate foraging habitat for the Tasmanian masked owl and its prey remain present in the landscape.

Periodic monitoring: A periodic monitoring program to ascertain presence/absence of the Tasmanian masked owl in the Offset area. This will inform timing of other management actions in the event of confirmed presence of nesting owls.

Vehicle control: Speed limits and vehicle exclusion areas will be established in the Offset area, to reduce the risk of vehicle strikes as part of offset management. This will reduce the availability of carcasses which may attract Tasmanian masked owls, thereby reducing risk of vehicle-related mortality. Prohibiting night-driving will help to prevent direct mortality since Tasmanian masked owls are almost exclusively active at night.

Animal control (feral and native): Annual monitoring and control (if required as an outcome of monitoring activities) of feral animals (ie fallow deer, feral cats, wild dogs) and native browsers (ie wallabies, possums etc.) will be undertaken within the Offset area. This will reduce any competition for food resources by introduced predators such as cats and decrease the risk of vehicle strike in the region due to reduced opportunity for vehicle collision with native browsers and introduced species which Tasmanian masked owls may opportunistically forage on.

Any feral animal control will include strict limitations and requirements for control methods to avoid any non-target poisoning of Tasmanian masked owls, as well as limitations on the timing of control measures in the event that Tasmanian masked owls are detected on site to reduce the risk of breeding failure and nest disturbance.

Weed control: Active control of invasive weeds will be undertaken throughout the life of the offset. Weed management will improve the overall habitat quality condition of the Offset area.

Active control of invasive weeds will be undertaken throughout the life of the offset. Weed management will improve the overall habitat quality condition of the Offset area. Although this measure may not directly benefit Tasmanian masked owls, weed control and vegetation improvement may help promote healthy populations of prey such as small mammals (including rabbits and rodents), and birds, thereby indirectly benefiting the Tasmanian masked owl.

Fire management: Fire restrictions and a controlled burn program will be implemented in the Offset area. Inappropriate fire regimes can reduce the habitat complexity and condition and remove or damage critical nesting habitats.

Management of habitat through controlled burning assists in maintaining foraging habitat, while also minimising the risk of catastrophic wildfires that may impact individuals and degrade or destroy habitat quality.

7.4.6. Habitat quality

Habitat quality scores have been informed by detailed field surveys of both the impact and potential Offset land. The Impact area score for the Tasmanian masked owl is 6 out of 10 and the start score of the potential Offset land is 7 out of 10. The habitat quality method is provided in Section 6 and the species-specific metrics are provided in Appendix A. Detailed habitat quality scoring is provided in Appendix B.

7.4.7. OAG Calculations

The total quantum or area of offset required for the Tasmanian masked owl has been assessed using the OAG. The calculation of the Offset area, achieving 100 % of the required offset with supporting information for the development of each OAG input is provided in Table 17.

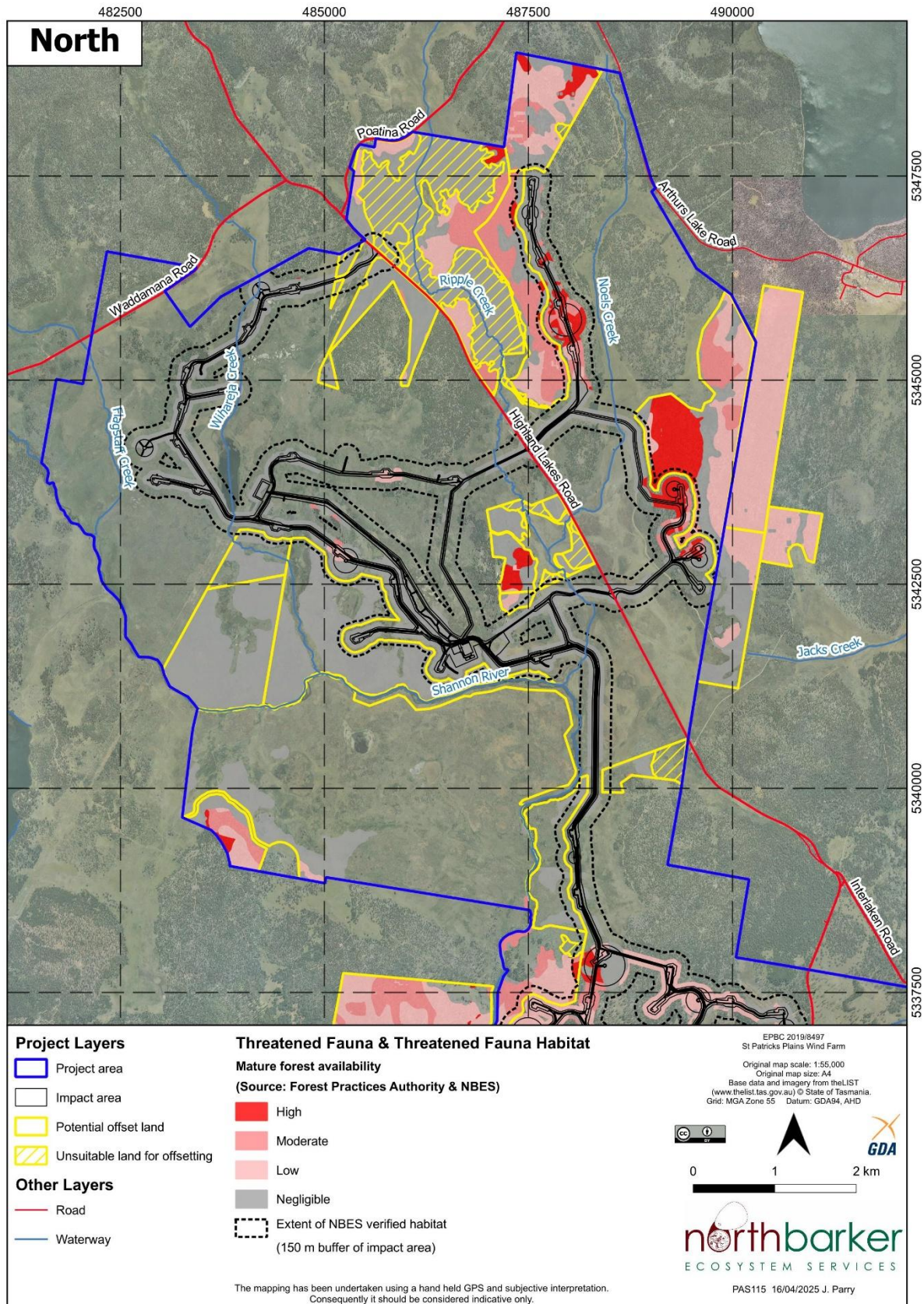


Figure 7: Mature forest availability (potential Tasmanian masked owl nesting habitat) in the northern potential Offset land area

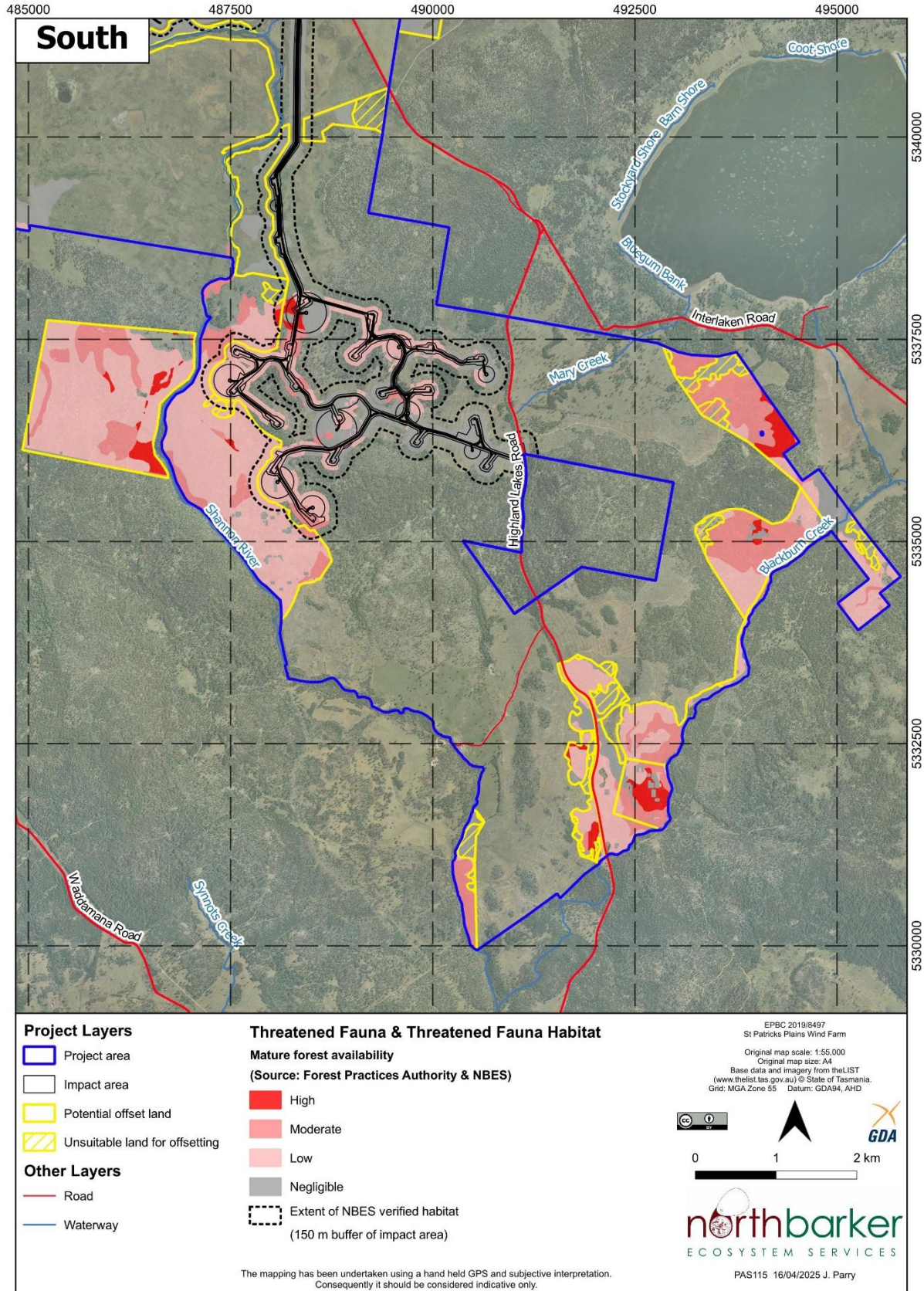


Figure 8: Mature forest availability (potential Tasmanian masked owl nesting habitat) in the southern potential Offset land area

Table 17: Tasmanian masked owl OAG calculations

OAG Field	Input	Justification
MNES		
Name	Tasmanian masked owl	
EPBC Act Status	Vulnerable	
Annual probability of extinction	0.2 %	Calculated by OAG.
Impact calculator		
Impact area	46.89 ha	The final area of SRI has been determined as the total of all high and moderate maturity forest within the permanent and temporary impact footprints as detailed in the SIA ¹¹⁶ .
Impact quality	6	The habitat quality of the Impact area is six (6), calculated using the method outlined in Section 6 and presented in Table 11 and Appendix B, informed by field validated information.
Total quantum of impact	28.13 ha	Adjusted impact area as per the OAG (60 % of the Impact area).
Offset calculator		
Time over which loss is averted	20 years	Duration of the risk mitigation actions to be taken, or 20 years, whichever is shorter.
Time until ecological benefit	20 years	This is the estimated time for habitat quality improvement outcomes of the offset to be realised. An estimate of 20 years has been used, based upon the timeframes of which the proposed management actions will provide benefit to the species. This captures both shorter-term and longer-term benefits likely to be realised through delivering the offset.
Risk of loss (%) without offset	5 %	Risk of loss generally represents the percentage chance that the habitat in the potential Offset land would be completely lost (no longer hold any value for the protected matter) over 20 years, as per the OAG. The RoL without the offset is conservatively predicted to be 5 %. This number is partially derived from a study ¹¹⁷ that assessed the background rate of loss across all Local Government Areas, including the Central Highlands LGA, which provides a value of 0.06 %. In addition to the background rate of loss in the Central Highlands LGA, a number of other threatening processes are present within the potential Offset land; thus, increasing the RoL at this site, including:

¹¹⁶ North Barker Ecosystem Services (2025)

¹¹⁷ Maseyk *et al.* (2017)

OAG Field	Input	Justification
		<ul style="list-style-type: none"> The potential Offset lands are zoned as Rural under the Tasmanian Planning Scheme and are privately owned. This zoning provides no formal protection for threatened natural values, including eastern quoll habitat. Section 38 of the EPBC Act provides that forestry operations conducted in relation to land covered by the Tasmanian RFA (and not prohibited by the RFA) are exempt from the assessment and approval requirements of Part 3 of the EPBC Act (except for any forestry operations in World Heritage properties or Ramsar wetland sites). With this in mind, land clearing for forestry under this scenario would be exempt from assessment under the EPBC Act, thus placing any potential property at a high risk due to a lack of legislative protection. 38.07 % of the total quantum of land within the potential Offset land is within a PTR. These reserves are administered under the Tasmanian <i>Forest Practices Act 1985</i>, with clearance of forest managed through a FPP which is regulated by the FPA. While this mechanism provides protection against conversion of forest to agricultural land (and other conversions); it does not prevent against modification of habitat to Tasmanian devils. Natural and assisted regeneration may occur, but restoration to the original state will take several decades. <p>A single FPP is current within one of the potential Offset land areas (GEW0583), which is issued to Rubmatsca Forestry Pty Ltd and is in effect until 31/12/2026, indicating an imminent threat to this area. A further 8 FPP's have been issued within the potential Offset land, with 1 having expired within the last 3 years. The remaining 7 expired more than 3 years ago. Within 5 km of the potential Offset land there are 125 FPPs (18 active, 11 expired within the last 3 years, and 96 expired more than 3 years ago). The volume of FPPs in the region provides an indication of the level of forestry activity in the St Patricks Plains region.</p> <p>Over recent years, there has been a level of concern from PFT regarding the number of PTR revocations, with anecdotal reports indicating that most common conversion post-revocation was to pasture/agricultural land (pers comm. Rob Smith – PFT). In the 2019-2024 period, approximately 18,012 ha of PTR were revoked across Tasmania, with high proportions of this land converted to pasture/agricultural land in recent times¹¹⁸. The total area of PTRs revoked in the 2023-24 period is 1,845 ha, and the progressive total since 1988-89 is 93,060 ha¹¹⁹.</p> <p>Activities that are unregulated and/or conducted illegally in the area include firewood and other resource collection, hunting, and general vandalism. These activities are considered a threat to the efficacy of the offset and may lead to direct and indirect impacts on Tasmanian masked owls. Novel disturbances such as hunting and logging may lead to breeding failure and nest abandonment. Illegal firewood collection can have adverse effects on threatened species and their habitat, as well as increasing additional threats such as the presence of predators (such as dogs) and the increased risk of vehicle collisions.</p> <p>The most common hunting target species in Tasmania include fallow deer, wallaby, and duck, all of which require a hunting permit and firearms licence, as well as landowner permission. The most likely target species in the vicinity of the offset property are</p>

¹¹⁸ Private Forests Tasmania (2020); Private Forests Tasmania (2024)

¹¹⁹ Private Forests Tasmania (2024); Forest Practices Authority (2024)

OAG Field	Input	Justification
		<p>wallabies and deer. Unregulated and illegal hunting may have similar impacts to that of firewood collection, such as the presence of predators and increase risk of vehicle collisions, as well as non-target mortality.</p> <p>Consistent with the approved DCCEEW advice, the measured background rate of loss, and the existing threatening processes in the potential Offset land, 5 % is considered an appropriate representation of RoL.</p>
Risk of loss (%) with Offset	0 %	<p>With the offset in place, the RoL is reduce to zero (0). The RoL with the offset has been predicted based on:</p> <ul style="list-style-type: none"> Protecting the Offset area through a legal mechanism (a conservation covenant under the Tasmanian NC Act) to prevent any further habitat modification / degradation; Establishment of an ongoing monitoring program; and Establishment of adaptive management strategies in an approved OAMP.
Confidence in result (%) – risk of loss	90 %	The high confidence reflects the very low RoL used, which is grounded in a detailed regional analysis and reflective of evidenced changes in the region.
Start quality	7	The habitat quality of the potential Offset land is seven (7), calculated using the method outlined in Section 6 and presented in Table 11 and Appendix B, informed by field validated information.
Future quality without offset	6 (-1)	<p>Without the offset, future habitat quality is predicted to decline by one-point. This decline is anticipated based on the continued degradation and proliferation of existing threats identified within the potential Offset land, including:</p> <ul style="list-style-type: none"> Habitat clearance through forest clearance; and Unregulated and illegal activities such as wood hooking.
Future quality with offset	8 (+1)	Through the application of management activities, the future habitat quality is predicted to increase by one-point across the Offset area through the management actions described in Section 7.4.5.
Confidence in result (%) Change in Quality	70 %	<p>A high confidence in the habitat quality result is predicted, noting that detailed habitat quality surveys have been undertaken using a prescribed method and a modest score improvement is predicted. There is a high confidence in the management actions proposed as they:</p> <ul style="list-style-type: none"> Build on and improve existing habitat; Utilise well established measures; and Avoid approaches that carry higher risks of delivery.
Total quantum of land required to achieve offset	174 ha	Considering all variables within the OAG, the total quantum of land required to achieve 100 % of the offset for the Tasmanian masked owl is 174 hectares.
% of impact offset	100.43 %	The calculated values result in 100 % of the offset being obtained.

7.5. TASMANIAN WEDGE-TAILED EAGLE

7.5.1. Ecology

The Tasmanian wedge-tailed eagle is endemic to Tasmania and nearby islands where it occurs in coastal, lowland and highland regions. The species inhabits a wide range of habitats including dry sclerophyll forest, temperate rainforest, sub-alpine forest, dry woodland, heathland, wetlands, grassland and farmland¹²⁰. Their distribution is naturally fragmented, since they occupy large home ranges and widely dispersed territories. Habitat usage is subject to seasonal variation, and juveniles disperse widely. Tasmanian wedge-tailed eagles forage during the day in open areas, feeding on live prey and carrion, mainly on rabbits and hares, but also consuming reptiles, birds and mammals. Typically, prey is attacked on the ground. Carrion forms a considerable part of the diet, particularly in juveniles lacking hunting experience¹²¹.

Breeding typically occurs in late winter to summer and is restricted to old-growth native forests dominated by *Eucalyptus* species with closed canopies. Tasmanian wedge-tailed eagles breed in solitary, monogamous pairs. Adult birds remain resident in their territories, re-using a favoured nest site until breeding fails. Nesting sites are used over long-term periods and have been known to be used for over 50 years¹²².

7.5.2. Presence in the potential Offset land

Aerial nest surveys between 2019 – 2024 and records from the Natural Values Atlas database show there are currently six confirmed nests present within the Project area and numerous additional nests within 1 km of the Project site (Natural Values Atlas as of 2/04/2025). Of these, three are present (although one of these was not relocated in 2024 surveys) within potential Offset land and another 8 are directly bordering Offset properties (<200 m) (Figure 9, Figure 10). Due to the density of nests, it is not expected that these will all be active in any given year, although it demonstrates the continued use of the area by multiple breeding pairs with verified breeding activity both within and directly adjacent to proposed Offset sites.

7.5.3. Offset Suitability

Confirmed presence of nests in two potential Offset land areas demonstrates that these properties contain suitable breeding habitat for wedge-tailed eagles (Figure 9, Figure 10), and the FPA wedge-tailed eagle nesting habitat model predicts there are additional areas of high-quality nesting habitat within the wider potential Offset land¹²³. These properties contain patches of mature *Eucalyptus dalrympleana* and *Eucalyptus pauciflora* forest (TASVEG DDP/DPD), are highly connected to surrounding mature forest, and are located within a suitable heterogeneous landscape of forest, grassland and agricultural land¹²⁴. Protection of known nests is a high priority for this Offset. Properties bordering known nests have also been considered within this OS as nest success may be influenced by changes to nearby land use.

7.5.4. Threats within the potential Offset land

Threats to this species have been primarily identified as loss of nesting habitat, disturbance of nesting birds and persecution by humans. Land clearing for agriculture, forestry and housing has removed suitable nesting sites or have left nest-trees too isolated and exposed for Tasmanian wedge-tailed eagles to reoccupy these remnant habitats. Breeding success has likely declined due to increased disturbance of nesting pairs, with breeding pairs abandoning nests when exposed to disturbance

¹²⁰ Threatened Species Section (2023)

¹²¹ Threatened Species Section (2023)

¹²² Threatened Species Section (2023)

¹²³ Forest Practices Authority (2014b)

¹²⁴ Forest Practices Authority (2013)

associated with logging activities, roadworks, and the development of rural and residential areas¹²⁵. Human-wildlife conflict is an additional threat to the Tasmanian wedge-tailed eagle, with culling programs implemented due to the incorrect belief that this species predated on domestic livestock¹²⁶. Other threats to the species include non-target and secondary poisoning from consuming animals exposed to harmful pest control measures, and vehicle strikes when feeding on roadkill. Additionally, the risk of collisions with overhead wires, fences, and wind turbines, and electrocution will likely increase with continuing development¹²⁷.

Current land use of potential Offset land presents ongoing disturbance to the Tasmanian wedge-tailed eagle. Existing threats within the potential Offset land includes the following:

- Habitat clearance, including:
 - 38.07 % of the total quantum of land within the potential Offset land is within a PTR. These reserves are administered under the Tasmanian *Forest Practices Act 1985*, with clearance of forest managed through a FPP which is regulated by the FPA. A single FPP is current within one of the potential Offset land areas (GEW0583), which is issued to Rubmatsca Forestry Pty Ltd and is in effect until 31/12/2026, indicating an imminent threat to this area.
 - Ongoing selective logging primarily removes mature trees, which can reduce canopy cover, patch sizes, and prevent recruitment of future nesting trees, reducing suitability for Tasmanian wedge-tailed eagles¹²⁸.
 - Illegal (and legal) firewood collection (often referred to as 'wood-hooking') is a recognized problem in Tasmania¹²⁹. This activity can have adverse effects on threatened species and their habitat, as well as increasing additional threats such as the presence of predators (such as dogs) and the increased risk of vehicle collisions.
- Clearance of adjacent forest or conversion to silviculture may also reduce breeding success through direct disturbance or by decreasing suitability of nests by isolating patches or exposing nests. Creating buffer zones in potential Offset land adjacent to reserved nests and high-quality nesting habitat will preserve the suitability of these existing reserves.
- Hunting (deer and native species) may pose risks to wedge-tailed eagles through secondary lead poisoning.

7.5.5. Management actions

The primary threats to the Tasmanian wedge-tailed eagle are persecution, secondary poisoning and habitat clearing. The land-based offset will include direct measures to reduction these key threats in the Offset area. As the impact relates to habitat loss, the offset will primarily focus on habitat function and condition. Management of the Offset area for Tasmanian wedge-tailed eagles will minimise direct impacts of removal of potential nesting trees, monitor and manage the risks of poisoning from hunting practices, and minimise disturbance caused by nearby forestry and agricultural operations.

The below management actions proposed in the Offset area are anticipated to improve overall habitat condition for the Tasmanian wedge-tailed eagle:

Formal protection: The Offset area will be formally protected and unregulated clearing within the Offset area will be strictly prohibited. This will prevent any commercial logging activities and retain areas of natural vegetation to ensure potential nesting trees and adequate foraging habitat for the Tasmanian wedge-tailed eagle and its prey remain present in the landscape.

¹²⁵ Bell & Mooney (1998)

¹²⁶ Department of the Environment (2025b)

¹²⁷ Threatened Species Section (2006); Threatened Species Section (2023)

¹²⁸ Bekessy *et al.* (2009)

¹²⁹ Abdu *et al.* (2022)

Vehicle control: Speed limits and vehicle exclusion areas will be established in the Offset area, to reduce the risk of vehicle strikes as part of offset management. This will reduce the availability of carcasses which may attract Tasmanian wedge-tailed eagles, thereby reducing risk of vehicle-related mortality.

Poaching/culling: Unregulated poaching, culling, and persecution of native wildlife will be strictly prohibited in the Offset area, enforced through signage and ongoing monitoring. Any animal (native and non-native) control will include strict limitations and requirements for control methods to avoid any non-target poisoning of the Tasmanian wedge-tailed eagle.

Animal control (feral and native): Annual monitoring and control (if required as an outcome of monitoring activities) of feral animals (ie fallow deer, feral cats, wild dogs) and native browsers (ie wallabies, possums etc.) will be undertaken within the Offset area. This will reduce any competition for food resources by introduced predators such as cats and decrease the risk of vehicle strike in the region due to reduced opportunity for vehicle collision with native browsers and introduced species which Tasmanian wedge-tailed eagles may opportunistically forage on.

Any feral animal control will include strict limitations and requirements for control methods to avoid any non-target poisoning of Tasmanian wedge-tailed eagles, including the removal of carcasses and/or lead bullet remains where carcass removal is not possible. Investigations into alternatives to lead bullets will be ongoing as a means to eliminate the threat of secondary poisoning.

Limitations on the timing of control measures will be in place to reduce the risk of breeding failure and nest disturbance.

Weed control: Active control of invasive weeds will be undertaken throughout the life of the offset. Weed management will improve the overall habitat quality condition of the Offset area. Although this measure may not directly benefit Tasmanian wedge-tailed eagles, weed control and vegetation improvement may help promote healthy populations of prey such as small mammals (including rabbits and rodents), thereby indirectly benefiting the Tasmanian wedge-tailed eagle.

Fire management: Fire restrictions and a controlled burn program will be implemented in the Offset area. Inappropriate fire regimes can reduce the habitat complexity and condition and remove or damage critical nesting habitats.

Management of habitat through controlled burning assists in maintaining foraging habitat, while also minimising the risk of catastrophic wildfires that may impact individuals and degrade or destroy habitat quality.

7.5.6. Habitat quality

Habitat quality scores have been informed by detailed field surveys of both the impact and potential Offset land. The Impact area score for the Tasmanian wedge-tailed eagle is 6 out of 10 and the start score of the potential Offset land is 7 out of 10. The habitat quality method is provided in Section 6 and the species-specific metrics are provided in Appendix A. Detailed habitat quality scoring is provided in Appendix B.

7.5.7. OAG Calculations

The total quantum or area of offset required for the Tasmanian wedge-tailed eagle has been assessed using the OAG. The calculation of the Offset area, achieving 100 % of the required offset with supporting information for the development of each OAG input is provided in Table 18.

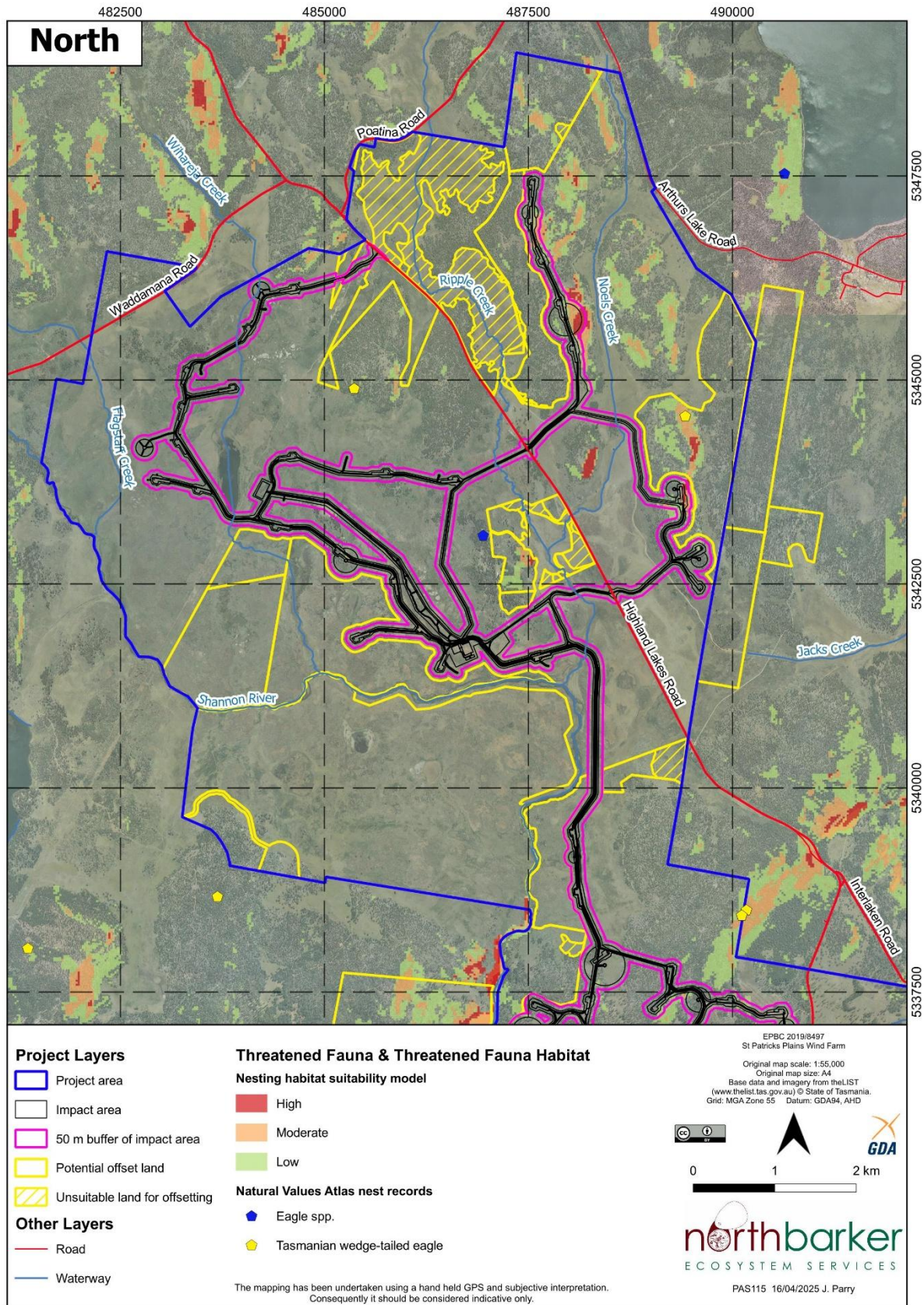


Figure 9: Eagle nesting habitat modelling in the northern potential Offset land area

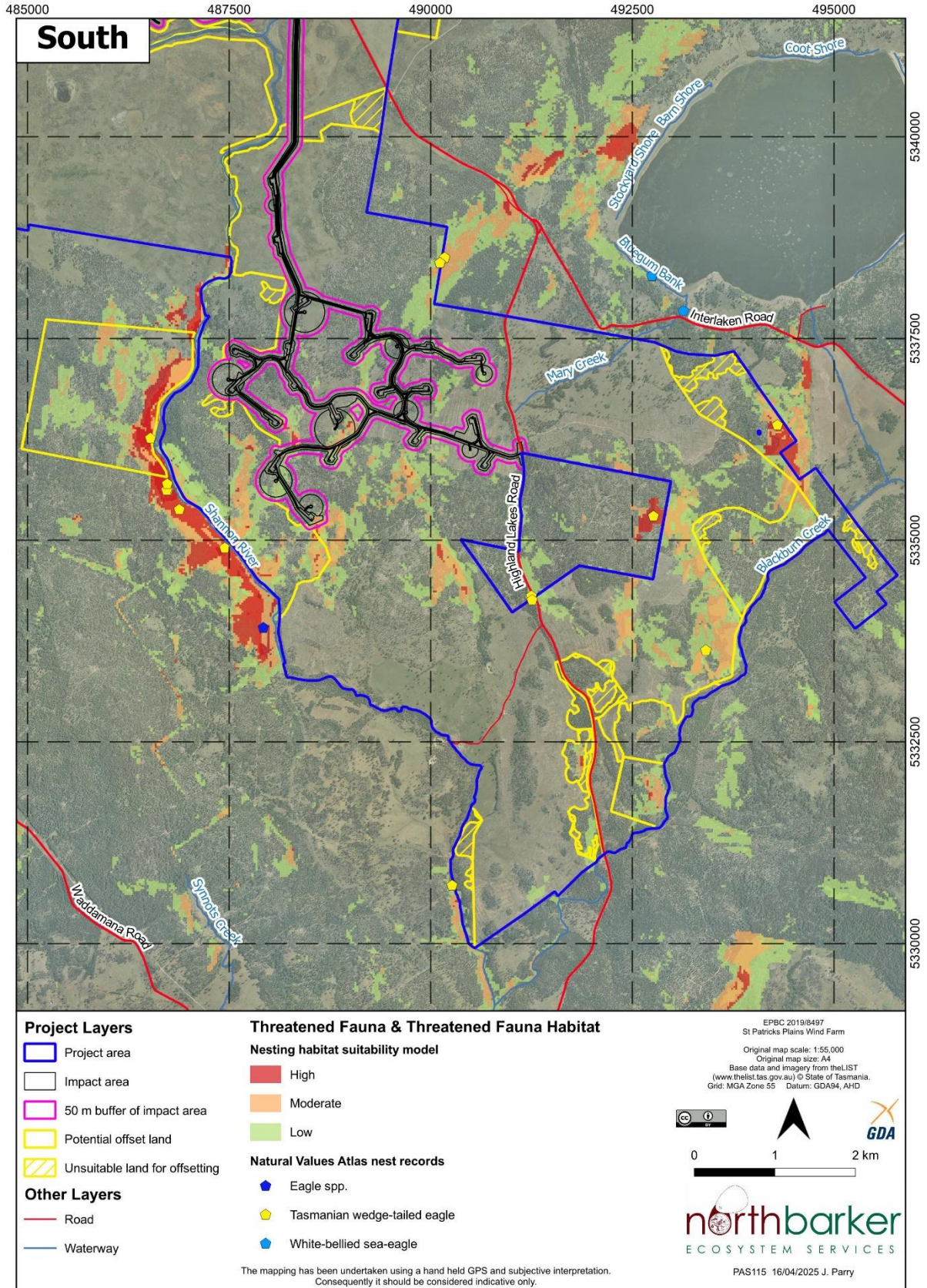


Figure 10: Eagle nesting habitat modelling in the northern potential Offset land area

Table 18: Tasmanian wedge-tailed eagle OAG calculations

OAG Field	Input	Justification
MNES		
Name	Tasmanian wedge-tailed eagle	
EPBC Act Status	Endangered	
Annual probability of extinction	1.2 %	Calculated by OAG.
Impact calculator		
Impact area	41.30 ha	The final area of SRI has been determined as the total of all low, moderate, and high modelled habitat (FPA categories >3) within the permanent and temporary impact footprints as detailed in the SIA ¹³⁰ .
Impact quality	6	The habitat quality of the Impact area is six (6), calculated using the method outlined in Section 6 and presented in Table 11 and Appendix B, informed by field validated information.
Total quantum of impact	24.78 ha	Adjusted impact area as per the OAG (60 % of the Impact area).
Offset calculator		
Time over which loss is averted	20 years	Duration of the risk mitigation actions to be taken, or 20 years, whichever is shorter.
Time until ecological benefit	20 years	This is the estimated time for habitat quality improvement outcomes of the offset to be realised. An estimate of 20 years has been used, based upon the timeframes of which the proposed management actions will provide benefit to the species. This captures both shorter-term and longer-term benefits likely to be realised through delivering the offset.
Risk of loss (%) without offset	5 %	Risk of loss generally represents the percentage chance that the habitat in the potential Offset land would be completely lost (no longer hold any value for the protected matter) over 20 years, as per the OAG. The RoL without the offset is conservatively predicted to be 5 %. This number is partially derived from a study ¹³¹ that assessed the background rate of loss across all Local Government Areas, including the Central Highlands LGA, which provides a value of 0.06 %.

¹³⁰ North Barker Ecosystem Services (2025)

¹³¹ Maseyk *et al.* (2017)

OAG Field	Input	Justification
		<p>In addition to the background rate of loss in the Central Highlands LGA, a number of other threatening processes are present within the potential Offset land; thus, increasing the RoL at this site, including:</p> <ul style="list-style-type: none"> • The potential Offset lands are zoned as Rural under the Tasmanian Planning Scheme and are privately owned. This zoning provides no formal protection for threatened natural values, including eastern quoll habitat. • Section 38 of the EPBC Act provides that forestry operations conducted in relation to land covered by the Tasmanian RFA (and not prohibited by the RFA) are exempt from the assessment and approval requirements of Part 3 of the EPBC Act (except for any forestry operations in World Heritage properties or Ramsar wetland sites). With this in mind, land clearing for forestry under this scenario would be exempt from assessment under the EPBC Act, thus placing any potential property at a high risk due to a lack of legislative protection. • 38.07 % of the total quantum of land within the potential Offset land is within a PTR. These reserves are administered under the Tasmanian <i>Forest Practices Act 1985</i>, with clearance of forest managed through a FPP which is regulated by the FPA. While this mechanism provides protection against conversion of forest to agricultural land (and other conversions); it does not prevent against modification of habitat to Tasmanian devils. Natural and assisted regeneration may occur, but restoration to the original state will take several decades. <p>A single FPP is current within one of the potential Offset land areas (GEW0583), which is issued to Rubmatsca Forestry Pty Ltd and is in effect until 31/12/2026, indicating an imminent threat to this area. A further 8 FPP's have been issued within the potential Offset land, with 1 having expired within the last 3 years. The remaining 7 expired more than 3 years ago. Within 5 km of the potential Offset land there are 125 FPPs (18 active, 11 expired within the last 3 years, and 96 expired more than 3 years ago). The volume of FPPs in the region provides an indication of the level of forestry activity in the St Patricks Plains region.</p> <p>Over recent years, there has been a level of concern from PFT regarding the number of PTR revocations, with anecdotal reports indicating that most common conversion post-revocation was to pasture/agricultural land (pers comm. Rob Smith – PFT). In the 2019-2024 period, approximately 18,012 ha of PTR were revoked across Tasmania, with high proportions of this land converted to pasture/agricultural land in recent times¹³². The total area of PTRs revoked in the 2023-24 period is 1,845 ha, and the progressive total since 1988-89 is 93,060 ha¹³³.</p> <ul style="list-style-type: none"> • Activities that are unregulated and/or conducted illegally in the area include firewood and other resource collection, hunting, and general vandalism. These activities are considered a threat to this species and may lead to direct and indirect impacts on Tasmanian wedge-tailed eagles. Novel disturbances such as hunting and logging may lead to breeding failure and nest abandonment. <p>Illegal firewood collection. This activity can have adverse effects on threatened species and their habitat, as well as increasing additional threats such as the presence of predators (such as dogs) and the increased risk of vehicle collisions.</p>

¹³² Private Forests Tasmania (2020); Private Forests Tasmania (2024)

¹³³ Private Forests Tasmania (2024); Forest Practices Authority (2024)

OAG Field	Input	Justification
		<p>The most common hunting target species in Tasmania include fallow deer, wallaby, and duck, all of which require a hunting permit and firearms licence, as well as landowner permission. The most likely target species in the vicinity of the offset property are wallabies and deer. Unregulated and illegal hunting may have similar impacts to that of firewood collection, such as the presence of predators and increase risk of vehicle collisions, as well as non-target mortality, particularly in the case of wedge-tailed eagles and lead-shot poisoning.</p> <p>Consistent with the approved DCCEEW advice, the measured background rate of loss, and the existing threatening processes in the potential Offset land, 5 % is considered an appropriate representation of RoL.</p>
Risk of loss (%) with Offset	0 %	<p>With the offset in place, the RoL is reduce to zero (0). The RoL with the offset has been predicted based on:</p> <ul style="list-style-type: none"> Protecting the Offset area through a legal mechanism (a conservation covenant under the Tasmanian NC Act) to prevent any further habitat modification / degradation; Establishment of an ongoing monitoring program; and Establishment of adaptive management strategies in an approved OAMP.
Confidence in result (%) – risk of loss	90 %	The high confidence reflects the very low RoL used, which is grounded in a detailed regional analysis and reflective of evidenced changes in the region.
Start quality	7	The habitat quality of the potential Offset land is seven (7), calculated using the method outlined in Section 6 and presented in Table 11 and Appendix B, informed by field validated information.
Future quality without offset	6 (-1)	<p>Without the offset, future habitat quality is predicted to decline by one-point. This decline is anticipated based on the continued degradation and proliferation of existing threats identified within the potential Offset land, including:</p> <ul style="list-style-type: none"> Habitat clearance through forest clearance; Non-target poisoning (lead-shot poisoning); and Unregulated and illegal activities such as wood hooking.
Future quality with offset	8 (+1)	Through the application of management activities, the future habitat quality is predicted to increase by one-point across the Offset area through the management actions described in Section 7.5.5.
Confidence in result (%) Change in Quality	70 %	<p>A high confidence in the habitat quality result is predicted, noting that detailed habitat quality surveys have been undertaken using a prescribed method and a modest score improvement is predicted. There is a high confidence in the management actions proposed as they:</p> <ul style="list-style-type: none"> Build on and improve existing habitat; Utilise well established measures; and Avoid approaches that carry higher risks of delivery.

OAG Field	Input	Justification
Total quantum of land required to achieve offset	224 ha	Considering all variables within the OAG, the total quantum of land required to achieve 100 % of the offset for the Tasmanian wedge-tailed eagle is 224 hectares.
% of impact offset	100.11 %	The calculated values result in 100 % of the offset being obtained.

7.6. PTUNARRA BROWN BUTTERFLY

7.6.1. Ecology

The Ptunarra brown butterfly is a small, orange-brown butterfly endemic to Tasmania. Found within *Poa* tussock grassland, woodland and grassy shrubland, this species is found in small populations above 400 m in the Central Plateau, the Steppes, eastern highlands, southern midlands and north-west plains¹³⁴. *Poa* grasses, in particular *Poa labillardierei*, *P. rodwayi* and *P. gunnii* are considered crucial for this species as a larval food plant, and presence is highly correlated with areas of significant cover of *Poa*¹³⁵.

The threats to the species include degradation from inappropriate grazing, land conversion to exotic pasture and eucalypt plantations, predation by the European wasp (*Vespula germanica*) and inappropriate fire regimes. Overgrazing, frequent fires and conversion of native grasslands reduce cover of preferred *Poa* grasses, while lack of disturbance can result in overgrowth and succession in grassland communities¹³⁶. Additionally, as a grassland dependant species, ptunarra habitat is not well reserved with the species predominantly occurring on private land¹³⁷. Priority actions for recovery include increasing protection of specific populations on private land, managing habitat disturbances, control of European wasps and appropriate management of fire¹³⁸.

7.6.2. Presence in the potential Offset land

Targeted field surveys undertaken in 2020 (Table 9) confirmed the presence of the ptunarra brown butterfly in grasslands and sedgelands (GPH and MGH) across the Project area¹³⁹. These surveys overlapped with all potentially suitable habitat in the potential Offset land, with an estimated 1,300 individuals recorded within potential Offset land, and over 2,000 individuals across the wider Project Area. Analysis of survey results established that the Project area is estimated to support a large population around 200,000 individuals across approximately 4,000 ha of suitable habitat¹⁴⁰.

Comparative analysis of habitat confirmed that relative abundance of ptunarra brown butterflies varies between habitat types, with sedgy grassland supporting the highest density of individuals (high quality habitat). Moderate and low-quality habitat within the potential Offset land is broadly attributed to the presence of dense *Hakea microcarpa* and highly grazed, very short grass, and tall inundation prone tussock grassland.

7.6.3. Offset Suitability

The potential Offset land contains known populations of ptunarra brown butterflies and large patches of high-quality grassland and sedgeland, which are predicted to support high densities of ptunarra within this population (Figure 11).

The potential Offset land is connected to surrounding high quality habitat within the Project area and the regional landscape. Reservation of high-quality butterfly habitat offers significant scope to contribute to the State's reserve estate, and the implementation of management actions aims to maintain or improve the condition of the units on site. The species is underrepresented in reserves, with conservation on private land listed as a priority action within the species Conservation Advice¹⁴¹. Given the population size and the species' distribution across the region, habitat management in this area would be expected to yield significant benefits for the species' long-term viability.

¹³⁴ Bell (1998)

¹³⁵ Bell (1998); Department of the Environment (2014)

¹³⁶ Neyland (1993); Bell (1998); Department of the Environment (2014); Potter-Craven (2019)

¹³⁷ Bell (1998)

¹³⁸ Department of the Environment (2014)

¹³⁹ North Barker Ecosystem Services (2023)

¹⁴⁰ North Barker Ecosystem Services (2023)

¹⁴¹ Department of the Environment (2014)

7.6.4. Threats within the potential Offset land

Current land use of the potential Offset land presents ongoing disturbance to ptunarra brown butterflies. Existing threats within the potential Offset land includes the following:

- Grazing by both livestock (sheep and cattle) and introduced deer. Currently stock numbers are limited to:
 - Wihareja: Approximately 50-60 cattle and 2,000 sheep across the entire property
 - St Patricks Plains: Approximately 2,000 sheep across the entire property; and
 - Allwrights: Approximately 1,000 sheep across the entire property
- Current stocking rates don't indicate overgrazing; however, if stocking rates were to increase, and deer population increases, overgrazing may reduce the quality of preferred grassy sedgeland habitat through the suppression of *Poa* growth.
- Lack of disturbance in some areas has resulted in large (notably absence of fire), dense stands of *Hakea microcarpa*, reducing abundance of *Poa* species and reducing the suitability for ptunarra larvae;
- Future conversion of grasslands to pasture or plantation may further reduce habitat availability.
- European wasps in the region present an ongoing threat of predation, and this introduced species is not currently monitored or controlled

7.6.5. Management actions

The primary threats to the Ptunarra brown butterfly are predation by introduced wasps, habitat clearing, and inappropriate fire regimes. The land-based offset will include management measures to reduce these three key threats. As the impact relates to habitat clearing, the offset will primarily focus on habitat protection, function and condition. The below management actions proposed in the Offset area are anticipated to improve overall habitat condition for the Ptunarra brown butterfly:

Formal protection: The Offset area will be formally protected and unregulated clearing within the Offset area will be strictly prohibited. This will prevent any clearance and conversion of habitat to agricultural land.

Population monitoring: A monitoring program to provide visibility on the health and size of the population within the Offset area.

Wasp monitoring and control: The presence and severity of European wasps in the Offset area will be monitored and ongoing wasp management implemented. There have been some control trials that have shown success in reducing wasp numbers and increasing Ptunarra brown butterfly numbers. This may include directly poisoning wasp nests and/or using baits. The establishment of native vegetation buffers may also be considered to provide longer term and less intensive solutions to wasp control.

Fire management: Fire restrictions and a controlled burn program will be implemented in the Offset area to prevent further loss of suitable habitat and minimise the establishment of unsuitable vegetation.

A balanced approach is essential, as these measures can have adverse effects where thresholds are exceeded, as disturbance (through ecological burns) will be required to maintain early successional grassland communities, although too frequent burning will suppress preferred habitat species¹⁴².

Habitat improvement: Removal or suppression (through burns and/or alternate methods) of woody shrubs such as *Hakea microcarpa* will further improve quality of GPH communities¹⁴³, supporting the long-term persistence of the ptunarra population in the Offset area. A repeatable habitat condition survey, conducted across regular intervals, paired with ongoing population monitoring, will aid in determining the efficacy of this management measure.

¹⁴² Kutt *et al.* (2022)

¹⁴³ Kirkpatrick *et al.* (2020)

Weed control: Active control of invasive weeds will be undertaken throughout the life of the offset. Weed management will improve the overall habitat quality condition of the Offset area, particularly the grassland habitats that support the ptunarra brown butterfly.

Stock monitoring: To provide a mechanism that is compatible with both preservation of high-quality GPH and MGH communities and existing land use for primary production, management actions will include regular assessment of stocking rates and ongoing monitoring of vegetation community condition. A balanced approach is essential, as these measures can have adverse effects where thresholds are exceeded, as disturbance (through grazing) will be required to maintain early successional grassland communities, although overgrazing may suppress preferred habitat species¹⁴⁴.

Animal control (feral and native): Annual monitoring and control (if required as an outcome of monitoring activities) of feral animals (primarily fallow deer) and native browsers (wallabies) will be undertaken within the Offset area. This will reduce trampling, degradation, and erosion of grassland habitats.

Proposed management actions, including grazing prescriptions and fire management, will require continuous monitoring and adaptive strategies to maintain habitat quality.

7.6.6. Habitat quality

Habitat quality scores have been informed by detailed field surveys of both the impact and potential Offset land. The Impact area score for the ptunarra brown butterfly is 7 out of 10 and the start score of the potential Offset land is 7 out of 10. The habitat quality method is provided in Section 6 and the species-specific metrics are provided in Appendix A. Detailed habitat quality scoring is provided in Appendix B.

7.6.7. OAG Calculations

The total quantum or area of offset required for the Ptunarra brown butterfly has been assessed using the OAG. The calculation of the Offset area, achieving 100 % of the required offset with supporting information for the development of each OAG input is provided in Table 19.

¹⁴⁴ Kutt *et al.* (2022)

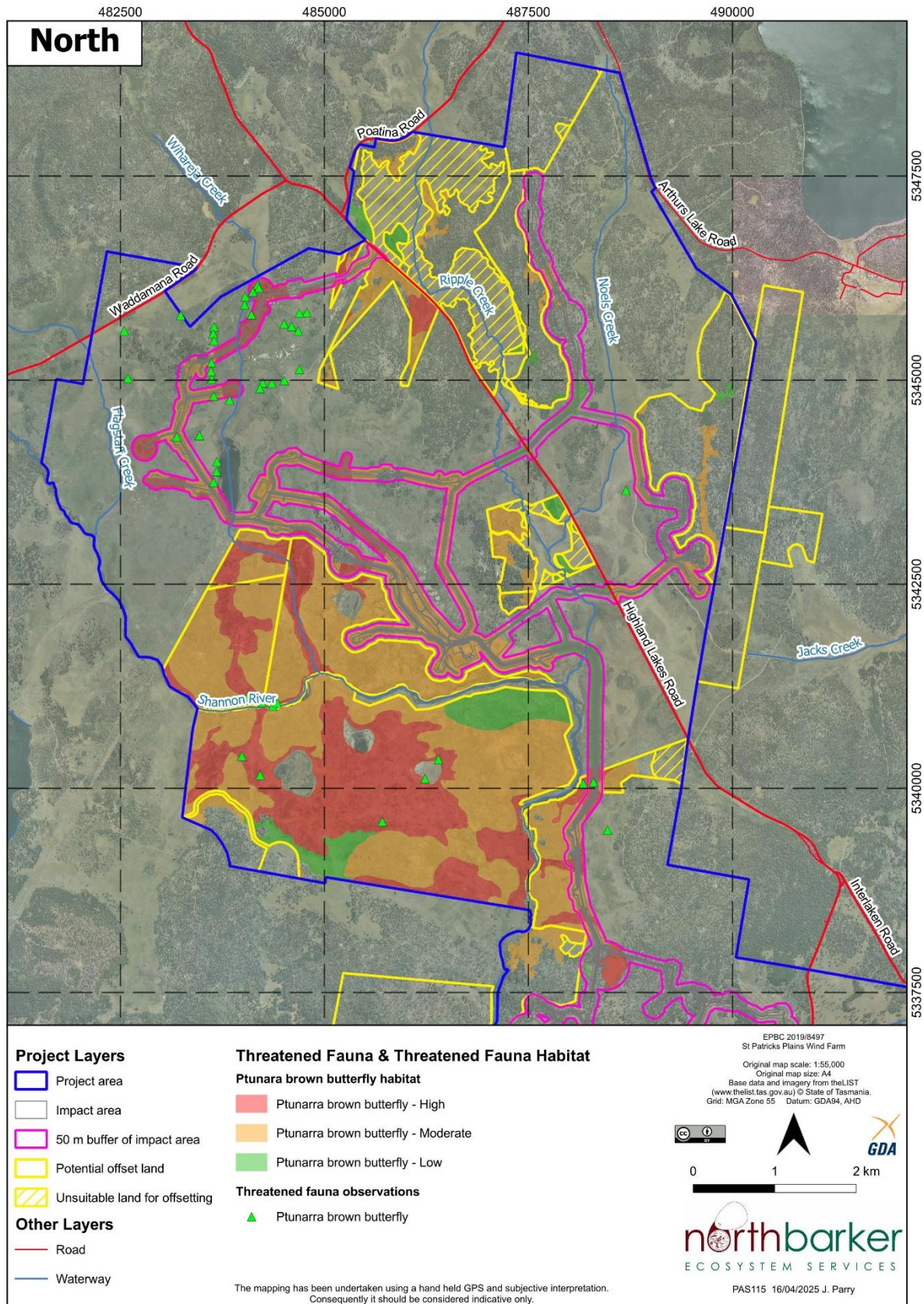


Figure 11: Verified ptunarra brown butterfly habitat in the northern potential Offset land area. No suitable habitat is present in the southern potential Offset land

Table 19: Ptunarra brown butterfly OAG calculations

OAG Field	Input	Justification
MNES		
Name	Ptunarra brown butterfly	
EPBC Act Status	Endangered	
Annual probability of extinction	1.2 %	Calculated by OAG.
Impact calculator		
Impact area	61.84 ha	The final area of SRI has been determined as the total of all permanent and longer-term temporary impacts to low, moderate, and high-quality habitat as detailed in the SIA ¹⁴⁵ .
Impact quality	7	The habitat quality of the Impact area is seven (7), calculated using the method outlined in Section 6 and presented in Table 11 and Appendix B, informed by field validated information.
Total quantum of impact	43.29 ha	Adjusted impact area as per the OAG (70 % of the Impact area).
Offset calculator		
Time over which loss is averted	20 years	Duration of the risk mitigation actions to be taken, or 20 years, whichever is shorter.
Time until ecological benefit	5 years	This is the estimated time for habitat quality improvement outcomes of the offset to be realised. An estimate of 5 years has been used, based upon the relatively fast timeframes of which the proposed management actions will provide benefit to the species. This captures both shorter-term and longer-term benefits likely to be realised through delivering the offset.
Risk of loss (%) without offset	0.06 %	Risk of loss generally represents the percentage chance that the habitat in the potential Offset land would be completely lost (no longer hold any value for the protected matter) over 20 years, as per the OAG. The RoL without the offset is predicted to be 0.06 %. This number is derived from a study ¹⁴⁶ that assessed the background rate of loss across all Local Government Areas, including the Central Highlands LGA, which provides a value of 0.06 %. Additional existing threats on the site are not likely to meaningfully increase the risk of loss to habitat for this species.

¹⁴⁵ North Barker Ecosystem Services (2025)

¹⁴⁶ Maseyk *et al.* (2017)

OAG Field	Input	Justification
Risk of loss (%) with Offset	0 %	<p>With the offset in place, the RoL is reduce to zero (0). The RoL with the offset has been predicted based on:</p> <ul style="list-style-type: none"> Protecting the Offset area through a legal mechanism (a conservation covenant under the Tasmanian NC Act) to prevent any further habitat modification / degradation; Establishment of an ongoing monitoring program; and Establishment of adaptive management strategies in an approved OAMP.
Confidence in result (%) – risk of loss	90 %	The high confidence reflects the very low RoL used, which is grounded in a detailed regional analysis and reflective of evidenced changes in the region.
Start quality	7	The habitat quality of the potential Offset land is seven (7), calculated using the method outlined in Section 6 and presented in Table 11 and Appendix B, informed by field validated information.
Future quality without offset	6 (-1)	<p>Without the offset, future habitat quality is predicted to decline by one-point. This decline is anticipated based on the continued degradation and proliferation of existing threats identified within the potential Offset land, including:</p> <ul style="list-style-type: none"> Habitat clearance through conversion to pasture; Predation by European wasps; Inappropriate fire regimes; and Overgrazing by domestic stock and fallow deer.
Future quality with offset	8 (+1)	Through the application of management activities, the future habitat quality is predicted to increase by one-point across the Offset area through the management actions described in Section 7.6.5.
Confidence in result (%) Change in Quality	70 %	<p>A high confidence in the habitat quality result is predicted, noting that detailed habitat quality surveys have been undertaken using a prescribed method and a modest score improvement is predicted. There is a high confidence in the management actions proposed as they:</p> <ul style="list-style-type: none"> Build on and improve existing habitat; Utilise well established measures; and Avoid approaches that carry higher risks of delivery.
Total quantum of land required to achieve offset	328 ha	Considering all variables within the OAG, the total quantum of land required to achieve 100 % of the offset for the ptunarra brown butterfly is 328 hectares.
% of impact offset	100.14 %	The calculated values result in 100 % of the offset being obtained.

8. LEGAL SECURITY

The land-based offset will be legally secured through a fixed-term conservation covenant under the Tasmanian *Nature Conservation Act 2002*. A conservation covenant provides a means to manage defined areas for nature conservation and can be used to secure areas of land to satisfy statutory offset requirements. The conservation covenant is legally binding and will exist for the life of the EPBC Act approval and will provide commensurate protection of the Offset area. The application for the conservation covenant will be submitted within six months of the OAMP being approved by DCCEEW.

9. ADDITIONALITY

Under Section 7.6 of the Policy, “Offsets must deliver a conservation gain for the impacted protected matter, and that conservation gain must be new, or additional to what is already required by a duty of care or to any environmental planning laws at any level of government”.

The management actions and the resulting offset outcomes are being provided due to anticipated Project impacts. The management actions and associated conservation gains outlined in this document are targeted to the offset matters, are additional to any existing land management occurring on the property and are additional to the obligations prescribed by relevant legislative requirements, guidance material, schemes or programs.

The potential Offset land is on private property that are not currently mapped as protected areas, in that they are not a National Park, nature refuge, wildlife reserve, State forest, council reserve and there is no current conservation covenant on the land. The legal security that will be provided as part of the offset is additional by way of a formal legal protection mechanism.

Specifically, the offset is considered additional due to the following considerations:

- a) The proposed management measures (refer to Section 7) are above any current obligation present on the land and will result in the improvement of habitat for the offset matters in discreet areas and active weed, pest and fire management across the Offset area.
- b) A reduction in threats, which have been identified as key threats to the species.
- c) Securement of the Offset area through the mechanism of a conservation covenant under the NC Act will provide a level of security above what is already in place within the area. Specifically, securement will protect the Offset area from existing threats that may result in loss and subsequent revision of vegetation and habitat classification (e.g. conversion of native vegetation/habitat to modified non-native land). This may result lead to a reduction in protective mechanisms available.

10. RISK ASSESSMENT

The likelihood and consequence ratings that have been used are required as per principle five of the Policy. This OS has considered the risks that may inhibit achieving the completion criteria for the Offset area, including risks that may be wholly outside the approval holder’s control.

As the final land-based offset and the other compensatory measures are further developed in an OAMP, the relevant risks will be revisited and reassessed. The OAMP will include a revision to this risk assessment.

Assessment of risks have been detailed in Table 20 and Appendix C. The risk analysis:

- Identifies events and threats that will, may, or are likely to impact the attainment of the completion criteria
- Assesses the likelihood and consequences of those events and threats eventuating, both before and after risk controls are applied, and assesses residual risk levels
- Identifies levels of uncertainty in mitigating the risks, with appropriate corrective actions and associated trigger criteria should risks and threats eventuate.

Table 20: Risk matrix

Risk matrix						
Likelihood (L): A qualitative measure of likelihood how likely is it that this event/circumstances will occur both before and after management activities are implemented						
Highly likely	Is expected to occur in most circumstances.					
Likely	Will probably occur during the life of the Project.					
Possible	Might occur during the life of the Project.					
Unlikely	Could occur but considered unlikely or doubtful.					
Rare	May occur in exceptional circumstances.					
Consequence (C): Qualitative measure of what will be the consequence/result if the issue does occur						
Minor	Minor incident of environmental damage that can be reversed (e.g. short-term delays to achieving strategy objectives, implementing low-cost, well-characterised corrective actions).					
Moderate	Isolated but substantial instances of environmental damage that could be reversed with intensive efforts (e.g. short-term delays to achieving strategy objectives, implementing well-characterised, high cost/effort corrective actions).					
High	Substantial instances of environmental damage that could be reversed with intensive efforts (e.g. medium-long term delays to achieving objectives, implementing uncertain, high-cost/effort corrective actions).					
Major	Major loss of environmental amenity and real danger of continuing (e.g. strategy objectives are unlikely to be achieved, with significant legislative, technical, ecological and/or administrative barriers to attainment that have no evidenced mitigation strategies).					
Critical	Severe widespread loss of environmental amenity and irrecoverable environmental damage. (e.g. strategy objectives are unable to be achieved, with no evidenced mitigation strategies).					
Final Risk Rating (R): A function of multiplying Likelihood (L) and Consequence (C)						
Consequence						
Risk Matrix	Likelihood	Minor	Moderate	High	Major	Critical
	Highly likely	Medium	High	High	Severe	Severe
	Likely	Low	Medium	High	High	Severe
	Possible	Low	Medium	Medium	High	Severe
	Unlikely	Low	Low	Medium	High	High
	Rare	Low	Low	Low	Medium	High

11. CONCLUSION

This Offset Strategy outlines the offset delivery approach to address the Project's SRIs on six MNES, which includes the following species:

- Tasmanian devil (*Sarcophilus harrisi*);
- Eastern quoll (*Dasyurus viverrinus*)
- Spotted-tail quoll (*Dasyurus maculatus maculatus*);
- Tasmanian masked owl (*Tyto novaehollandiae castanops*)
- Tasmanian wedge tailed eagle (*Aquila audax fleayi*); and
- Ptunarra brown butterfly (*Oreixenica ptunarra*).

The offset has been developed in accordance with the principles and requirements of the Commonwealth *EPBC Act Environmental Offsets Policy 2012*.

The Offset area is a direct, land-based offset located on up to eight (8) properties. A total of 4,036 ha has been made available for consideration; however, the maximum offset required as per OAG calculations is 764 ha, made up of 436 ha, which is the required Offset area for the eastern quoll and Tasmanian devil (Offsets for the Tasmanian masked owl, and Tasmanian wedge-tailed eagle will be stacked within this Offset area) and 328 ha, which is the required Offset area for the ptunarra brown butterfly. The potential Offset land supports a mix of vegetation communities that provide suitable habitat for the relevant MNES. The potential Offset land is part of a large, contiguous corridor of habitat, and is connected to several protected areas, including several conservation covenants and informal reserves, and a State reserve. It is also close to the Impact area, being approximately 40 m away at its closest point. As such, the offset supports the same populations of relevant MNES as those being impacted, while also having a buffer from any potential indirect impacts.

The potential Offset land has been subject to historic impacts and ongoing degradation and threatening processes. Field surveys identified habitat degradation, selective logging, cattle and sheep grazing, replacement of the ground layer with pasture grass species, extensive weed infestations in areas, and occurrence of pest species such as fallow deer and feral cats. Ecological field surveys have been completed to assess habitat quality within the potential Offset land. Habitat quality was scored in accordance with the *EPBC Act Offsets Assessment Guide*¹⁴⁷, using the TASVEG VCA method. The potential Offset land ranges from a score of 7 to a score of 8 out of 10.

The overall management objective of the Offset is to improve the habitat quality for the offset matters to a level that provides greater conservation value than its current form within the Impact area. The desired conservation outcome is to protect and restore habitat, increase habitat extent, resources and patch connectivity, and reduce threats so that viable populations for the relevant MNES can be sustained. This will be achieved through specific completion criteria by year 20, with some conservation gains anticipated to be achieved within 5-10 years. Achievement of proposed completion criteria is expected to result in improved ecosystem function and result in greater resilience, whereby beyond the duration of the offset (i.e. 20 years or until the completion criteria are achieved, whichever is longer) general land management obligations will be sufficient to maintain the completion criteria. This Offset Strategy provides details on these management actions and legislative requirements, justification for the offset approach and the expected outcomes for each relevant MNES across the Offset area.

The Offset area required to acquit the predicted impacts to the relevant MNES have been calculated using the Guide¹⁴⁸. The Offset area will be secured through a conservation covenant under the Tasmanian *Nature Conservation Act 2002*.

¹⁴⁷ Department of Sustainability, Environment, Water, Population and Communities (2012b)

¹⁴⁸ Department of Sustainability, Environment, Water, Population and Communities (2012c)

12. REFERENCES

- Abdu, N., Tinch, E., Levitt, C., Volker, P.W., & MacDonald, D.H. (2022). Illegal firewood collection in Tasmania: Approaching the problem with the Institutional Analysis and Development (IAD) framework. *Land Use Policy*, 118, 106130.
- Bekessy, S.A., Wintle, B.A., Gordon, A., Fox, J.C., Chisholm, R., Brown, B., Regan, T., Mooney, N., Read, S. M. & Burgman, M. A. (2009). Modelling human impacts on the Tasmanian wedge-tailed eagle (*Aquila audax fleayi*). *Biological Conservation*, 142, pp. 2438–2448.
- Bell, P.J. (1998). *Ptunarra Brown Butterfly Recovery Plan 1998-2003*. Department of Primary Industries, Water and Environment, Hobart, Tasmania.
- Bell, P.J. & Mooney, N.J. (1998). *Wedge-tailed Eagle Recovery Plan 1998-2003*. Department of Primary Industries, Water and Environment, Hobart, Tasmania.
- Cunningham, C.X., Johnson, C.N., & Jones, M.E. (2020). A native apex predator limits an invasive mesopredator and protects native prey: Tasmanian devils protecting bandicoots from cats. *Ecology Letters*, 23(4), 711-721.
- Cunningham, C.X., Comte, S., McCallum, H., Hamilton, D.G., Hamede, R., Storfer, A., Hollings, T., Ruiz-Aravena, M., Kerlin, D.H., Brook, B.W., Hocking, G. & Jones, M.E. (2021). Quantifying 25 years of disease-caused declines in Tasmanian devil populations: Host density drives spatial pathogen spread. *Ecology Letters*. 24(5), Article 5.
- Cunningham, C.X., Aandahl, Z., Jones, M.E., Hamer, R., & Johnson, C.N. (2022). Regional patterns of continuing decline of the eastern quoll. *Australian Mammalogy*, 45(2), 151-159.
- Department of Climate Change, Energy, the Environment and Water (2024), *Threat abatement plan for predation by feral cats 2024*, Department of Climate Change, Energy, the Environment and Water, Canberra, Australian Capital Territory
- Department of the Environment (2014). *Approved Conservation Advice for Oreixenica ptunarra (Ptunarra brown butterfly)*. Department of the Environment, Canberra, Australian Capital Territory.
- Department of the Environment (2015). *Threat abatement plan for predation by feral cats*. Commonwealth of Australia, Canberra, Australian Capital Territory.
- Department of the Environment (2025a). *Sarcophilus harrisii in Species Profile and Threats Database*. Department of the Environment, Canberra, Australian Capital Territory.
- Department of the Environment (2025b). *Aquila audax fleayi in Species Profile and Threats Database*. Department of the Environment, Canberra, Australian Capital Territory.
- Department of Environment, Land, Water and Planning (2016). *National recovery plan for the spotted-tailed quoll Dasyurus maculatus*. Commonwealth of Australia, Canberra, Australian Capital Territory.
- Department of the Environment, Water, Heritage and the Arts (2009). *Approved Conservation Advice for Sarcophilus harrisii (Tasmanian Devil)*. Department of the Environment, Water, Heritage and the Arts, Canberra, Australian Capital Territory.
- Department of the Environment, Water, Heritage and the Arts (2010). *Approved Conservation Advice for Tyto novaehollandiae castanops (Tasmanian Masked Owl)*. Department of the Environment, Water, Heritage and the Arts, Canberra, Australian Capital Territory.

- Department of Primary Industries, Parks, Water and Environment (2010). *Draft Recovery Plan for the Tasmanian devil (Sarcophilus harrisii)*. Department of Primary Industries, Parks, Water and Environment, Hobart, Tasmania.
- Department of Sustainability, Environment, Water, Population and Communities (2012a). *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy*. Department of Sustainability, Environment, Water, Population and Communities. Canberra, Australian Capital Territory.
- Department of Sustainability, Environment, Water, Population and Communities (2012b). *Environment Protection and Biodiversity Conservation Act 1999 Offsets assessment guide*. Department of Sustainability, Environment, Water, Population and Communities. Canberra, Australian Capital Territory.
- Department of Sustainability, Environment, Water, Population and Communities (2012c). *How to use the Offsets assessment guide*. Department of Sustainability, Environment, Water, Population and Communities. Canberra, Australian Capital Territory.
- Environment Protection Authority (2024). *Environmental Assessment Report – St Patricks Plains Wind Farm*. Environment Protection Authority, Hobart, Tasmania.
- ERA Planning and Environment (2023). St Patricks Plains Wind Farm Environmental Impact Statement – Final. 29 June 2023. ERA Planning Pty Ltd, Hobart, Tasmania.
- ERA Planning and Environment (2024). St Patricks Plains Wind Farm Supplement to Environmental Impact Statement – Final V3. 27 March 2024. ERA Planning Pty Ltd, Hobart, Tasmania.
- Fancourt, B.A. (2015a). *Drought, disease or devil declines? Identifying the cause of decline of the eastern quoll, Dasyurus viverrinus*. PhD Thesis. University of Tasmania.
- Fancourt, B.A., Bateman, B.L., VanDerWal, J., Nicol, S.C., Hawkins, C.E., Jones, M.E. and Johnson, C.N. (2015a). Testing the role of climate change in species decline: is the eastern quoll a victim of a change in the weather? *PLoS ONE*, 10(6): e0129420.
- Fancourt, B.A., Hawkins, C.E., Cameron, E.Z., Jones, M.E., & Nicol, S.C. (2015b). Devil declines and catastrophic cascades: is mesopredator release of feral cats inhibiting recovery of the eastern quoll? *PLoS One*, 10(3), e0119303.
- Fancourt, B.A. (2016). Diagnosing species decline: A contextual review of threats, causes and future directions for management and conservation of the eastern quoll. *Wildlife Research*, 43(3), 197.
- Forest Practices Authority (2013). *Wedge-tailed Eagle Nest Monitoring Project 2007–12 Nest site use, timing of breeding, and a review of the nesting habitat model*. Forest Practices Authority, Hobart, Tasmania.
- Forest Practices Authority (2014a). *Identifying masked owl habitat (No. 17; Fauna Technical Note)*. Forest Practices Authority, Hobart, Tasmania.
- Forest Practices Authority (2014b). *Wedge-tailed eagle nesting habitat model (No. 6; Fauna Technical Note)*. Forest Practices Authority, Hobart, Tasmania.
- Forest Practices Authority (2016). *Mature habitat availability map (Fauna Technical Note No. 2)*. Forest Practices Authority, Hobart, Tasmania.
- Forest Practices Authority (2024). *Annual Report 2023–24*. Hobart, Tasmania
- Glen, A.S. and Dickman, C.R. (2008) Niche overlap between marsupial and eutherian carnivores: does competition threaten the endangered spotted-tailed quoll? *Journal of Applied Ecology* 45, 700–707.

- Invasive Species Council (2024). Tassie devils and eagles at high risk of deadly bird flu: Chief Vet says. <https://invasives.org.au/media-releases/tassie-devils-and-eagles-at-high-risk-of-deadly-bird-flu-chief-vet-says/>. Accessed 11/04/2025.
- Jones, E.M., Koch, A.J., Mann, D.F., Hamede, R.K., & Jones, M.E. (2023). What drives the abundance of marsupial carnivores in production forest landscapes? *Forest Ecology and Management*, 529, 120745.
- Jones, M. E., & Rose, R. K. (1996). *Preliminary assessment of distribution and habitat associations of the spotted-tailed quoll (Dasyurus maculatus maculatus) and eastern quoll (D. viverrinus) in Tasmania to determine conservation and reservation status*. Tasmanian Public Land Use Commission.
- Kirkpatrick, J., Gilfedder, L., Duncan, F., & Wapstra, M. (2020). Frequent planned fire can prevent succession to woody plant dominance in montane temperate grasslands. *Austral Ecology*, 45(7), 872–879.
- Kutt, A.S., Dickson, C.R., Quarmby, J., Kingdom, D., & Hamer, R.P. (2022). Evaluating predictors of Ptunarra Brown Butterfly *Oreixenica ptunarra* abundance on a conservation reserve to refine future monitoring. *Ecological Management & Restoration*, 23(1), 100–104.
- Maseyk, F.J.F., Evans, M.C., & Maron, M. (2017). *Guidance for Deriving 'Risk of Loss' Estimates When Evaluating Biodiversity Offset Proposals Under the EPBC Act*. Report to the National Environmental Science Programme Department of the Environment and Energy.
- Michaels, K., Panek, D., & Kitchener, A. (2020). *TASVEG VCA Manual: A manual for assessing vegetation condition in Tasmania, Version 2.0*. Natural and Cultural Heritage, Department of Primary Industries, Parks, Water and Environment, Hobart, Tasmania.
- Neyland, M. (1993). The ecology and conservation management of the ptunarra brown butterfly *Oreixenica ptunarra* (Lepidoptera; Nymphalidae; Satyrinae) in Tasmania, Australia. *Papers and Proceedings of the Royal Society of Tasmania*, 127, 43–48.
- North Barker Ecosystem Services (2023). *St Patricks Plains Wind Farm Flora and Fauna Assessment* (Natural Values Assessment V. 7.1; For Ark Energy Pty Ltd). North Barker Ecosystem Services, Hobart, Tasmania.
- North Barker Ecosystem Services (2024). *St Patricks Plains Wind Farm Threatened Avian Fauna—Site Utilisation* (Natural Values Assessment V. 2.7; For Ark Energy Pty Ltd). North Barker Ecosystem Services, Hobart, Tasmania.
- North Barker Ecosystem Services (2025). *EPBC Ref: 2019/8497 Response to Request for Further Information. St Patricks Plains Wind Farm* (RFI V3.0; For Ark Energy Pty Ltd). North Barker Ecosystem Services, Hobart, Tasmania.
- Potter-Craven, J. (2019). *Conservation management to protect the threatened ptunarra brown butterfly (Oreixenica ptunarra) from the threat of predation by introduced vespid wasps in Tasmania, Australia*. PhD Thesis, University Of Tasmania.
- Private Forests Tasmania (2020). *Annual Report 2019-20*. Hobart, Tasmania
- Private Forests Tasmania (2024). *Annual Report 2023-24*. Hobart, Tasmania
- Threatened Species Scientific Committee (2009). *Approved Conservation Advice for Sarcophilus harrisii (Tasmanian Devil)*. Department of the Environment, Water, Heritage and the Arts, Canberra, Australian Capital Territory.

- Threatened Species Scientific Committee (2010). *Approved Conservation Advice for Tyto novaehollandiae castanops (Tasmanian Masked Owl)*. Department of the Environment, Water, Heritage and the Arts, Canberra, Australian Capital Territory.
- Threatened Species Scientific Committee (2015). *Conservation Advice Dasyurus viverrinus eastern quoll*. Department of the Environment. Canberra, Australian Capital Territory.
- Threatened Species Section (2006). *Threatened Tasmanian Eagles Recovery Plan 2006-2010*. Department of Primary Industries and Water, Hobart, Tasmania.
- Threatened Species Section (2022). *Listing Statement for Oreixenica ptunarra (ptunarra brown butterfly)*. Department of Natural Resources and Environment, Hobart, Tasmania.
- Threatened Species Section (2023). *Listing Statement for Aquila audax fleayi (Wedge-tailed eagle)*. Department of Natural Resources and Environment, Hobart, Tasmania.
- Threatened Species Section (2025). *Tasmanian Devil (Sarcophilus harrisii): Species Management Profile for Tasmania's Threatened Species Link*. Department of Natural Resources and Environment Tasmania. <https://www.threatenedspecieslink.tas.gov.au/Pages/Tasmanian-Devil.aspx>
- Wilson, B.A., Evans, M.J., Rapley, S., Gordon, I.J., Wimpenny, C., Newport, J., & Manning, A.D. (2024). Everybody needs good neighbours: Movement, habitat use, and conspecific association in a reintroduced mesopredator. *Biodiversity and Conservation*, 33(10), 2809–2832.

APPENDIX A – HABITAT QUALITY SCORING METHODOLOGY

Table A1: Habitat quality scoring methodology table

Component	Subcomponent	Source	Metric	Score options	Scoring guidance	Collection method	Justification
Site condition (Total out of 5)	Vegetation structure and composition	TASVEG VCA Manual	Forest Large trees % of the benchmark number of large trees/ha per canopy health category >70%, 30–70 % or <30 %)	0	None present	As per the TASVEG VCA Manual	Vegetation structure and composition provides quantification of floristic features that are used by the species for habitat
				1	>0-20 % @ <30 % canopy health		
				2	>0-20 % @ 30-70 % canopy health OR >20-40 % @ <30 % canopy health		
				3	>0-20 % @ >70 % canopy health OR >20-40% @ 30-70 % canopy health		
				4	>20-40 % @ >70 % canopy health OR >40-70 % @ <30 % canopy health		
				5	>40-70 % @ 30-70 % canopy health		
				6	>40-70 % @ >70 % canopy health OR >70-100 % @ <30 % canopy health		
				7	>70-100 % @ 30-70 % canopy health		
				8	>70-100 % @ >70 % canopy health OR ≥ benchmark @ <30 % canopy health		
				9	≥ benchmark @ 30-70 % canopy health		
		10	≥ benchmark @ >70 % canopy health				
				TASVEG VCA Manual	Forest Tree canopy cover	0	<10 % cover
				1	<50 % or > 150 % @ <30 % canopy health		

Component	Subcomponent	Source	Metric	Score options	Scoring guidance	Collection method	Justification		
			% of the benchmark cover per canopy health category (>70%, 30 – 70 % or <30 %)	3	<50 % or >150 % @ 30-70 % canopy health		features that are used by the species for habitat		
				3	<50 % or >150 % @ 30-70 % canopy health OR ≥50 % OR ≤150 % @ <30 % canopy health				
				4	≥50 % OR ≤150 % @ 30-70 % canopy health				
				5	≥50 % OR ≤150 % @ >70 % canopy health				
		TASVEG VCA Manual	Forest and non-forest Lack of weeds % of weed coverage per 'high' threat weed category (none, ≤50 % or >50 %)			0	> 75 % OR 25-75 % @ >50 % high threat weeds	As per the TASVEG VCA Manual	Vegetation structure and composition provides quantification of floristic features that are used by the species for habitat
						2	25-75 % @ ≤50 % high threat weeds		
						4	25-75 % @ no high threat weeds OR 10-25 % @ >50 % high threat weeds		
						6	10-25 % @ ≤50 % high threat weeds		
						7	10-25 % @ no high threat weeds OR 5-10 % @ >50 % high threat weeds		
						9	5-10 % @ ≤50 % high threat weeds		
						11	5-10% @ no high threat weeds OR <5 % @ >50 % high threat weeds		
						13	<5 % @ ≤50 % high threat weeds		
		TASVEG VCA Manual	Forest and non-forest Organic litter % of benchmark cover per native or non-native dominance			0	<10 %	As per the TASVEG VCA Manual	Vegetation structure and composition provides quantification of floristic features that are used by the species for habitat
						2	<50 % & dominated by non-native		
						3	<50 % & dominated by native		
4	≥50 % & dominated by non-native								
5	≥50 % & dominated by native								

Component	Subcomponent	Source	Metric	Score options	Scoring guidance	Collection method	Justification
		TASVEG VCA Manual	Forest Logs % of benchmark length per presence of large logs (absent/present)	0	<10 %	As per the TASVEG VCA Manual	Vegetation structure and composition provides quantification of floristic features that are used by the species for habitat
				2	<50 % and large logs absent		
				3	<50 % and large logs present		
				4	≥50 % and large logs absent		
				5	≥50 % and large logs present		
	Habitat species diversity	TASVEG VCA Manual	Forest and non-forest Understorey life forms	0	All strata and life forms absent	As per the TASVEG VCA Manual	Habitat species diversity assesses the degree of ecological functioning of the habitat used by species for habitat
				5	Up to 50 % life forms present		
				10	≥50 % to 90 % of life forms present - of those, ≥50 % substantially modified		
				15	≥50% to 90 % of life forms present - of those, <50 % substantially modified OR ≥90 % of life forms present - of those ≥50 % substantially modified		
				20	≥90 % of life forms present - of those <50 % substantially modified		
				25	≥90 % of life forms present - of those none are substantially modified		
		TASVEG VCA Manual	Forest Recruitment	0	No recruitment cohort or community driven episodic events	As per the TASVEG VCA Manual	Habitat species diversity assesses the degree of ecological functioning of the habitat used by species for habitat
				1	Evidence of recruitment cohort with low diversity & <30 % recruitment of native woody species		
				3	Evidence of recruitment cohort with: - high diversity and <30 % OR - low diversity and 30-70 % recruitment of native woody species		

Component	Subcomponent	Source	Metric	Score options	Scoring guidance	Collection method	Justification	
				5	No recruitment cohort but within community driven episodic events (high OR low diversity) OR evidence of recruitment cohort with low diversity and $\geq 70\%$ native woody species recruitment			
				6	Evidence of recruitment cohort with high diversity & 30-70 % recruitment of native woody species			
				10	Evidence of recruitment cohort with high diversity & $\geq 70\%$ recruitment of native woody species			
	Habitat features	Custom	Forest and non-forest Availability of suitable habitats (denning features, structural complexities, hollow-bearing trees, nests)	5	Absent	Qualitatively collected from field findings. All evidence of habitat features recorded as presence/absence per site and relative densities estimated	Quantification of the availability of habitat features is critical to determine how much a species may utilise a site, and to what purpose the species has for the site	
				10	Rare			
				15	Occasional			
				20	Common			
				25	Abundant			
	Site context (Total out of 3)	Connectivity	TASVEG VCA Manual	Patch size Patch area & significant disturbance presence	1	<2 ha	As per the TASVEG VCA Manual	Larger patch sizes are generally more beneficial to a species as there are often more resources and undisturbed access to resources
					2	Between 2 and 5 ha		
4					Between 5 and 10 ha			
6					Between 10 and 20 ha			
8					≥ 20 ha but significantly disturbed			
10					≥ 20 ha but not significantly disturbed			
TASVEG VCA Manual		Neighbourhood % native vegetation in a radius from site \times weighting	Up to 3 for 100 m radius	Native vegetation % \times 0.03	As per the TASVEG VCA Manual	Similar to patch size, the relative percentage of native vegetation within the local area assists with understanding the		
			Up to 4 for 1 km radius	Native vegetation % \times 0.04				

Component	Subcomponent	Source	Metric	Score options	Scoring guidance	Collection method	Justification
				Up to 3 for 5 km radius	Native vegetation % × 0.03		mosaic/connectedness of a patch to the broader landscape, and the species ability to traverse that landscape
		TASVEG VCA Manual	Distance to core area	0	> 5 km	As per the TASVEG VCA Manual	The relative distance of a site to a patch of native vegetation (core area) in relation to disturbance is critical to determining the usefulness of a patch to a species, how easily accessible it is and how many key habitat features may be present
				1	1 - 5 km and significantly disturbed		
				2	1 - 5 km and not significantly disturbed		
				3	< 1 km and significantly disturbed		
				4	< 1 km and not significantly disturbed OR contiguous and significantly disturbed		
	5	Contiguous and not significantly disturbed					
	Site importance to the population or occurrence in the community	Custom	Functional habitat types	5	Foraging and dispersal only (unsuitable breeding)	Based on habitat type mapping from field surveys and modelling	The amount and type of habitat types present in a site is a critical metric to determine the value of the Offset area relative to the wider landscape
				15	Sub-optimal denning		
				25	Optimal denning		
		Custom	Habitat complexity mosaic Diversity of habitat types within a 5 km radius	5	Homogenous	Based on habitat type mapping from field surveys and modelling	Diversity of habitat types (habitat mosaic) is a critical feature to the quality of habitat for this species. The more habitat types in a local area, the higher the site quality
				10	Low complexity		
				15	Moderate complexity		
20				High complexity			
25		Very high complexity					
Threats		Custom	Vehicle strike likelihood Tasmanian devil, spotted-tail	0	High likelihood - No signage, frequent traffic, nearby major highway, no monitoring program	Field surveys and geospatial measurements	Vehicle strikes are most likely when near busy roads, fast roads, roads with poor lighting

Component	Subcomponent	Source	Metric	Score options	Scoring guidance	Collection method	Justification
			quoll, Tasmanian wedge-tailed eagle	10	Moderate likelihood - Some signage and traffic, not near major roads		and signage etc. Weighted based on relative threat to the species
				15	Low likelihood - Warning signage present, not near any roads and/or very remote and minimal traffic		
			Vehicle strike likelihood Eastern quoll, Tasmanian masked owl	0	High likelihood - No signage, frequent traffic, nearby major highway, no monitoring program		
				5	Moderate likelihood - Some signage and traffic, not near major roads		
				10	Low likelihood - Warning signage present, not near any roads and/or very remote and minimal traffic		
		Custom	Culling / poaching / persecution / non-targeted poisoning Tasmanian devil	0	High likelihood - No monitoring program, no fencing established or maintained, no signage, no legal security	Field observations, landowner liaison, and available literature	Effort to clearly demarcate the Offset area through legal security and visual cues such as signage and fencing will reduce the ability for these actions to occur. Weighted based on relative threat to the species
				5	Moderate likelihood - Some fencing, may not be maintained, some or minimal signage		
				10	Low likelihood - Established monitoring program, fencing established and maintained, signage present, legal security organised		
			Culling / poaching / persecution / non-targeted poisoning Eastern quoll, spotted-tail quoll, Tasmanian masked owl	0	High likelihood - No monitoring program, no fencing established or maintained, no signage, no legal security		
				10	Moderate likelihood - Some fencing, may not be maintained, some or minimal signage		

Component	Subcomponent	Source	Metric	Score options	Scoring guidance	Collection method	Justification
			Culling / poaching / persecution / non-targeted poisoning Tasmanian wedge-tailed eagle	15	Low likelihood - Established monitoring program, fencing established and maintained, signage present, legal security organised		
				0	High likelihood - No monitoring program, no fencing established or maintained, no signage, no legal security		
				10	Moderate likelihood - Some fencing, may not be maintained, some or minimal signage		
				20	Low likelihood - Established monitoring program, fencing established and maintained, signage present, legal security organised		
		Custom	Predation and competition from introduced predators Tasmanian devil	0	High likelihood - feral animals present, no or minimal monitoring/management in place	Field observations, landowner liaison, and available literature	Feral animals compete for resources and can attack the individuals and young of these species, having monitoring and management measures in place is highly important to habitat quality. Weighted based on relative threat to the species
				5	Moderate likelihood - Feral animals present, some regular management measures in place		
				10	Low likelihood - Feral animals are minimal, long term and regular monitoring in place and regular or adaptive feral animals' controls in place		
			Predation and competition from introduced predators Eastern quoll, spotted-tail quoll	0	High likelihood - feral animals present, no or minimal monitoring/management in place		
				10	Moderate likelihood - Feral animals present, some regular management measures in place		

Component	Subcomponent	Source	Metric	Score options	Scoring guidance	Collection method	Justification
			Predation and competition from introduced predators Ptunarra brown butterfly	15	Low likelihood - Feral animals are minimal, long term and regular monitoring in place and regular or adaptive feral animals' controls in place		
				0	High likelihood - feral animals present, no or minimal monitoring/management in place		
				10	Moderate likelihood - Feral animals present, some regular management measures in place		
				20	Low likelihood - Feral animals are minimal, long term and regular monitoring in place and regular or adaptive feral animals' controls in place		
		Custom	Inappropriate fire regimes Tasmanian devil, eastern quoll, spotted-tail quoll	0	High likelihood - No or minimal evidence of active management, high weed infestations (more than 60 % or more), high fuel loads, no existing fire breaks	Habitat type mapping from field surveys and modelling, historical fire mapping, observations from surveys and landowner liaison	Inappropriate fire regimes are a risk to ground-dwelling mammals that den on the ground. Young devils and quolls are especially at risk to bushfires. Weighted based on relative threat to the species
				5	Moderate likelihood - Some evidence of active management, Some weed infestations (30-60 %), moderate fuel loads, unmaintained fire breaks		
				10	Low likelihood - Good evidence of active management, low weed infestations (less than 30 %), low fuel loads, majority of firebreaks maintained		
				0	High likelihood - No or minimal evidence of active management, high		

Component	Subcomponent	Source	Metric	Score options	Scoring guidance	Collection method	Justification
			Inappropriate fire regimes Ptunarra brown butterfly		weed infestations (more than 60 % or more), high fuel loads, no existing fire breaks		
				10	Moderate likelihood - Some evidence of active management, Some weed infestations (30-60 %), moderate fuel loads, unmaintained fire breaks		
				20	Low likelihood - Good evidence of active management, low weed infestations (less than 30 %), low fuel loads, majority of firebreaks maintained		
		Custom	Habitat loss / modification / degradation Spotted-tail quoll, Tasmanian masked owl, Tasmanian wedge-tailed eagle, ptunarra brown butterfly	0	High likelihood - Area has no or minimal statutory protection, can still have patches of habitat loss, and/or weeds dominate the habitat (60 % or more) and significantly reduce or replace native vegetation	Data from field surveys and modelling, anecdotal observations from surveys and landowner liaison	Developing covenants or offsets to protect habitat from loss or modification is important to increasing habitat quality of a site. Weeds infestations and habitat degradation can replace native vegetation and reduce resource availability
				10	Moderate likelihood - Area has some statutory protection but can still be impacted and/or weeds are common in the habitat (30-60 %) and reduce or replace native vegetation in some areas		
				20	Low likelihood - Area is statutory protected and cannot be impacted and/pr weeds are present in isolated patches or are not dominant across the habitat (30 % or less) and is sub-dominant with native species or absent entirely		

Component	Subcomponent	Source	Metric	Score options	Scoring guidance	Collection method	Justification
		Custom	Loss of nesting habitat (dieback), hollow competition and/or nest disturbance Tasmanian wedge-tailed eagle	0	High likelihood - Loss or disturbance of nesting habitat common, no monitoring program	Field observations	Availability of nesting materials and habitat is a limiting feature of a population's abundance in an area. Providing nesting habitat and monitoring its success improves a sites ability to allow breeding of the species without disturbance. Weighted based on relative threat to the species
				10	Moderate likelihood - Loss or disturbance of nesting habitat infrequent or occasional		
				15	Low likelihood - Minimal loss or disturbance of nesting habitat, monitoring program in place, common nesting microhabitat		
			Loss of nesting habitat (dieback), hollow competition and/or nest disturbance Tasmanian masked owl	0	High likelihood - Loss or disturbance of nesting habitat common, no monitoring program		
				10	Moderate likelihood - Loss or disturbance of nesting habitat infrequent or occasional		
				20	Low likelihood - Minimal loss or disturbance of nesting habitat, monitoring program in place, common nesting microhabitat		
Species stocking rate (Total out of 2)	Species presence	Custom	Species presence within or adjacent to site All species	0	No	Field survey results	Usage of the site is critical to justify if the species will use the Offset area and to what degree in the future
				5	Yes – adjacent to site		
				10	Yes – present on site		
	Species density	Custom	Estimated density (per ha)	N/A	N/A	N/A	Data relevant to this sub-component not collected
	Role of the site population in the overall species population	Custom	Key population for breeding Tasmanian devil, spotted-tail quoll, Tasmanian masked owl, ptunarra brown butterfly	0	No	Field survey records and historical records, population and habitat modelling, and available literature	Analyses the value of the population that will utilise the Offset area relative to the species population across Tasmania
				5	Yes / possibly		

Component	Subcomponent	Source	Metric	Score options	Scoring guidance	Collection method	Justification
			Key population for breeding	0	No		
			Tasmanian wedge-tailed eagle	10	Yes / possibly		
		Custom	Key population for dispersal	0	No		
			All species	5	Yes / possibly		
		Custom	Necessary for maintaining genetic diversity	0	No		
			Tasmanian devil, spotted-tail quoll, Tasmanian masked owl, ptunarra brown butterfly	5	Yes / possibly		
			Necessary for maintaining genetic diversity	0	No		
			Tasmanian wedge-tailed eagle	15	Yes / possibly		
		Custom	Near the limit of the species range	0	No		
			Tasmanian devil, spotted-tail quoll, Tasmanian masked owl, ptunarra brown butterfly	5	Yes / possibly		
			Near the limit of the species range	0	No		
			Tasmanian wedge-tailed eagle	15	Yes / possibly		

APPENDIX B – HABITAT QUALITY SCORES

Table B1: Habitat quality scores for the Tasmanian devil

HQ component & weighting	HQ subcomponent	HQ metric	Maximum score	Impact area score	Offset area score	Offset improvement score*	
Site condition (weighted 5/10)	Vegetation structure and composition	Forest Large trees (%)	10	2.1	5.7	6	
		Forest Tree canopy cover (%)	5	2.3	2.8	3	
		Forest and non-forest Lack of weeds (%)	15	14.2	14.2	15	
		Forest and non-forest Organic litter (%)	5	4.4	4.8	5	
		Forest Logs (%)	5	4.1	4.9	5	
	Habitat species diversity	Forest and non-forest Understorey life forms	25	18.75	16.25	17.5	
		Forest Recruitment	10	10	6.8	7	
	Habitat features	Forest and non-forest Availability of suitable microhabitat features (denning, hollow bearing trees)	25	10	15	15	
	Forest subtotal (raw score)			100	65.9	70.5	73.5
	Weighted forest total (converted to a score out of 5)			5	3.3	3.5	3.7
Site context (weighted 3/10)	Connectivity	Patch size (ha)	10	6.7	8	8	
		Neighbourhood (%)	10	4.2	7	7	
		Distance to core area (km)	5	4	4	4	
	Site importance to the population or occurrence in the community	Functional habitat types	25	25	25	25	
		Habitat complexity	25	25	25	25	
	Threats	Vehicle strike likelihood	15	10	10	10	

HQ component & weighting	HQ subcomponent	HQ metric	Maximum score	Impact area score	Offset area score	Offset improvement score*
		Culling / poaching / persecution / non-targeted poisoning	10	5	5	10
		Predation and competition from introduced predators	10	0	0	5
		Inappropriate fire regimes	10	10	10	10
	Subtotal (raw score)		120	89.9	94	104
	Weighted total (converted to a score out of 3)		3	2.2	2.4	2.6
Species stocking rate (weighted 2/10)	Species presence	Species presence within or adjacent to site	10	10	10	10
	Species density	N/A	N/A	-	-	-
	Role of the site population in the overall species population	Key population for breeding	5	5	5	5
		Key population for dispersal	5	5	5	5
		Necessary for maintaining genetic diversity	5	0	0	0
		Near the limit of the species range	5	0	0	0
	Subtotal (raw score)		30	20	20	20
Weighted total (converted to a score out of 2)		2	1.3	1.3	1.3	
HQ total (forest) (raw score)			250	175.8	184.5	197.5
HQ weighted total (converted to a score out of 10)			10	7.0	7.4	7.9

* Offset improvement scores assume a minimum of incremental gains in overall site condition elements

Table B2: Habitat quality scores for the eastern quoll

HQ component & weighting	HQ subcomponent	HQ metric	Maximum score	Impact area score	Offset area score	Offset improvement score*	
Site condition (weighted 5/10)	Vegetation structure and composition	Forest Large trees (%)	10	2.1	5.7	6	
		Forest Tree canopy cover (%)	5	2.3	2.8	3	
		Forest and non-forest Lack of weeds (%)	15	14.2	14.2	15	
		Forest and non-forest Organic litter (%)	5	4.4	4.8	5	
		Forest Logs (%)	5	4.1	4.9	5	
	Habitat species diversity	Forest and non-forest Understorey life forms	25	18.75	16.25	17.5	
		Forest Recruitment	10	10	6.8	7	
	Habitat features	Forest and non-forest Availability of suitable microhabitat features (denning, hollow bearing trees)	25	10	15	15	
	Forest subtotal (raw score)			100	65.9	70.5	73.5
	Weighted forest total (converted to a score out of 5)			5	3.3	3.5	3.7
Site context (weighted 3/10)	Connectivity	Patch size (ha)	10	6.7	8	8	
		Neighbourhood (%)	10	4.2	7	7	
		Distance to core area (km)	5	4	4	4	
	Site importance to the population or occurrence in the community	Functional habitat types	25	25	25	25	
		Habitat complexity	25	25	25	25	
	Threats	Vehicle strike likelihood	10	5	5	10	
		Culling / poaching / persecution / non-targeted poisoning	15	10	10	15	

HQ component & weighting	HQ subcomponent	HQ metric	Maximum score	Impact area score	Offset area score	Offset improvement score*	
		Predation and competition from introduced predators	15	0	0	10	
		Inappropriate fire regimes	10	10	10	10	
	Subtotal (raw score)		125	89.9	94	114	
	Weighted total (converted to a score out of 3)		3	2.2	2.3	2.7	
Species stocking rate (weighted 2/10)	Species presence	Species presence within or adjacent to site	10	5	5	5	
	Species density	N/A	N/A	-	-	-	
	Role of the site population in the overall species population	Key population for breeding		5	0	0	0
		Key population for dispersal		5	0	0	0
		Necessary for maintaining genetic diversity		5	0	0	0
		Near the limit of the species range		5	5	5	5
	Subtotal (raw score)		30	10	10	10	
Weighted total (converted to a score out of 2)		2	0.7	0.7	0.7		
HQ total (forest) (raw score)			250	165.8	174.5	197.5	
HQ weighted total (converted to a score out of 10)			10	6.5	6.8	7.7	

* Offset improvement scores assume a minimum of incremental gains in overall site condition elements

Table B3: Habitat quality scores for the spotted-tail quoll

HQ component & weighting	HQ subcomponent	HQ metric	Maximum score	Impact area score	Offset area score	Offset improvement score*	
Site condition (weighted 5/10)	Vegetation structure and composition	Forest Large trees (%)	10	2.1	5.7	6	
		Forest Tree canopy cover (%)	5	2.3	2.8	3	
		Forest and non-forest Lack of weeds (%)	15	14.2	14.2	15	
		Forest and non-forest Organic litter (%)	5	4.4	4.8	5	
		Forest Logs (%)	5	4.1	4.9	5	
	Habitat species diversity	Forest and non-forest Understorey life forms	25	18.75	16.25	17.5	
		Forest Recruitment	10	10	6.8	7	
	Habitat features	Forest and non-forest Availability of suitable microhabitat features (denning, hollow bearing trees)	25	10	15	15	
	Forest subtotal (raw score)			100	65.9	10.5	73.5
	Weighted forest total (converted to a score out of 5)			5	3.3	3.5	3.7
Site context (weighted 3/10)	Connectivity	Patch size (ha)	10	6.7	8	8	
		Neighbourhood (%)	10	4.2	7	7	
		Distance to core area (km)	5	4	4	4	
	Site importance to the population or occurrence in the community	Functional habitat types	25	25	25	25	
		Habitat complexity	25	25	25	25	
	Threats	Vehicle strike likelihood	15	10	10	15	
Culling / poaching / persecution / non-targeted poisoning		15	10	10	15		

HQ component & weighting	HQ subcomponent	HQ metric	Maximum score	Impact area score	Offset area score	Offset improvement score*
		Predation and competition from introduced predators	15	0	0	10
		Inappropriate fire regimes	10	10	10	10
		Habitat loss / modification / degradation	20	10	10	20
	Subtotal (raw score)		150	104.9	109.0	139.0
	Weighted total (converted to a score out of 3)		3	2.1	2.2	2.8
Species stocking rate (weighted 2/10)	Species presence	Species presence within or adjacent to site	10	5	5	5
	Species density	N/A	N/A	-	-	-
	Role of the site population in the overall species population	Key population for breeding	5	0	0	0
		Key population for dispersal	5	0	0	0
		Necessary for maintaining genetic diversity	5	0	0	0
		Near the limit of the species range	5	0	0	0
	Subtotal (raw score)		30	5	5	5
Weighted total (converted to a score out of 2)		2	0.3	0.3	0.3	
HQ total (forest) (raw score)			250	175.8	184.5	217.5
HQ weighted total (converted to a score out of 10)			10	6.3	6.6	7.8

* Offset improvement scores assume a minimum of incremental gains in overall site condition elements

Table B4: Habitat quality scores for the Tasmanian masked owl

HQ component & weighting	HQ subcomponent	HQ metric	Maximum score	Impact area score	Offset area score	Offset improvement score*	
Site condition (weighted 5/10)	Vegetation structure and composition	Forest Large trees (%)	10	2.1	5.7	6	
		Forest Tree canopy cover (%)	5	2.3	2.8	3	
		Forest and non-forest Lack of weeds (%)	15	14.2	14.2	15	
		Forest and non-forest Organic litter (%)	5	4.4	4.8	5	
		Forest Logs (%)	5	4.1	4.9	5	
	Habitat species diversity	Forest and non-forest Understorey life forms	25	18.75	16.25	17.5	
		Forest Recruitment	10	10	6.8	7	
	Habitat features	Forest and non-forest Availability of suitable microhabitat features (denning, hollow bearing trees)	25	10	15	15	
	Forest subtotal (raw score)			100	65.9	70.5	73.5
	Weighted forest total (converted to a score out of 5)			5	3.3	3.5	3.7
Site context (weighted 3/10)	Connectivity	Patch size (ha)	10	6.7	8	8	
		Neighbourhood (%)	10	4.2	7	7	
		Distance to core area (km)	5	4	4	4	
	Site importance to the population or occurrence in the community	Functional habitat types	25	15	25	25	
		Habitat complexity	25	25	25	25	
	Threats	Vehicle strike likelihood	10	10	10	10	
		Culling / poaching / persecution / non-targeted poisoning	15	10	10	15	

HQ component & weighting	HQ subcomponent	HQ metric	Maximum score	Impact area score	Offset area score	Offset improvement score*
		Loss of nesting habitat (dieback), hollow competition and/or nest disturbance	20	10	10	20
		Habitat loss / modification / degradation	20	10	10	20
	Subtotal (raw score)		140	94.9	109	134
	Weighted total (converted to a score out of 3)		3	2.0	2.3	2.9
Species stocking rate (weighted 2/10)	Species presence	Species presence within or adjacent to site	10	5	5	5
	Species density	N/A	N/A	-	-	-
	Role of the site population in the overall species population	Key population for breeding	5	0	0	0
		Key population for dispersal	5	0	0	0
		Necessary for maintaining genetic diversity	5	0	0	0
		Near the limit of the species range	5	5	5	5
	Subtotal (raw score)		30	10	10	10
Weighted total (converted to a score out of 2)		2	0.7	0.7	0.7	
HQ total (forest) (raw score)			250	170.8	189.5	217.5
HQ weighted total (converted to a score out of 10)			10	6.3	7.0	8.1

* Offset improvement scores assume a minimum of incremental gains in overall site condition elements

Table B5: Habitat quality scores for the Tasmanian wedge-tailed eagle

HQ component & weighting	HQ subcomponent	HQ metric	Maximum score	Impact area score	Offset area score	Offset improvement score*	
Site condition (weighted 5/10)	Vegetation structure and composition	Forest Large trees (%)	10	2.1	5.7	6	
		Forest Tree canopy cover (%)	5	2.3	2.8	3	
		Forest and non-forest Lack of weeds (%)	15	14.2	14.2	15	
		Forest and non-forest Organic litter (%)	5	4.4	4.8	5	
		Forest Logs (%)	5	4.1	4.9	5	
	Habitat species diversity	Forest and non-forest Understorey life forms	25	18.75	16.25	17.5	
		Forest Recruitment	10	10	6.8	7	
	Habitat features	Forest and non-forest Availability of suitable microhabitat features (denning, hollow bearing trees)	25	10	15	15	
	Forest subtotal (raw score)			100	65.9	70.5	73.5
	Weighted forest total (converted to a score out of 5)			5	3.3	3.5	3.7
Site context (weighted 3/10)	Connectivity	Patch size (ha)	10	6.7	8	8	
		Neighbourhood (%)	10	4.2	7	7	
		Distance to core area (km)	5	4	4	4	
	Site importance to the population or occurrence in the community	Functional habitat types	25	15	25	25	
		Habitat complexity	25	25	25	25	
	Threats	Vehicle strike likelihood	15	15	15	15	
		Culling / poaching / persecution / non-targeted poisoning	15	10	10	20	

HQ component & weighting	HQ subcomponent	HQ metric	Maximum score	Impact area score	Offset area score	Offset improvement score*
		Loss of nesting habitat (dieback), hollow competition and/or nest disturbance	20	10	10	15
		Habitat loss / modification / degradation	20	10	10	20
	Subtotal (raw score)		145	99.9	114	139
	Weighted total (converted to a score out of 3)		3	2.1	2.4	2.9
Species stocking rate (weighted 2/10)	Species presence	Species presence within or adjacent to site	10	10	10	10
	Species density	N/A	N/A	-	-	-
	Role of the site population in the overall species population	Key population for breeding	5	0	0	0
		Key population for dispersal	5	0	0	0
		Necessary for maintaining genetic diversity	5	0	0	0
		Near the limit of the species range	5	0	0	0
	Subtotal (raw score)		30	10	10	10
Weighted total (converted to a score out of 2)		2	0.7	0.7	0.7	
HQ total (forest) (raw score)			250	175.8	194.5	222.5
HQ weighted total (converted to a score out of 10)			10	6.4	7.1	8.1

* Offset improvement scores assume a minimum of incremental gains in overall site condition elements

Table B6: Habitat quality scores for the ptunarra brown butterfly

HQ component & weighting	HQ subcomponent	HQ metric	Maximum score	Impact area score	Offset area score	Offset improvement score*	
Site condition (weighted 5/10)	Vegetation structure and composition	Non-forest Dominant life form cover (%)	15	1.3	2.5	2.5	
		Forest and non-forest Lack of weeds (%)	15	13.4	14.7	15	
		Forest and non-forest Organic litter (%)	5	4	5	5	
	Habitat species diversity	Forest and non-forest Understorey life forms	25	16	14.2	15	
		Non-forest Persistence potential	10	6	10	10	
	Habitat features	Forest and non-forest Availability of suitable microhabitat features (denning, hollow bearing trees)	25	20	25	25	
	Forest subtotal (raw score)			95	60.7	71.4	72.5
	Weighted forest total (converted to a score out of 5)			5	3.2	3.8	3.8
Site context (weighted 3/10)	Connectivity	Patch size (ha)	10	8	7	7	
		Neighbourhood (%)	10	7	7	7	
		Distance to core area (km)	5	4	4	4	
	Site importance to the population or occurrence in the community	Functional habitat types	25	25	25	25	
	Threats	Predation and competition from introduced predators	20	10	10	20	
		Inappropriate fire regimes	15	10	10	15	
		Habitat loss / modification / degradation	20	0	0	20	
	Subtotal (raw score)			105	64	63	98
Weighted total (converted to a score out of 3)			3	1.8	1.8	2.8	

HQ component & weighting	HQ subcomponent	HQ metric	Maximum score	Impact area score	Offset area score	Offset improvement score*	
Species stocking rate (weighted 2/10)	Species presence	Species presence within or adjacent to site	10	10	10	10	
	Species density	N/A	N/A	-	-	-	
	Role of the site population in the overall species population	Key population for breeding		5	5	5	5
		Key population for dispersal		5	5	5	5
		Necessary for maintaining genetic diversity		5	5	5	5
		Near the limit of the species range		5	0	0	0
	Subtotal (raw score)			30	25	25	25
	Weighted total (converted to a score out of 2)			2	1.7	1.7	1.7
HQ total (forest) (raw score)			250	149.7	159.4	195.5	
HQ weighted total (converted to a score out of 10)			10	6.5	6.9	8.5	

* Offset improvement scores assume a minimum of incremental gains in overall site condition elements

APPENDIX C – RISK ASSESSMENT

Table C1: Risk assessment

Risk event	Risk description	Initial risk rating			Planned management measures	Residual risk rating		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Stochastic events								
Climate change	Increased fire frequency and severity leading to habitat loss or degradation.	Possible	High	Medium	Implementation of a fire management strategy will reduce the likelihood and severity of fire events.	Possible	Moderate	Medium
Climate change	Increased risk of extreme events and associated damage to habitat, including suitable foraging, breeding and dispersal habitat.	Possible	High	Medium	No management actions are likely to prevent impact.	Possible	High	Medium
Cyclones / severe tropical lows / flooding	Catastrophic damaging storm event resulting in physical damage to habitat in the Offset area.	Likely	Moderate	Medium	No management actions are likely to prevent impact.	Likely	Moderate	Medium
Wildlife	Extensive, unplanned bushfire event destroying the Offset area.	Possible	Major	Severe	Implementation of a fire management strategy will reduce the likelihood and severity of unplanned fire events.	Unlikely	High	Medium
Offset risks								
The Offset site failing (regardless of the cause)	The Offset area fails.	Unlikely	Critical	High	Ark Energy will commit to finding an alternative offset in	Rare	Major	Medium

Risk event	Risk description	Initial risk rating			Planned management measures	Residual risk rating		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
					the unlikely event the offset fails due to unforeseen reasons.			
Offset funding shortfall	The financial commitments required to fulfil the offset requirements are not met.	Unlikely	Critical	High	Offset funding will be estimated and allocated prior to commencement.	Rare	Major	Medium
Offset threats								
General								
Inadequate breeding habitat within the Offset area	Inadequate denning and breeding habitat opportunities for threatened fauna in the Offset area, which will impact breeding.	Possible	High	Medium	Offset area to be selected in accordance with presence of suitable threatened fauna breeding habitat and opportunities. Offset management will avoid the loss of existing breeding habitat and aim to increase breeding habitat where possible.	Unlikely	Moderate	Low
Threatened fauna vehicle strikes in Offset area	Possible injuries or deaths from uncontrolled/unregulated vehicle access to, from and around the Offset area.	Possible	High	Medium	Operations limited to daylight hours where possible. Enforcement of 40 km/hr speed limit within the Offset area. The identification of potential roadkill hotspots will be integrated in the offset selection process, mitigation areas that could increase the risk of vehicle strikes.	Unlikely	Moderate	Low

Risk event	Risk description	Initial risk rating			Planned management measures	Residual risk rating		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Reduction in available resources and increased predation from introduced species	<p>Fallow deer, wild dogs, European foxes, feral cats and other predatory invasive species being introduced in the Offset area, resulting in a decrease of food availability, reduction in available resources and increased predation for threatened fauna.</p> <p>Invasive species contribute to direct competition for resources, direct mortality, indirect mortality from baiting programs to manage invasive species, habitat degradation and displacement and the potential introduction of disease.</p>	Likely	Major	High	<p>Continual monitoring of the threatened species in the Offset area will occur.</p> <p>An Action plan and corrective management measures will be implemented if invasive fauna is recorded within the Offset area.</p> <p>Feral animal control including live trapping, shooting and baiting.</p>	Rare	Moderate	Low
Deliberate culling impacts (including hunting and baiting) within Offset area	<p>Possible illegal hunting, culling or baiting occurring within the Offset area which causes injuries or death to threatened fauna. The risks include direct mortality from hunting and threatened fauna being impacted by broadscale poisoning through baiting programs targeting dingoes and other invasive species.</p>	Possible	Moderate	Medium	<p>Signed landowner agreements to prevent any future culling of threatened species (noting landowners have reported never having culled them). Monitoring of threatened fauna and the Offset area will detect any culling that occurs within.</p> <p>Monitoring (baiting recommended to be preceded by trials to assess extent of non-</p>	Rare	Moderate	Low

Risk event	Risk description	Initial risk rating			Planned management measures	Residual risk rating		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
					target impacts to the northern quoll (CoA 2016).			
Habitat degradation/ destruction causing fragmentation	Extensive land clearing for development and agriculture and timber harvesting, which contributes to fragmentation, habitat loss and reduction of available breeding, denning and foraging resources. Extensive clearing may also occur from inappropriate fire regimes and bush fires.	Likely	Major	High	<p>The Project will be designed to avoid and protect critical habitat, retain movement corridors and put in natural buffers.</p> <p>Activities such as heavy machinery operation during breeding season will be avoided.</p> <p>Illegal timber harvesting will be eliminated from the Offset area.</p> <p>An environmental covenant and habitat protection through National Park and Conservation Agreements will be investigated and applied.</p>	Possible	High	Medium
Inappropriate fire regimes	Inappropriate fire regimes can result in high intensity fires which damage suitable foraging, dispersal, breeding and denning habitat. These fires cause indirect impacts to habitat structure and reduces available resources. They may also contribute to indirect mortality by altering breeding cycles and	Likely	High	High	<p>Implementation of a fire management strategy will reduce the likelihood and severity of fire events.</p> <p>Implementation of an invasive species control program will include managing fuel loads of weeds to reduce risk from high intensity fire.</p>	Possible	Moderate	Medium

Risk event	Risk description	Initial risk rating			Planned management measures	Residual risk rating		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
	increasing predation by removing sheltering habitat.							
Weeds	<p>Increased weed distribution and density impacts habitat structure by obstructing foraging, dispersal, hunting and breeding habitat.</p> <p>Inappropriate pesticide and herbicide use.</p>	Likely	Moderate	Medium	<p>Implementation of a weed management plan will occur, including safe and appropriate uses of pesticides and herbicides. The project will commit to revegetation and regeneration programs which will include monitoring, bush regeneration and managing fuel loads of weeds to reduce risk from high intensity fire.</p> <p>There will be strict quarantine protocols implemented onsite.</p>	Unlikely	Moderate	Low
Disease/ population isolation	<p>The spread of disease directly contributes to mortality and whole population reductions, with fragile and isolated populations at higher risk.</p> <p>Impacts of disease is more problematic in populations with low genetic diversity.</p>	Possible	Moderate	Medium	<p>Implementing of strict monitoring programs for at risk threatened fauna (i.e. Tasmania devil). Fauna observed to be sick will be taken to a vet surgery (or Tasmania devil hospital). Implementation of strict hygiene protocols on site.</p>	Possible	Moderate	Medium
Species-specific risks								
Tasmanian devil								

Risk event	Risk description	Initial risk rating			Planned management measures	Residual risk rating		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Introduction of DFTD within the Offset area(s)	Risk of DFTD becoming present in the Offset area(s).	Likely	Critical	Severe	Other compensatory measures have been proposed to focus on DFTD, including potential vaccination programs and to monitor DFTD exposure and transmission. With the research opportunities, DFTD risk can be monitored with appropriate corrective actions being implemented to mitigate the spread and reduce the consequence.	Likely	High	High
Tasmanian masked owl								
Mortality from collisions	This species is vulnerable to collisions with vehicles and man-made structures such as power lines.	Possible	Minor	Low	No management actions are likely to prevent impact.	Possible	Minor	Low
Loss of nesting habitat through tree die-back	Rural die-back causes by insects or fungal pests, extreme climatic conditions or anthropogenic interference may results in the loss of suitable nesting habitat for this species.	Possible	Minor	Low	Implementation of strict hygiene protocols on site.	Possible	Minor	Low
Secondary poisoning	Secondary poisoning from preying on animals that have ingested rodenticides or other pest control toxins.	Possible	Moderate	Medium	Land management across the Offset area will minimise Rodenticide use (and if unavoidable, avoid second-generation anticoagulants and utilise first-generation	Possible	Moderate	Medium

Risk event	Risk description	Initial risk rating			Planned management measures	Residual risk rating		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
					anticoagulated or non-toxic alternatives).			
Competition for hollows	Increasing cockatoo populations may compete with the Tasmanian masked owl for hollows.	Possible	Moderate	Medium	Monitoring of hollows known to be utilised by Tasmania masked owl.	Possible	Minor	Low
Tasmanian wedge-tailed eagle								
Nest disturbance	This species is highly sensitive to human activity occurring near nesting sites, in some cases leading to nest abandonment. Close proximity to urbanisation and humans often leads to diurnal disruption to the camp or interference by people. Uniformed agricultural practitioners or community can lead to persecution due to the imagined risk to livestock.	Possible	Moderate	Medium	Educate surrounding landowners and people undertaking works within the Offset area around Tasmanian wedge-tailed eagle ecology and sensitivity.	Possible	Minor	Low
Collision risks	Collisions, electrocution and entanglement while dispersing may post a threats, particularly to juvenile birds.	Possible	Minor	Low	Wind turbine placement needs to be strategic and avoid high-risk areas known for nesting and hunting.	Possible	Minor	Low
Ptunarra brown butterfly								
Severe fire outbreak	Fire outbreak resulting in loss of habitat critical for the Ptunarra brown butterfly	Possible	High	Medium	Implement a Fire Management Plan across the entire Offset area. This will	Possible	Moderate	Medium

Risk event	Risk description	Initial risk rating			Planned management measures	Residual risk rating		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
					reduce future impacts to suitable Ptunarra brown butterfly habitat. An analysis will be undertaken of previous fire history data to identify regions that have previously been impacted by high-intensity fires.			
Management of the Offset area								
Unauthorised clearing in the Offset area	Additional disturbances occur to the Offset area through other land uses or activities.	Likely	Moderate	Medium	Ark Energy will enter into a legal agreement with the landholder for use of the site for offsets and the OAMP will be developed in consultation with the landholder. The OAMP will consider the use of fencing and signage to provide additional awareness and protection of the Offset area.	Possible	Minor	Low
Failure of weed management	Failure of weed management to effectively reduce the occurrence of weeds and remove weeds from the Offset area, due to chronic source of ongoing disturbance.	Possible	High	Medium	The OAMP will include specific requirements around weed management, including performance criteria, monitoring, corrective actions, and adaptive management. Additionally, it will include a requirement for regular review and update of weed management protocols.	Possible	Minor	Low

Risk event	Risk description	Initial risk rating			Planned management measures	Residual risk rating		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Offset measures are ineffective to reduce the risk of bushfire	Mismanagement of fire hazards or inappropriate management measures allow an uncontrolled bushfire to occur (e.g. controlled burn becomes uncontrolled, increased fire hazard unaccounted for in planning).	Possible	High	Medium	Undertake review of fire management efforts historically, known fire history, and fire management requirements for vegetation types and the regional/climatic conditions. Fire management strategy with controlled burns, fire breaks to reduce the likelihood and severity of unplanned fire events and reduce the risk of uncontrolled bushfire events, fire management lines, fuel hazard reduction, particularly around potential den sites, and ongoing monitoring and review of the strategy – applied across the whole property.	Possible	High	Medium