Biodiversity Development Assessment Report

Orana BESS

March 2023

Project Number: 220277

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Accredited Assessor Declaration

I certify that this report has been prepared on the basis of the requirements of, and information provided under, the Biodiversity Assessment Method and s6.15 of the BC Act. It has been assessed in accordance with BAM 2020. A full list of staff qualifications and experience can be found in Appendix F of this report.

In preparing this assessment I have acted in accordance with the Accredited BAM Assessor Code of Conduct.

I declare that I have considered the circumstances and there is no actual, perceived or potential conflict of interest.

Signature: Michelle Patrick

Name: Michelle Patrick

Date: 02/03/2023

BAM Assessor Accreditation No: BAAS19078

The associated development case (00035128/BAAS19078/22/00035129) within the BAM Calculator has been finalised as of 31/03/2023, with the associated credit report reflected in Revision 1. NGH has submitted the BAM-C case to the north west region via BOAMs.

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Acronyms and abbreviations

Item	Definition
ASL	Above sea level
AWS	Automatic weather station
BAM	Biodiversity Assessment Method 2020
BC Act	*Biodiversity Conservation Act 2016* (NSW)
BCAR	Biodiversity Certification Assessment Report
BCD	Biodiversity Conservation Division (formerly Office of Environment and Heritage)
BDAR	Biodiversity Development Assessment Report
BESS	Battery Energy Storage System
Biosecurity Act	*Biosecurity Act 2015* (NSW)
BOM	Australian Bureau of Meteorology
CEMP	Construction environmental management plan
Cwth	Commonwealth
DAWE	Department of Agriculture, Water and the Environment
DPE	(NSW) Department of Planning and Environment (formerly Department of Planning, Industry and Environment)
EEC	Endangered ecological community – as defined under relevant law applying to the proposal
EIS	Environmental impact statement
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwth)
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
ESD	Ecologically Sustainable Development
FM Act	*Fisheries Management Act 1994* (NSW)
ha	hectares
HBT	*Hollow bearing tree*
ISEPP	State Environmental Planning Policy (Infrastructure) 2007 (NSW)
KFH	Key Fish Habitat

Item	Definition
km	kilometres
LEP	Local Environment Plan
m	metres
MNES	Matters of National Environmental Significance under the EPBC Act (*c.f.*)
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
PCT	Plant Community Type
REF	Review of Environmental Factors
REP	Regional Environmental Plan
SAII	Serious and Irreversible Impact
SEPP	*State Environmental Planning Policy* (NSW)
sp/spp	Species/multiple species
SSD	State Significant Development
SEARs	Secretary's Environmental Assessment Requirements
TEC	Threatened Ecological Community

Executive summary

The proposed Orana Battery Energy Storage System (BESS) (the Development) is classified as State Significant Development (SSD). A Biodiversity Development Assessment Report (BDAR) is required by the Secretary's Environmental Assessment Requirements (SEARs) to assess the biodiversity impacts according to the NSW Biodiversity Assessment Methodology (BAM). NGH has prepared this BDAR on behalf of the Proponent, Akaysha Pty Ltd (Akaysha).

The proposed Development is located in the Dubbo Local Government Area (LGA) at 6945 Goolma Road, Montefiores NSW 2080, approximately 2km north-east of Wellington. The Development would involve the construction, operation and decommissioning of a Battery Energy Storage System that would supply electricity to the national electricity grid.

The proposed Development Footprint (all areas that may be impacted, as defined in Section 1.1 covers 14.77 ha and is composed predominantly of native vegetation.

The vegetation within the Development Footprint has been assessed by NGH through stratification and vegetation integrity plot (BAM plot) surveys conducted in 2022. The results determined the type and condition of Plant Community Types (PCTs) and associated Threatened Ecological Communities (TECs) within the Development Site. One PCT was identified in different conditions:

- PCT 266 '*White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion'*.

This PCT is listed as Critically Endangered under the *Biodiversity Conservation Act 2016* as White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions.

Due to the high exotic component, this PCT, did not meet the condition thresholds for the EPBC Act equivalent of this TEC (White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland critically endangered ecological community).

The PCT on site was divided into two vegetation zones according to condition and vegetation quality as follows:

- Vegetation Zone 1 Woodland PCT 266 White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion covering 28.47 hectares in the development site and 3.66 hectares in the development footprint.
- Vegetation Zone 2 Derived Grassland PCT 266 White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion covering 19.82 hectares in the development site and 6.96 hectares in the development footprint.

No ecosystem credits were generated for PCT 266 due to the low diversity and cover of native species in the understorey at the site resulting in a low vegetation integrity score and therefore no offsets are required for this PCT. However, 220 hollow bearing trees were recorded and of these 37 hollow bearing trees will be impacted.

Species credits were generated for two species, the Masked Owl and Pink-tailed Legless Lizard. Two other threatened fauna species were recorded on site (Superb Parrot and Grey-headed Flying Fox); however, no species credits were generated as the habitat on site was determined to be foraging only (not breeding) habitat.

Table E1 Species credits requiring an offset

Species Credit Species	Biodiversity risk weighting	Area of habitat for species polygons	Species credits required	Suitable IBRA Subregion for offset
Aprasia parapulchella **Pink-tailed Legless Lizard**	2	6.92 ha (Veg Zone 2) 3.42 ha (Veg Zone 1)	26	Any in NSW
Tyto novaehollandiae **Masked Owl**	2	1.81 ha (Veg Zone 1) 3.29 ha (Veg Zone 2)	12	Any in NSW

Retirement of the species credits will be carried out in accordance with the NSW Biodiversity Offsets Scheme (BOS), and will be achieved by either:

a) Retiring credits under the Biodiversity Offsets Scheme based on the like-for-like rules, or
b) Making payments into the Biodiversity Conservation Fund using the offset payments calculator, or
c) Funding a biodiversity action that benefits the threatened entities impacted by the development.

This BDAR also documents impact on Commonwealth Matters of National Environmental Significance (MNES). The Pink-tailed Legless Lizard is listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwth) (EPBC Act) and the referral process under the EPBC Act is currently being undertaken.

1. Introduction

The proposed Orana Battery Energy Storage System (Orana BESS) is classified as a State Significant Development (SSD) under the State and Regional Development State Environmental Planning Policy (SEPP). This Biodiversity Development Assessment Report (BDAR) assesses the impacts of the proposed Orana BESS (the proposal) according to the NSW Biodiversity Assessment Methodology (BAM) as required by the Secretary's Environmental Assessment Requirements (SEARs) for the proposal.

NGH Pty Ltd has been engaged by Akaysha to prepare a BDAR for the Orana BESS for the Development Footprint within the lots listed in Table 1-1.

Table 1-1 Lot/DP list of Development Footprint

Lot/DP Number	Ownership	Infrastructure components to be included in the lot
Lot 1 DP1226751	Freehold	BESS, access track, onsite substation, O&M buildings
Lot 2 DP1226751	Transgrid	Transmission line, grid connection
Lot 2 DP534034	Freehold	Nil, included in 25m constructability buffer only
Lot DP1136578	Freehold	Indicative access track
Road corridor (Goolma Road)	TfNSW	Intersection upgrades

1.1 The Proposal

Akaysha are proposing to develop the Orana BESS, with an anticipated capacity of 400MW.

The BESS includes the following infrastructure:

- Lithium-ion storage technology
- Operations and maintenance building, site office, switch room and control room.
- Water tanks, security lighting, CCTV and fencing.
- Substation and switch yard - Up to two 330kV/33kV power transformers connecting the BESS to the existing Transgrid substation.
- Transmission line connections - A new overhead or underground transmission line from the Orana substation to the existing Wellington Substation, rated at 330kV and approximately 300m in length.
- Site access from Goolma Road
- Upgrade and extend existing farm track. Refer to Section 3.3.6.

The temporary works areas: Construction compound and construction parking and laydown areas will be entirely within the Development Footprint which is 14.77 ha. The construction and operational footprint will be less than this area as a 25 metre buffer has been applied to the development footprint.

1.1.1 Definitions

The following terms are used in this document:

- **Assessment Area** – land extending 1500 m out from the Development Site used to assess native vegetation extent and other landscape features.
- **Development Footprint**– all areas of land which may be directly impacted by the proposal, either during construction, operation or decommissioning. The Development Footprint has been defined by buffering the Indicative Infrastructure Layout by 25 m, this accounts for all disturbance required to allow for construction activities.
- **Development Site**– the development site is land within which the development footprint will be sited together with areas of land that could be indirectly impacted by the proposal. That is, the Development Site contains the Development Footprint plus a 100 m buffer to allow for indirect impacts.
- **Subject Land** - The development site has the same meaning as 'subject land' defined in the BAM 2020 for the purpose of this BDAR. It excludes the assessment area which surrounds the subject land (i.e., the area of land in the 1500 m buffer zone around the subject land or 500m buffer zone for linear proposals).

1.2 Development Site

1.2.1 Site Location

The development site is located at 6945 Goolma Road, Montefiores, approximately 2km north of Wellington, NSW. The development site is identified as areas mentioned in Table 1-1 including Lot 1 DP1226751, Lot 2 DP1226751 and Lot 2 DP 1136578 (approximately 56.9ha, 40.5ha and 235.5ha respectively). The BESS infrastructure layout would cover an area of approximately 14.77 ha of this (see Figure 1-1).

The Development Site comprises agricultural dominated landscape. The site visit indicated that no areas within the Development Footprint have been subject to cropping or intensive agricultural land use.

Key features of the Development Site include (see Figure 1-2):

- Woodland
- Grassland
- Hollow bearing trees
- Infrastructure
- One dam
- Two unnamed ephemeral waterways. One running north to south in the far east of the site is mapped as Strahler stream order 2 and one running north to south through the centre of the development centre mapped as stream order 1.
- Agricultural grazing land
- Rocky outcrops

Vegetation cover across the development site is PCT 266 (White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion) in the form of woodland and derived grassland. There is one dam within the development site. The vegetation is predominantly

composed of a mix of woodland and grassland. In the woodland area the dominant canopy species is White Box (*Eucalyptus albens*) with exotic and native grasses and herbs. In the grassland areas there was a mix of native and exotic grasses and herbs with low species diversity. Cattle were grazing in the southern part of the site, and around the substation the land was grazed by sheep.

1.3 Study Aims

The aim of this BDAR is to assess the native vegetation and habitats in the Development Site and Development Footprint to determine the impacts and offset requirements under the *Biodiversity Conservation Act 2016 (BC Act)* according to the NSW Biodiversity Assessment Methodology (BAM) as required by the Secretary's Environmental Assessment Requirements (SEARs) for the proposal.

This BDAR includes an assessment of impacts on protected matters listed under the federal *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). This assessment includes use of the Protected Matters Search Tool (PMST) to determine potential species and communities occurring within the locality, and targeted surveys across the site to detect the presence of these entities or their habitats. Entities known or considered likely to occur have been included in the impact assessment, and Assessments of Significance have been prepared to determine the significance of potential impacts on these entities.

1.4 Source of Information Used in the Assessment

The following details sources of information used in the preparation of this report:

Table 1-2 Information sources used in the preparation of this report

Information	Source
Australia's Interim Biogeographic Regionalisation for Australia (IBRA) bioregions and subregions	www.environment.gov.au/land/nrs/science/ibra/australias-bioregions-maps (Department of Climate Change, Energy, the Environment and Water, 2021) https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Bioregions/bioregions-of-new-south-wales.pdf (NSW National Parks and Wildlife Service, 2003)
Mitchell Landscapes	Descriptions for NSW (Mitchell) Landscapes, Version 3 (DECC, 2002)
Concept design and project information	Akaysha
Biodiversity Assessment Method 2020	www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/accredited-assessors/biodiversity-assessment-method-2020 (DPIE, Biodiversity Assessment Method, 2020)
Biodiversity Assessment Method Calculator	www.lmbc.nsw.gov.au/bamcalc (Welcome to the Biodiversity Assessment Calculator, 2022)
Department of Primary Industries (DPI) profiles of threatened species, populations, ecological communities and key threatening processes	www.dpi.nsw.gov.au/fishing/threatened-species/what-current (NSW Department of Primary Industries, 2022)
Directory of Important Wetlands	www.environment.gov.au/water/wetlands/australian-wetlands-database/directory-important-wetlands (Department of Climate Change, Energy, the Environment and Water, 2021)
NSW Biodiversity Values Map and Threshold Tool	www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap (DPIE, Biodiversity Values Mapping tool, 2021)
NSW BioNet Atlas	www.bionet.nsw.gov.au (NSW Department of Planning, Industry and Environment, 2022)
NSW BioNet Vegetation Classification	www.bionet.nsw.gov.au (Department of Planning, Industry and

Information	Source
	Environment, 2022)
NSW Flora Online	https://plantnet.rbgsyd.nsw.gov.au (The Royal Botanic Gardens and Domain Trust Version, 2022)
NSW SEED Mapping Portal	www.seed.nsw.gov.au (NSW Government, 2022)
NSW Historical, Aerial and Satellite Imagery	NSW Government Spatial Services, Historical, Aerial and Satellite Imagery https://www.spatial.nsw.gov.au/products_and_services/aerial_and_historical_imagery
NSW Soil and Land Information	www.environment.nsw.gov.au/eSpade2WebApp#
NSW Threatened Species Profiles (NSW Government)	www.environment.nsw.gov.au/threatenedspeciesapp (NSW Department of Planning, Industry and Environment, 2022)
NSW Threatened Species Scientific Committee final determinations	www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/nsw-threatened-species-scientific-committee/determinations/nsw-threatened-species-scientific-committee-final-determinations (NSW Department of Planning, Industry and Environment, n.d.)
Protected Matters Search Tool (Commonwealth Government)	www.environment.gov.au/epbc/protected-matters-search-tool
Species Profiles and Threats (SPRAT) Database (Commonwealth Government)	www.environment.gov.au/cgi-bin/sprat/public/sprat.pl (Department of Climate Change, Energy, the Environment and Water, 2022)

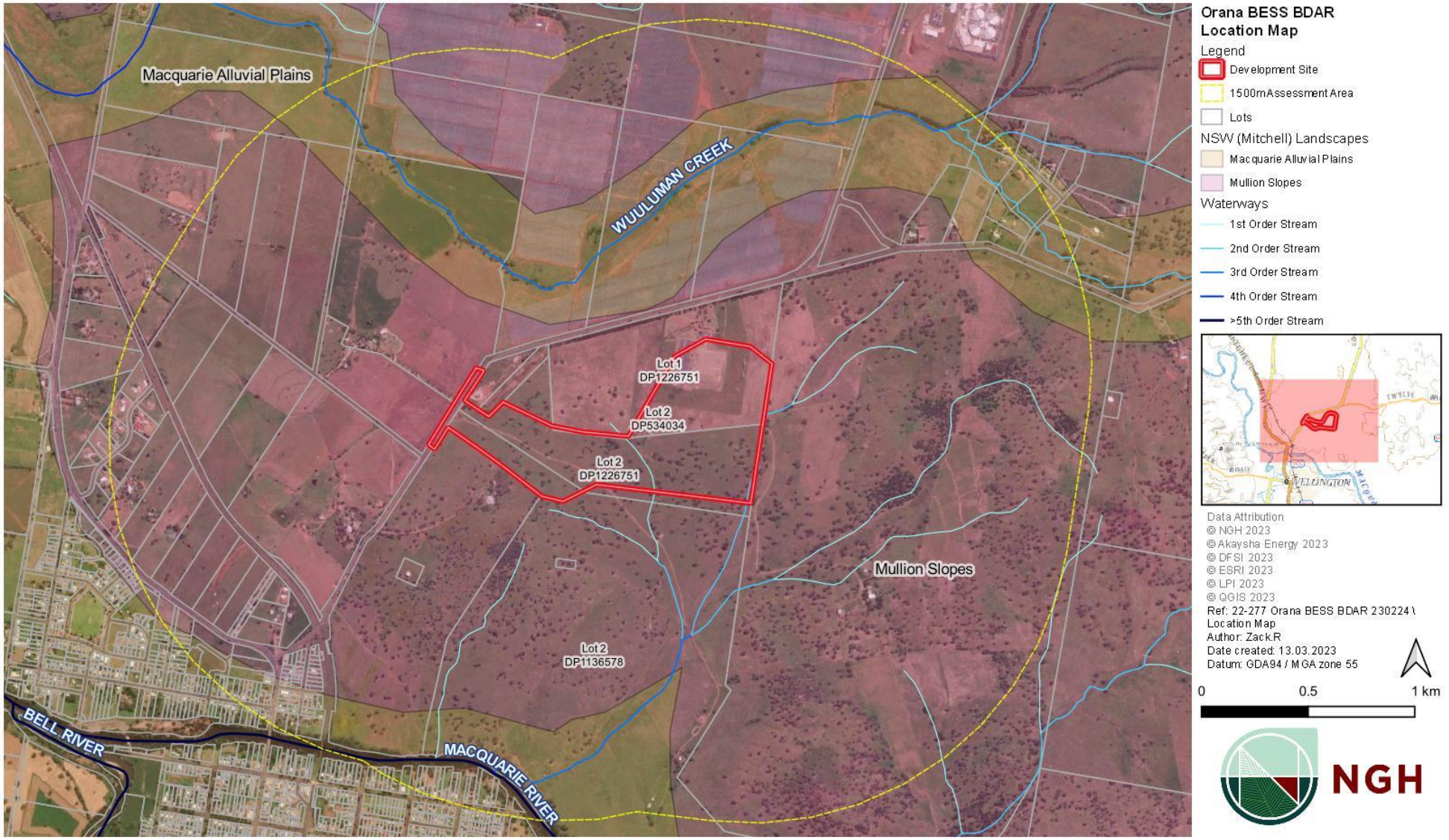


Figure 1-1 Location Map

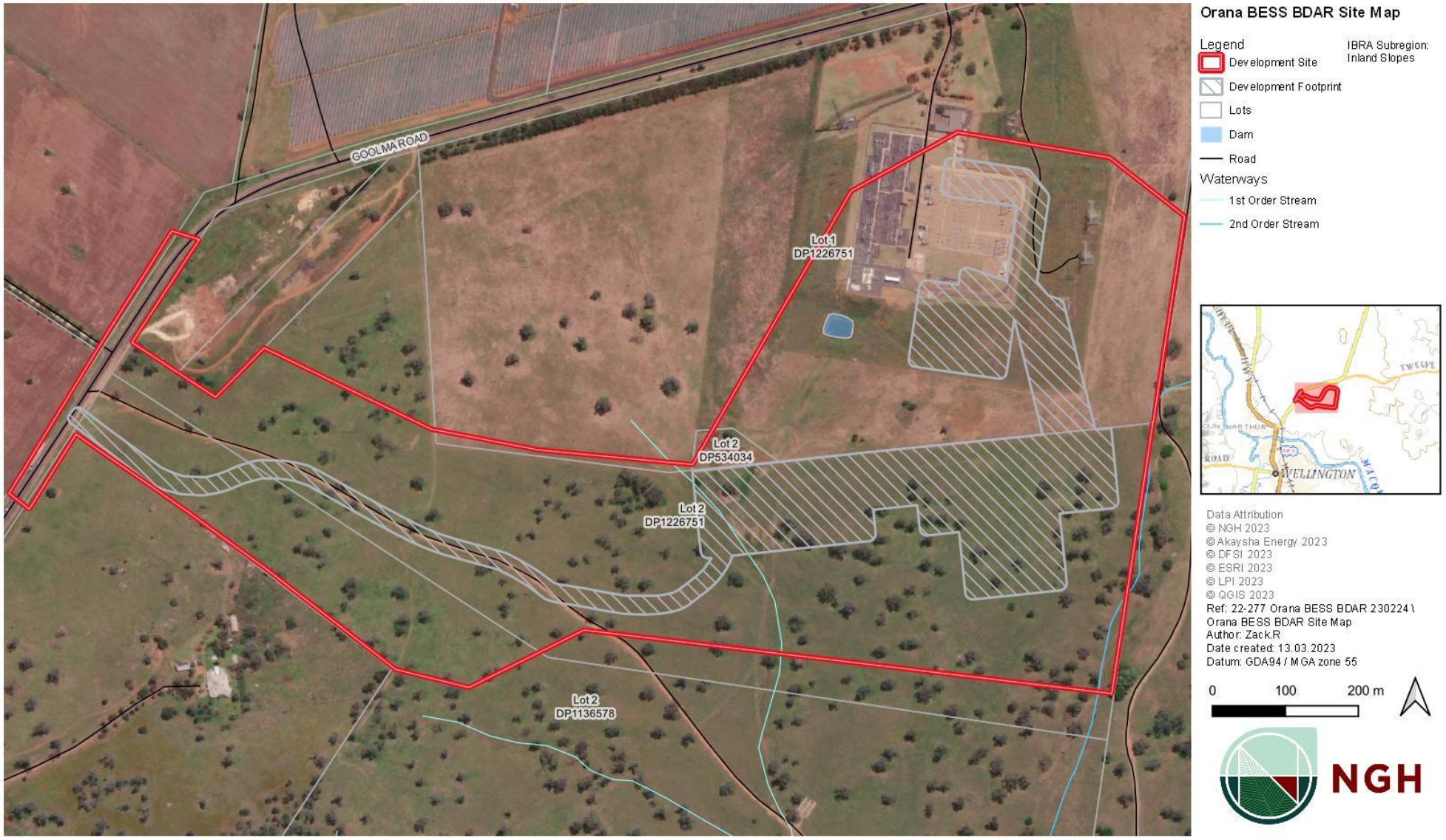


Figure 1-2 Map showing the Development Site.

2. Landscape Context

2.1 Overview

The development site is located in undulating topography with grazing being the dominant land use. The site is adjacent to a Goolma Road, to the west is agricultural land and to the north Wellington Solar Farm and the Substation. Wellington township is located to the south and the immediate adjacent properties and agricultural land.

The landscape features described in the following section are illustrated in Figure 1-1 to Figure 2-4.

2.2 IBRA Bioregion

Interim Biogeographical Regionalisation for Australia (IBRA) bioregions are geographically distinct bioregions based on common climates, geology, landforms and native vegetation (Thackaway and Creswell, 1995). There are 89 Bioregions within Australia. The Development Site falls across one IBRA Bioregion, the South Western Slopes (Figure 1-1).

The South Western Slopes Bioregion is an extensive area of 8,657,426 ha (approximately 8,070,608 occurs in NSW, the remainder in Victoria). It extends from Albury in the south to Dunedoo in the northeast. Parts of the Macquarie River, Murray, Murrumbidgee and Lachlan Catchments are included in this bioregion. The climate is mainly sub-humid with hot summers and no dry season. Where there are higher elevations in the eastern boundary of the bioregion, adjacent to the South Eastern Highlands, there is a temperate climate with warm summers. Mean annual rainfall ranges between around 400mm in the west up to around 1200mm in the east (NSW National Parks and Wildlife Service, 2003).

2.3 IBRA Subregion

The Development Site falls within the Inland Slopes IBRA subregion. The South West Slopes IBRA region has two IBRA sub-regions – Inland Slopes and Lower Slopes (OEH 2023). The inland Slopes Sub-IBRA region was entered into the BAM Calculator.

The Inland Slopes extends from Dunedoo in the north to Albury in the south west. The Inland Slopes and Lowers Slopes are separated by elevation change.

2.4 NSW Landscape Regions

The Development Site falls across the Mullion Slopes Mitchell Landscapes. This was entered into the BAM Calculator.

The Mullion Slopes is described below:

'Steep hills and strike ridges on tightly folded Ordovician andesite, conglomerate and tuff, Silurian rhyolite and shale, Devonian quartz sandstones, slate and minor limestone, general elevation 500 to 830m, local relief 200m. Stony uniform sand and loam in extensive rock outcrop along crests, stony red and brown texture-contrast soil on slopes, yellow harsh texture-contrast soil in valleys with some evidence of salinity. Gravel and sand in streambeds. Open forest to woodland of; white gum (Eucalyptus rossii), brittle gum (Eucalyptus mannifera), broad-leaved peppermint (Eucalyptus dives), red box (Eucalyptus polyanthemos), mountain grey gum (Eucalyptus cypellocarpa), white box (Eucalyptus albens) with yellow box (Eucalyptus melliodora) on lower slopes and river oak (Casuarina cunninghamiana) along the streams' (DECC, 2002).

2.5 Percent Native Vegetation Cover

The development site is native vegetation and exotic vegetation. The native vegetation cover was calculated in accordance with the definitions under the BAM 2020 by applying a 1500m buffer around the edge of the development site and digitising all native vegetation within inside the 1500m buffer, including native vegetation inside the development site. Native vegetation cover within the Development Site and Development Footprint were determined through vegetation stratification and survey, however the broader 1500m buffer relied on State Vegetation Mapping (SEED, 2015).

The native vegetation cover within the 1500m buffer was estimated at approximately 738.98ha out of a total area of 1407.52ha. This equates to 52.56% native vegetation coverage within the 1500m buffer, which was entered into the BAM Calculator. This percent cover falls into the >30 – 70% cover class. See Figure 2-4 showing native vegetation within the 1500 m buffer.

Vegetation extent is discussed in more detail in section 3.1.

2.6 Areas with non-native vegetation

Areas of non-native vegetation have been cleared and used for agriculture. The exotic areas in the development footprint extend around the substation and a small area downstream from the dam in the development site. The total area of exotic vegetation in the development site is 7.596 and in the development footprint it is 2.67ha. These areas provide suitable foraging habitat for raptors, parrots, cockatoos and macropods, and introduced species such as cats, foxes and rabbits.

2.7 Hydrology

2.7.1 Strahler Stream Order – Rivers, Creeks and Streams

The waterway within the development site is shown on Figure 2-1.

First order stream

There is an unnamed ephemeral first order stream that is a tributary of the Macquarie River which is 1.6km south east of the Development Footprint. There was water present with minimal to no flow occurring during the August site visit.

Second order stream

There is an unnamed ephemeral second order stream that is a tributary of the Macquarie River which is 1.6km south east of the Development Footprint. There was water present with minimal to no flow occurring during start of August site visit, however heavy rains at end of August site visit resulted in fast flows. The Macquarie River flooded in Wellington at the same time.

Figure 2-1 Unnamed ephemeral watercourses (Strahler stream order 1 and 2 respectively)

2.7.2 Wetlands

An EPBC protected matters search completed on 28 July 2022 identified four wetlands of international importance. The closest of these to the Development Site are the Macquarie Marshes, located 150-200km from the Development Site. There are no wetlands mapped or seen during the site visit within the Development Site. One dam exists in the northern section of the Development Site near the Substation.

2.8 Connectivity Features

No state or regionally significant biodiversity links occur within the Development Site nor within 1500m assessment area. The woodland trees in the Development Site and surrounding properties provide connectivity to the vegetation on the Macquarie and Bell Rivers within the locality. The closest reserve is Mount Arthur Reserve which is 7 kilometres to the west of Wellington. Mount Wellington Caves are located further south of Wellington and Aspley townships.

The development site and surrounding area is fragmented with many areas being cleared for agricultural pursuits such as cropping or grazing. The woodland areas have been modified with many trees and shrubs being removed or impacted due to grazing.

The development site shows woodland habitat with a mixed understorey of native and exotic grasses and forbs. The native species persist in lower diversity, cover and composition (see Figure 2-2). The canopy trees continue to provide habitat for many native species and are important stepping stones from larger reserves.

Figure 2-2 Examples of grassland and fragmented woodland in the Development Site.

2.9 Geology & Soils

2.9.1 Areas of Geological Significance

There are no caves, karsts, or cliffs within the Development Site.

There are some imbedded, partially imbedded and surface granite rocks scattered around the site (See Figure 2-3). There are loose rocks throughout the development site. NGH ecologists assessed the rocky areas in September 2022 and concluded that they were not large enough for the Brush-tailed Rock Wallaby but were suitable for the Pink-tailed Legless Lizard (PTLL) (*Aprasia parapulchella*). The PTLL was identified on the development site during the September 2022 targeted surveys.

The drainage lines, although ephemeral, show some evidence of clay soils in low lying areas with pugging due to the cattle grazing in the development site. The rocky areas around the substation are exposed and imbedded. There were areas that had been de-rocked around the substation.

Figure 2-3 Example of rocky outcrop and scattered rocks in the Development Site

2.9.2 Soil hazards

The *NSW Acid Sulfate Soils Risk* mapping, *Environmental Protection Authority contaminated lands records*, and *Environmental Planning Instrument – Salinity* mapping were reviewed 22/02/2022, and no mapped area or records were identified within the Development Site.

2.10 Areas of Outstanding Biodiversity Value

No areas of outstanding biodiversity value occur within the Development Site. Areas of Outstanding Biodiversity Value are special areas with irreplaceable biodiversity values that are important to the whole of New South Wales, Australia or globally.

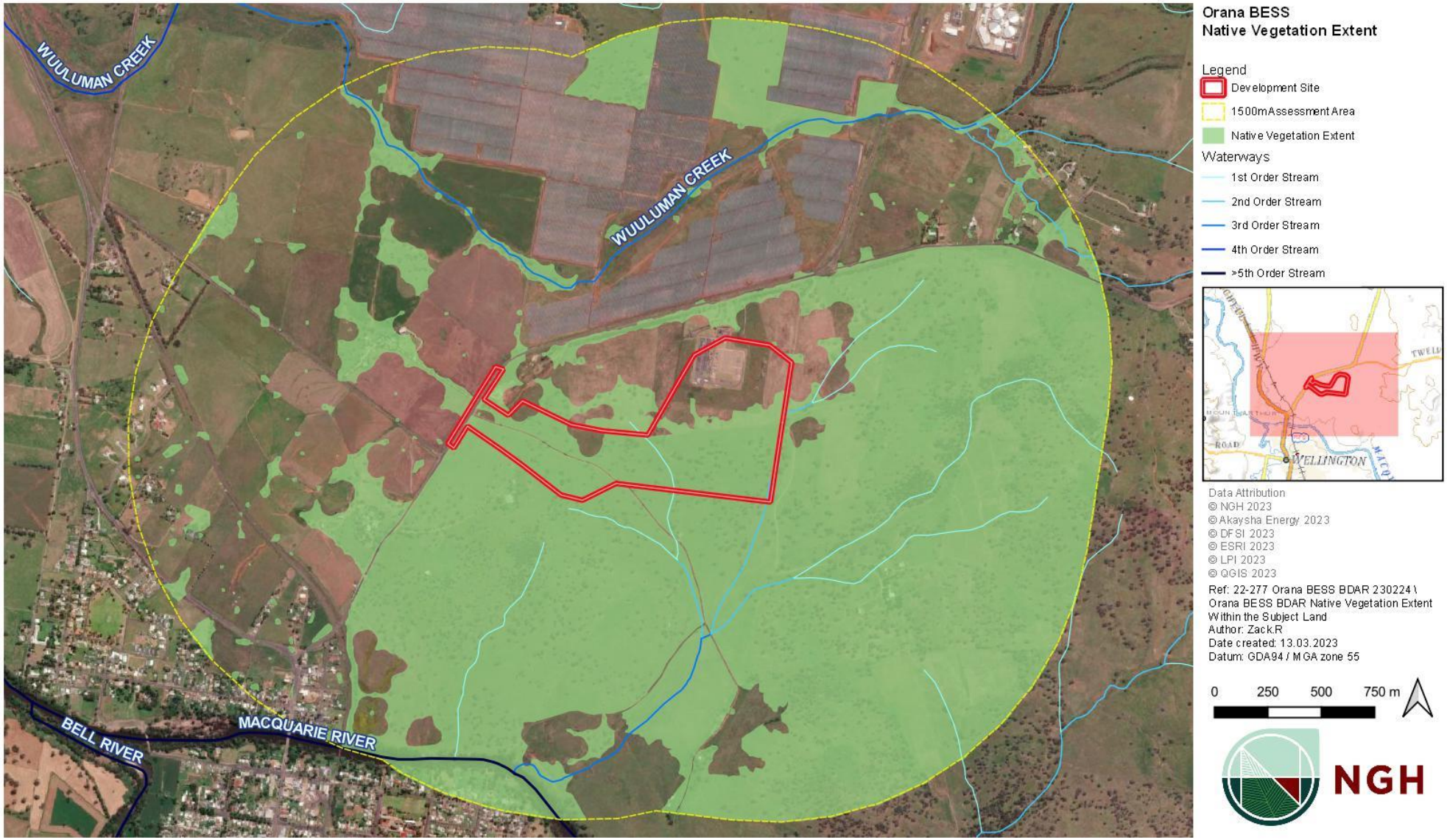


Figure 2-4 Native vegetation extent in development site and 1500 m buffer

3. Native Vegetation

3.1 Native Vegetation Extent

The Development Site is dominated by a mix of native and non-native groundcover vegetation. The areas are divided into two forms – Woodland where there is a presence of White Box (*Eucalyptus albens*) and derived grassland. It is evident the site has a long history of agricultural use and grazing.

3.1.1 Existing native vegetation mapping

A search was undertaken of the DPIE BioNet Vegetation Classification Tool (BioNet) database and the NSW SEED Mapping Portal to assess existing vegetation mapping information within the Development Site. Relevant mapping of the Development Site included State Vegetation Central West-Lachlan Region Version 1.4.VIS_ID 4468, aerial imagery, areas that were ground truthed during the vegetation stratification and woody extent vegetation GIS layers. This mapping helped inform vegetation mapping, however PCT and condition were based on on-site data collection.

The majority of the development site was mapped as PCT 266 - White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion, with a small patch in the middle part of the development footprint mapped as PCT 76 - Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions. After undertaking floristic surveys, NGH ecologists determined that all of the development was PCT 266 - White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion.

3.1.2 Areas not containing native vegetation

Two small areas of exotic vegetation were recorded in the development site. The first was around the substation and the second was a small area downhill from the existing dam. The road reserve contained patches of exotic vegetation. These areas were surveyed using BAM plots to determine the floristic cover and abundance.

The infrastructure that formed part of the areas not containing native vegetation included the roads and hardstands areas around Wellington township, substation and solar farms. All of these areas were excluded from the native vegetation extent mapping.

3.2 Plant Community Types (PCTs)

3.2.1 Methods to Assess PCTs

In addition to reviewing the native vegetation mapping as described in section 3.1.1 the following details the identification of PCTs.

Field surveys

On-site field surveys were conducted by BAM accredited ecologists in August 2022 and September 2022 to determine the PCTs on-site and determine the presence of any threatened ecological communities. Surveys included BAM plot data collection and stratification of vegetation across the site. Targeted flora and fauna surveys were conducted to determine the presence of

suitable habitat for threatened fauna, both for 'ecosystem credit' species and 'species credit' species (see section 4).

Floristic surveys

A site inspection and 9 vegetation integrity plots (BAM plots) were conducted across the Development Site from the 20th-22nd September 2022. The aim of this field work was to assess the vegetation visually and conduct an acceptable number of VI plots in the representative PCTs observed onsite.

PCT Identification was based on:

- most dominant native species present inside 20 x 20m plots;
- tree species observed in similar and adjoining landforms to the Development Site (where absent in plots); and
- location in the IBRA subregion and distribution using the BioNet Vegetation Classification Database.

Once PCTs were identified, they were then stratified into different condition states using VI scores generated by the BAM-C.

Vegetation integrity quadrats consisting of 20 x 20m floristic survey (composition, structure) and 20 x 50m (function) were replicated across the Development Footprint as detailed in the BAM within each vegetation zone. Data was collected utilising the methodology presented in the BAM (DPIE 2020) by an accredited BAM assessor. All plot surveys, impact assessment and credit calculations were directed by and certified by an accredited BAM assessor. Details of personnel involved in field surveys is provided in Appendix E.

3.2.2 Limitations

A thorough search of the development site was undertaken where possible to do so in accordance with the BAM, and relevant threatened flora and fauna guidelines.

Targeted threatened flora and fauna surveys were undertaken in August, September and December 2022 at the optimal survey times for the species as recommended by the BAM-C. PCT determination and assessment of their overall condition were considered to have a high confidence and considered adequate. Minimum plot numbers and targeted flora and fauna survey methods, effort and timing have been met.

Although sufficient survey methods and effort were undertaken to identify all hollow-bearing trees within the Development Site, it is possible that some hollows in the canopy of trees may not have been detected given assessment was undertaken from the ground.

3.2.3 PCTs identified

One PCT was identified within the Development Footprint:

- PCT 266 '*White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion'*.

Descriptions of the PCT identified is provided in Table 3-1.

Table 3-1 Description of PCT 266 within the Development Site

PCT name: White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion'		
Vegetation formation	Grassy Woodlands;	
Vegetation class	Western Slopes Grassy Woodlands;	
Vegetation type	**PCT ID**	266
	Common Community Name	White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion'
Approximate extent within the Development Site	28.47 ha – woodland low - good condition (VI score <15) 19.82 ha – grassland low condition (VI score <15)	
Species relied upon for PCT identification	Species name	Relative abundance
	Eucalyptus albens	2 in plot 6, 2 in plot 8
	Calotis lappulacea	5 in plot 6, 20 in plot 4, 5 in plot 3, 2 in plot 2, 5 in plot 7
	Rumex brownii	5 in plot 1, 5 in plot 6, 10 in plot 5, 1 plot 4, 1 in plot 3, 20 in plot 2, 1 in plot 8, 10 in plot 7,
	Desmodium varians	10 in plot 6, 20 in plot 4, 15 in plot 3, 50 in plot 8,
	Oxalis perennans	100 in plot 6, 20 in plot 4, 10 in plot, 5 in plot 8, 5 in plot 7,
	Vittadinia cuneata	5 in plot 6, 20 in plot 4, 10 in plot 3, 5 in plot 8, 5 in plot 7,
	Bothriochloa macra	10 in plot 6, 2 in plot 4, 1 in plot 7,
	Chloris truncata	300 (mostly new growth in plot 4)
	Aristida behriana	1 in plot 4
	Plantago varia	1 in plot 6
Justification of evidence used to identify the PCT	The dominance of the canopy species *E. albens* narrowed the possible PCTs down to three, PCT 268, PCT 282 and PCT 266. PCT 266 was chosen over 268 and PCT 282 due to the dominance of *E. albens* and the understorey species present.	
TEC Status	This PCT forms part of the Critically Endangered BC Act listed White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North	

PCT name: White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion'	
	Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions, referred to from this point onwards as 'Box-Gum Woodland'. This PCT, due to the high exotic component, does not meet the condition thresholds for the EPBC Act equivalent of this TEC (DEH, undated).
Estimate of percent cleared within NSW	94%
Examples	 Figure 3-1 PCT 266 Woodland Low - Good (zone 1)

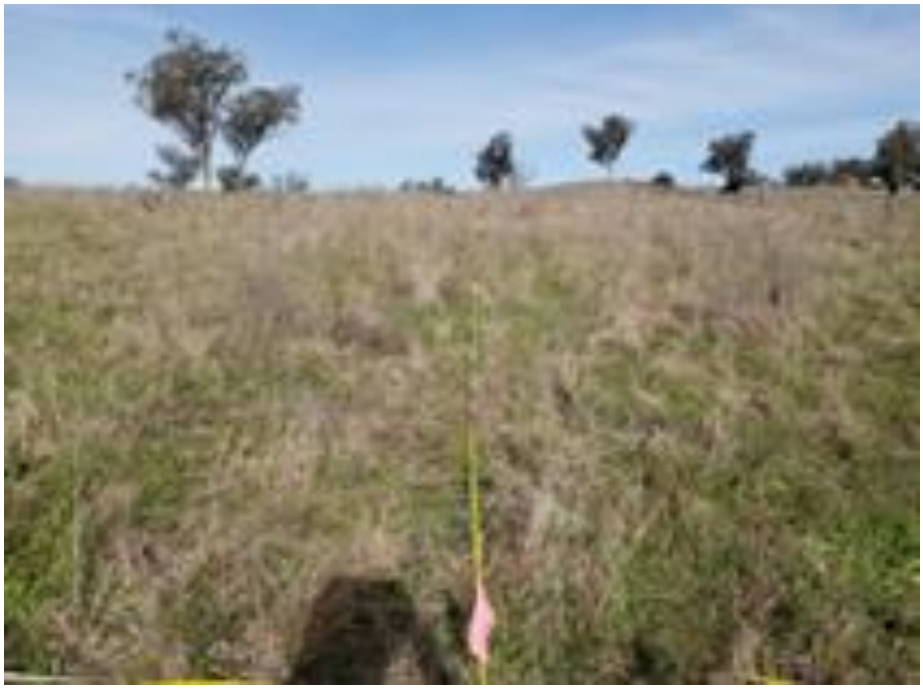
PCT name: White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion'
 Figure 3-2 PCT 266 Grassland - Low (zone 2)  Figure 3-3 PCT 266 Grassland - Low (zone 2)

Figure 3-4 PCTs in the Development Site.

3.3 Vegetation Integrity Assessment

3.3.1 Vegetation zones and survey effort

Vegetation integrity plots were used to further delineate PCTs into vegetation zones based on condition, which was determined using the vegetation integrity score (VI score) calculated in the BAM-C and extrapolated out in combination with on-site vegetation stratification and aerial imagery.

The number of vegetation integrity plots (BAM plots) undertaken per zone was based on Table 3, Section 4.3.4 of the BAM (2020). As BAM plots were used to inform planning to avoid and minimise impacts, refer to Table 3-2.

Table 3-2 Vegetation zones within the Development Footprint.

Zone ID	PCT ID	Condition	Area in development site (ha)	Area in development footprint (ha)	Plots undertaken (and required under the BAM)	Patch size (ha)
1	266_Woodland_Low-Good	Low - good	28.47	3.66	3	101
2	266_Grassland_Low	Low	19.82	6.96	4	101
3	Exotic	Poor	8.30	2.60	2	101
		Total Area (ha)	**56.59**	**13.29**	9	

3.3.2 Vegetation integrity assessment results

The results of the plot field data can be found in Appendix A. The plot data from the vegetation integrity survey plots were entered into the BAM calculator. The results of the vegetation integrity assessment are provided in Table 3-3.

Table 3-3 Current vegetation integrity scores for each vegetation zone within the Development Footprint

Zone ID	PCT/Zone	Composition score	Structure score	Function score	Vegetation Integrity Score
1	266_Woodland_Low-Good	33.2	11.9	5.1	12.6
2	266_Grassland_Low	53	1.4	0	0.9
3	Exotic	31.2	2.8	13.6	10.6

Figure 3-5 Vegetation zones and plot locations at the Development Site.

4. Threatened Species

4.1 Ecosystem Credit Species

The following ecosystem credit species were returned by the BAM calculator as being associated with the PCTs present within the Development Footprint. These are assumed to occur and contribute to ecosystem credits.

Table 4-1 Ecosystem credit species predicted by the BAM-C.

Common Name	Associated PCT	NSW Listing Status	National Listing Status	Sensitivity to potential gain
Fauna				
Anthochaera phrygia **Regent Honeyeater (Foraging)**	PCT 266	Critically Endangered	Critically Endangered	High Sensitivity to Potential Gain
Artamus cyanopterus cyanopterus **Dusky Woodswallow**	PCT 266	Vulnerable	Not Listed	Moderate Sensitivity to Gain
Callocephalon Fimbriatum **Gang-gang Cockatoo** ***(Foraging)***	PCT 266	Vulnerable	Endangered	High Sensitivity to Gain
Calyptorhynchus lathami **Glossy Black-Cockatoo (Foraging)**	PCT 266	Vulnerable	Not Listed	High Sensitivity to Gain
Chthonicola sagittata **Speckled Warbler**	PCT 266	Vulnerable	Not Listed	High Sensitivity to Gain
Circus assimilis **Spotted Harrier**	PCT 266	Vulnerable	Not Listed	Moderate Sensitivity to Potential Gain
Climacteris picumnus victoriae **Brown Treecreeper (eastern subspecies)**	PCT 266	Vulnerable	Not Listed	High Sensitivity to Gain
Daphoenositta chrysoptera **Varied Sittella**	PCT 266	Vulnerable	Not Listed	Moderate Sensitivity to Potential Gain
Dasyurus maculatus	PCT 266	Vulnerable	Endangered	

Common Name	Associated PCT	NSW Listing Status	National Listing Status	Sensitivity to potential gain
Spotted-tailed Quoll				
Falco subniger **Black Falcon**	PCT 266	Vulnerable	Not Listed	Moderate Sensitivity to Gain
Falsistrellus Tasmaniensis **Eastern False Pipistrelle**	PCT 266	Vulnerable	Not Listed	High Sensitivity to Gain
Glossopsitta pusilla **Little Lorikeet**	PCT 266	Vulnerable	Not Listed	High Sensitivity to Gain
Glossopsitta Porphyrocephala **Purple-crowned Lorikeet**	PCT 266	Vulnerable	Not Listed	High Sensitivity to Gain
Grantiella picta **Painted Honeyeater**	PCT 266	Vulnerable	Vulnerable	Moderate Sensitivity to Gain
Haliaeetus leucogaster **White-bellied Sea-Eagle (Foraging)**	PCT 266	Vulnerable	Listed as a marine/migratory species	High Sensitivity to Gain
Hieraaetus morphnoides **Little Eagle (Foraging)**	PCT 266	Vulnerable	Not Listed	Moderate Sensitivity Gain
Hirundapus Caudacutus **White-throated Needletail**	PCT 266	Not Listed	Vulnerable	High sensitivity to gain
Lathamus discolor **Swift Parrot**	PCT 266	Endangered	Critically Endangered	Moderate Sensitivity to Potential Gain
Lophoictinia isura **Square-tailed Kite (Foraging)**	PCT 266	Vulnerable	Not Listed	Moderate Sensitivity Gain
Melanodryas cucullata cucullata **Hooded Robin (south-eastern form)**	PCT 266	Vulnerable	Not Listed	Moderate Sensitivity to Gain

Common Name	Associated PCT	NSW Listing Status	National Listing Status	Sensitivity to potential gain
Melithreptus gularis gularis **Black-chinned Honeyeater (eastern subspecies)**	PCT 266	Vulnerable	Not Listed	Moderate Sensitivity to Gain
Miniopterus orianae oceanensis **Large Bent-winged Bat (Foraging)**	PCT 266	Vulnerable	Not Listed	Very High Sensitivity to Potential Gain
Neophema pulchella **Turquoise Parrot**	PCT 266	Vulnerable	Not Listed	High Sensitivity to Potential Gain
Ninox connivens **Barking Owl (Foraging)**	PCT 266	Vulnerable	Not Listed	High Sensitivity to Potential Gain
Nyctophilus corbeni **Corben's Long-eared Bat**	PCT 266	Vulnerable	Vulnerable	High Sensitivity to Potential Gain
Petroica boodang **Scarlet Robin**	PCT 266	Vulnerable	Not Listed	Moderate Sensitivity to Gain
Petroica phoenicea **Flame Robin**	PCT 266	Vulnerable	Not Listed	Moderate Sensitivity to Gain
Polytelis swainsonii **Superb Parrot (Foraging)**	PCT 266	Vulnerable	Vulnerable	High Sensitivity to Potential Gain
Pomatostomus temporalis temporalis **Grey-crowned Babbler (eastern subspecies)**	PCT 266	Vulnerable	Not Listed	Moderate Sensitivity to Gain
Pteropus Poliocephalus **Grey-headed Flying-fox (Foraging)**	PCT 266	Vulnerable	Vulnerable	High Sensitivity to Potential Gain
Saccolaimus flaviventris **Yellow-bellied Sheathtail-bat**	PCT 266	Vulnerable	Not Listed	Moderate Sensitivity to Gain

Common Name	Associated PCT	NSW Listing Status	National Listing Status	Sensitivity to potential gain
Stagonopleura guttata **Diamond Firetail**	PCT 266	Vulnerable	Not Listed	Moderate Sensitivity to Gain
Tyto novaehollandiae **Masked Owl (Foraging)**	PCT 266	Vulnerable	Not Listed	High Sensitivity to Potential Gain

4.2 Predicted species excluded from inclusion in the BAM-C

The following predicted species were excluded from further assessment based on evidence of geographic limitations, degraded habitat or the species being vagrant. Further details are provided in the last column of Table 4-2.

Table 4-2 Predicted species excluded from further assessment.

Ecosystem credit species	Vegetation zones excluded	Reason for exclusion
Anthochaera phrygia **Regent Honeyeater (Foraging)**	PCT 266 (Vegetation Zones 1 & 2)	Not in Important Habitat Area map
Lathamus discolor **Swift Parrot (Breeding)**	PCT 266 (Vegetation Zones 1 & 2)	Not in Important Habitat Area map. No breeding habitat on mainland Australia
Miniopterus orianae oceanensis **Large Bent-winged Bat**	PCT 266 (Vegetation Zones 1 & 2)	Lack of preferred habitat, no caves within 100m of development site. Further consultation with BCD confirmed this species could be excluded due to the nearest caves kilometres away.

4.3 Candidate Species

4.3.1 Candidate species to be assessed

The BAM Calculator predicted the following candidate species to are likely occur within the Development Footprint (Table 4-3). Under the BAM, these generate additional species credits unless:

1. They are excluded because key habitat features don't exist, or they are geographically limited. Some species may also be excluded because important habitat mapping does not exist inside the subject land, or
2. Habitat quality is sufficiently degraded such that they could not occur or,
3. Survey effort has demonstrated they are not present.

Criterion 1 and 2 are addressed in the table below, excluding 6 species on this basis.

Table 4-3 Candidate species requiring assessment.

Species Credit Species	Key habitat requirements, geographic restrictions, Important habitat mapping	Sensitivity to gain class	BC Act Status	EPBC Act status	Criterion 1: Geographic limits, important mapped areas	Criterion 2: Suitable habitat quality and abundance on site	Included or excluded or added, or assumed present	Reason for inclusion or exclusion or assumed presence
Anthochaera phrygia **Regent Honeyeater (Breeding)**	Key habitat is geographically restricted in NSW to areas mapped as 'important mapped areas' and sourced in BOAMS. Relevant experts have compiled this map based on best available scientific literature.	High Sensitivity to Potential Gain	Critically Endangered	Critically Endangered	Subject land is outside of important habitat mapping.	White Box is one of the key species.	Excluded	Proposal Site not on important habitat map
Ammobium craspedioides ***Yass Daisy***	None	High Sensitivity to Gain	Vulnerable	Vulnerable	Subject land is within known geographic range	Box-Gum woodland	Included	Within known distribution. Associated with dominant tree species, *Eucalyptus albens*, on site
Acacia ausfeldii **Ausfeld's Wattle**	Foot slopes and low rises on sandstone	High Sensitivity to Gain	Vulnerable	Not Listed	Subject land is within known	White Box is dominant tree on site	Included	Within known distribution. Associated with dominant tree species,

Species Credit Species	Key habitat requirements, geographic restrictions, Important habitat mapping	Sensitivity to gain class	BC Act Status	EPBC Act status	Criterion 1: Geographic limits, important mapped areas	Criterion 2: Suitable habitat quality and abundance on site	Included or excluded or added, or assumed present	Reason for inclusion or exclusion or assumed presence
					geographic range. Associated with White Box			*Eucalyptus albens*, on site
Aprasia parapulchella **Pink-tailed Legless Lizard**	Rocky areas or within 50m of rocky areas	High Sensitivity to Gain	Vulnerable	Vulnerable	Subject land is within known geographic range. Rocky areas	Rocky areas with partially imbedded rocks.	Included	Rocky areas on site
Burhinus grallarius **Bush Stone-curlew**	Requires fallen/standing dead timber including logs.	High Sensitivity to Gain	Endangered	Not Listed	Open woodland. Within known geographic range.	Lowland grassy woodland on site. Some fallen/standing timber on site	Included	Suitable habitat present within Development Site and within known or predicted distribution.
Callocephalon fimbriatum **Gang-gang Cockatoo** **(Breeding)**	Hollow bearing trees Eucalypt tree species with hollows at least 3 m above the ground and with hollow diameter of 7 cm or larger	High Sensitivity to Gain	Vulnerable	Endangered	Habitat features present in within Development Footprint.	Box-gum woodland, some hollows greater than 10cm in diameter. Open eucalypt	Included	Suitable habitat present within Development Site and within known distribution. Trees with

Species Credit Species	Key habitat requirements, geographic restrictions, Important habitat mapping	Sensitivity to gain class	BC Act Status	EPBC Act status	Criterion 1: Geographic limits, important mapped areas	Criterion 2: Suitable habitat quality and abundance on site	Included or excluded or added, or assumed present	Reason for inclusion or exclusion or assumed presence
						assemblages on site		hollows >9cm present
Calyptorhynchus lathami **Glossy Black-Cockatoo (Breeding)**	Requires living or dead hollow bearing trees, where hollow is >15cm in diameter and >8m from ground.	High Sensitivity to Gain	Vulnerable	Not Listed	Hollow-bearing trees present within the Development Site.	Hollow bearing trees > 15cm in diameter present	Included	Hollow-bearing trees with >15cm diameter present within Development Site and within known distribution.
Euphrasia arguta **Euphrasia arguta**	None	High Sensitivity to Gain	Critically Endangered	Critically Endangered	Within predicted geographic range according to DPIE profile.		Included	Within predicted geographic range according to DPIE profile.
Grevillea wilkinsonii **Tumut Grevillea**	None	High Sensitivity to Gain	Critically Endangered	Endangered	Within predicted geographic range according to DPIE profile.	Alluvial soil	Included	Although up to 2.5m tall and not seen on site precautionary measure would be to include -

Species Credit Species	Key habitat requirements, geographic restrictions, Important habitat mapping	Sensitivity to gain class	BC Act Status	EPBC Act status	Criterion 1: Geographic limits, important mapped areas	Criterion 2: Suitable habitat quality and abundance on site	Included or excluded or added, or assumed present	Reason for inclusion or exclusion or assumed presence
					Outside of the distribution according to the Recovery Plan 2001			cattle could have eaten it down
Haliaeetus leucogaster **White-bellied Sea-Eagle (Breeding)**	Requires living or dead mature trees within suitable vegetation within 1 km of a rivers, lakes, large dams or creeks, wetlands and coastlines.	High Sensitivity to Gain	Vulnerable	Not Listed	No large waterbodies within 1km of Development Footprint. However large river approx. 1.3km away.	Living and dead mature trees in Development Site	Include	Large waterbody approx. 1.3km away.
Hieraaetus morphnoides **Little Eagle (Breeding)**	Nest trees - live (occasionally dead) large old trees within vegetation)	Moderate Sensitivity to Potential Gain	Vulnerable	Not Listed	Within geographic range. Large trees present within wooded areas throughout Development Footprint.	Open woodland with paddock trees present	Included	Suitable habitat present within Development Site and within known or predicted distribution.

Species Credit Species	Key habitat requirements, geographic restrictions, Important habitat mapping	Sensitivity to gain class	BC Act Status	EPBC Act status	Criterion 1: Geographic limits, important mapped areas	Criterion 2: Suitable habitat quality and abundance on site	Included or excluded or added, or assumed present	Reason for inclusion or exclusion or assumed presence
Keyacris scurra **Key's Matchstick Grasshopper**	No habitat constraints listed. Comments: Where understory is favourable, habitat under scattered trees could be suitable.	High Sensitivity to Gain	Endangered	Endangered	Within predicted geographic range Grassland and open woodland	Grassland and open woodland	Included	Suitable habitat present within Development Site
Lathamus discolor **Swift Parrot (Breeding)**	Breeding habitat is geographically restricted – breeds only in Tasmania. As per mapped areas	Moderate Sensitivity to Potential Gain	Endangered	Critically Endangered	Outside of geographically restricted breeding habitat.	A favoured feed tree is on site – White Box	Excluded	Development Site outside of known breeding areas (TAS). Site not in Important Habitat Area map
Lophoictinia isura **Square-tailed Kite (Breeding)**	Nest trees	Moderate Sensitivity to Potential Gain	Vulnerable	Not Listed	Within known geographic range	Watercourse with some trees present. Trees onsite could potentially be nested in	Included	Trees present suitable for nesting. Within known geographic range.
Miniopterus orianae oceanensis **Large Bent-winged Bat**	Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including	Very High Sensitivity to Potential Gain	Vulnerable	Not Listed	Caves and other suitable geological features were not present	Suitable size hollows	Excluded	This species has been excluded based on the absence of suitable roosting

Species Credit Species	Key habitat requirements, geographic restrictions, Important habitat mapping	Sensitivity to gain class	BC Act Status	EPBC Act status	Criterion 1: Geographic limits, important mapped areas	Criterion 2: Suitable habitat quality and abundance on site	Included or excluded or added, or assumed present	Reason for inclusion or exclusion or assumed presence
(Breeding)	species records with microhabitat code "IC - in cave;" observation type code "E nest-roost;" with numbers of individuals >500				within Development Footprint.			sites within or near the Development Footprint, specifically caves, tunnels, mines and culverts. Wellington caves where it was recorded was greater than 7km away.
Ninox connivens **Barking Owl (Breeding)**	Breeding requires living or dead trees with hollows >20cm diameter and > 4m above the ground.	High Sensitivity to Potential Gain	Vulnerable	Not Listed	Suitable habitat present in within Development Footprint.	Suitable size hollows Paddock trees present	Included	Suitable habitat present within Development Site and within known or predicted distribution.
Petaurus norfolcensis **Squirrel Glider**	None	High Sensitivity to Potential Gain	Vulnerable	Not Listed	Suitable habitat present within Development Footprint.	Suitable size hollows Paddock trees present	Included	Suitable habitat present within Development Site and within known or predicted distribution.

Species Credit Species	Key habitat requirements, geographic restrictions, Important habitat mapping	Sensitivity to gain class	BC Act Status	EPBC Act status	Criterion 1: Geographic limits, important mapped areas	Criterion 2: Suitable habitat quality and abundance on site	Included or excluded or added, or assumed present	Reason for inclusion or exclusion or assumed presence
***Petaurus norfolcensis* - endangered population Squirrel Glider in the Wagga Wagga Local Government Area**	None	High Sensitivity to Potential Gain	Endangered population	Not listed	Outside Wellington area	N/A	Excluded	Outside known distribution
***Petrogale penicillata* Brush-tailed Rock-wallaby**	Requires land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or cliff lines.	Very High Sensitivity to Potential Gain	Endangered	Vulnerable	Required land forms not present within Development Footprint.	No	Excluded	This species has been excluded based on the absence of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops, and cliff lines within 1 km of the Development Footprint.

Species Credit Species	Key habitat requirements, geographic restrictions, Important habitat mapping	Sensitivity to gain class	BC Act Status	EPBC Act status	Criterion 1: Geographic limits, important mapped areas	Criterion 2: Suitable habitat quality and abundance on site	Included or excluded or added, or assumed present	Reason for inclusion or exclusion or assumed presence
Phascogale tapoatafa **Brush-tailed Phascogale**	No habitat constraint listed. Comment: During breeding season, males may seek temporal refuge points in paddock trees with hollows.	High Sensitivity to Potential Gain	Vulnerable	Not Listed	Development Site not within known distribution for species but is within predicted range.	Suitably sized hollows Paddock trees with hollows – may be used by males during breeding season. Associated with PCT 266. Patch size < 5 ha	Included	Development Site not within known distribution for species but is within predicted range. Associated with PCT 266 and patch size is 57.3ha (in development site)
Phascolarctos cinereus **Koala**	Presence of koala use trees - refer to Survey Comments field in TBDC	High Sensitivity to Potential Gain	Endangered	Endangered	Suitable habitat present in all wooded zones within Development Footprint.	Paddock trees present. High preferred use feed tree – White Box - present	Included	Suitable habitat present within Development Site and within known distribution.
Polytelis swainsonii **Superb Parrot (Breeding)**	Breeding requires living or dead *E. blakelyi, E. melliodora, E. albens, E. camaldulensis, E. microcarpa, E.*	High Sensitivity to Potential Gain	Vulnerable	Vulnerable	Suitable habitat and associated important breeding trees present within	Living and dead White Box trees with suitably sized hollows present	Included	Suitable habitat present within Development Site.

Species Credit Species	Key habitat requirements, geographic restrictions, Important habitat mapping	Sensitivity to gain class	BC Act Status	EPBC Act status	Criterion 1: Geographic limits, important mapped areas	Criterion 2: Suitable habitat quality and abundance on site	Included or excluded or added, or assumed present	Reason for inclusion or exclusion or assumed presence
	polyanthemos, E. mannifera, or *E. intertexta* with hollows > 5 cm diameter, > 4m above ground, or trees with a DBH of greater than 30cm.				Development Footprint			TBCD general notes: Breeding habitat can be identified by the presence of habitat features and observed nest OR two or more birds seen on site.'
Prasophyllum sp. Wybong ***Prasophyllum* sp. Wybong**	None	Moderate Sensitivity to Potential Gain	Not Listed	Critically Endangered	Known to occur in open eucalypt woodland and grassland, which are present within the Development Site.	Paddock trees present.	Included	Development Site not within known distribution for species but is within predicted range. Species habitat requirements are not well defined, as such a precautionary approach has been taken to assume suitable habitat present within site.

Species Credit Species	Key habitat requirements, geographic restrictions, Important habitat mapping	Sensitivity to gain class	BC Act Status	EPBC Act status	Criterion 1: Geographic limits, important mapped areas	Criterion 2: Suitable habitat quality and abundance on site	Included or excluded or added, or assumed present	Reason for inclusion or exclusion or assumed presence
Pteropus poliocephalus **Grey-headed Flying-fox (Breeding)**	Breeding habitat is restricted to known breeding camps.	High Sensitivity to Potential Gain	Vulnerable	Vulnerable	No breeding camps present within the Development Site.	No (breeding camp not on site – only seen foraging during survey)	Excluded	Two breeding camps on Macquarie River in Wellington, however Development site foraging habitat. Assessment of Significance completed – foraging individuals seen in August and September field visit
Swainsona sericea **Silky Swainson-pea**	None	High Sensitivity to Potential Gain	Vulnerable	Not Listed	Suitable habitat present – box-gum woodland	No information, and Bionet record within 10km is old	Included	Suitable habitat present within Development Site and within known distribution.
Synemon plana **Golden Sun Moth**	Wallaby grass (Rytidosperma sp) and Speargrass (Austrostipa sp) present		Vulnerable	Vulnerable	Within known distribution	Wallaby grass (Rytidosperma sp) and Speargrass	Included	Suitable habitat present within Development Site and within known

Species Credit Species	Key habitat requirements, geographic restrictions, Important habitat mapping	Sensitivity to gain class	BC Act Status	EPBC Act status	Criterion 1: Geographic limits, important mapped areas	Criterion 2: Suitable habitat quality and abundance on site	Included or excluded or added, or assumed present	Reason for inclusion or exclusion or assumed presence
						(Austrostipa sp) present		distribution on NSW profile.
Tyto novaehollandiae **Masked Owl (Breeding)**	Hollow bearing trees Living or dead trees with hollows greater than 20cm diameter	High Sensitivity to Potential Gain	Vulnerable	Not Listed	Hollow-bearing trees present within the Development Site.	Paddock trees present. Living or dead trees with hollows greater than 20cm diameter	Included	Suitable hollow-bearing trees present within Development Site and within known distribution.

4.4 Targeted Surveys

4.4.1 Survey weather conditions and limitations

Weather conditions recorded for the 2022 survey dates from the Bureau of Meteorology (BOM) at the Wellington (D & J Rural) AWS (ID: 065034) Station are presented in Table 4-4.

Table 4-4 Weather summary

Survey Date	Maximum temperature (°C)	Minimum temperature (°C)	Relative Humidity (RH)	Rainfall (mm) on survey date, preceding 14 days	Max wind gust (km/h)	Surveys undertaken
01/08/2022	17.1	5.5	97	6.4mm, 8.2 mm in previous 14-days	13	Call-playback – Nocturnal Avifauna and Mammals HBT marking. Spotlighting for nocturnal avifauna and mammals.
02/08/2022	17.6	-1.6	82	0 mm, 14.6 mm in previous 14-days	4	Call-playback Nocturnal Avifauna and Mammals HBT marking. Spotlighting for nocturnal avifauna and mammals.
03/08/2022	23.0	0.6	87	0.8mm, 14.6 mm in previous 14-days	9	Call-playback Nocturnal Avifauna and Mammals HBT marking. Spotlighting for nocturnal avifauna and mammals.
04/08/2022	No data	9.0	No data	9.4mm, 15.4 mm in previous 14-days	19	Call-playback – Nocturnal Avifauna and Mammals HBT marking. Spotlighting for nocturnal avifauna and mammals.
19/09/2022	19.0	3.8	76	0mm, 76.2 mm in previous 14 days	4	Diurnal bird survey Reptile rock turning search. Spotlighting for nocturnal mammals SAT surveys (Koala)
20/09/2022	22.5	1.5	82	0mm, 76.2 mm in previous 14 days	4	Diurnal bird survey Reptile rock turning

Survey Date	Maximum temperature (ºC)	Minimum temperature (ºC)	Relative Humidity (RH)	Rainfall (mm) on survey date, preceding 14 days	Max wind gust (km/h)	Surveys undertaken
						search. Spotlighting for nocturnal mammals BAM plots. Targeted flora surveys SAT surveys (Koala)
21/09/2022	15.8	9.8	90	2.0, 76.2 mm in previous 14 days	calm	Diurnal bird survey Targeted flora surveys SAT surveys (Koala) HBT surveys
22/09/2022	22.0	9.9	85	24.4, 78.2 mm in previous 14 days	7	Targeted flora surveys BAM plots. HBT surveys
12/12/2022	22.7	18.9	70	1.0, 8.0 mm in previous 14 days	41	Diurnal bird survey (Gang-gang Cockatoo)
13/12/2022	25.3	4.5	75	3.4 mm, 7.2 mm in previous 14 days	4	Diurnal bird surveys (Gang-gang Cockatoo) Golden Sun Moth and Keys Matchstick Grasshopper surveys Targeted Flora surveys (Euphrasia arguta)
14/12/2022	22.0	7.1	83	0, 10.6 mm in previous 14 days	11	Diurnal bird surveys (Gang-gang Cockatoo) Set up cameras for Brush-tailed Phascogale
15/12/2022	24.0	5.3	53	0, 10.6 mm in previous 14 days	7	Diurnal bird survey (Gang-gang Cockatoo)
20/12/2022	28.3	7.2	49	0, 10.6 mm in previous 14 days	19	Golden Sun Moth and Keys Matchstick Grasshopper surveys
06/01/2023	27.0	10.3	49	1.2, 24.8mm	28	Golden Sun Moth surveys Rebait and recharge low batteries in camera traps

Survey Date	Maximum temperature (°C)	Minimum temperature (°C)	Relative Humidity (RH)	Rainfall (mm) on survey date, preceding 14 days	Max wind gust (km/h)	Surveys undertaken
						for Brush-tailed Phascogale
12/01/2023	37.5	17.5	78	0, 9mm in previous 14 days	15	Golden Sun Moth surveys Removed camera traps for Brush-tailed Phascogale

The Golden Sun Moth survey on 20th of December 2022 was carried out later in the day due to delay in arriving (road works), however, weather was warm and relatively still until towards the end of the survey – which was too windy, but the area where it was being surveyed during higher winds was in poor condition – not ideal for this species).

Golden Sun Moth survey on 6 January 2023 between 10.30 am – 2.30pm. Weather changed during surveys – wind picked up during survey, cloud cover changed over time, was sunny with some clouds at first, then lot of cloud cover, then became less cover.

Golden Sun Moth survey on 12 January 2023 was carried out later in the day due to delay in arriving (road works). The day was very warm, and 3 breaks were taken in the shade during the survey time. Beginning of the day had a mild breeze, 10-15% cloud. Towards end of survey wind stronger than a breeze, cloud came in and became approximately 75% cover, then thunder.

Weather data on BOM not always accurate for site. It was very wet on Wednesday 21 September so a short field day. Thursday 22 September 2022 had little rain. There was no rain at the site during field surveys in December 2022.

4.4.2 Consultation with BCD and Species Experts

To determine if a species was excluded or included in targeted fauna surveys from the candidate species list the following consultation was undertaken:

- Consultation with BCD included the following outcomes from a meeting on October 11th, 2022:
  - Confirmation to exclude Large Bent Winged Bat and Brush-tailed Rock Wallaby.
  - Confirmation further surveys were required and approval of survey methods for Brush-tailed Phascogale, Keys Matchstick Grasshopper and Golden Sun Moth
  - Confirmation from the BCD expert the Superb Parrot not likely breeding in area. No species credits required.
- Consultation with Professor Michael Kearney for Keys Matchstick Grasshopper identification.
- Consultation with Doctor Damian Michael for Pink-tailed legless lizard identification confirmation.

4.4.3 Candidate species requiring surveys (confirmation of presence of absence)

The candidate species that required surveys to confirm presence or absence are listed in Table 4-5. These species require survey in accordance with the BAM and other relevant guidelines or must be assumed present to determine if species credits are generating credits. The survey effort and results are provided in Section 4.4.4.

Table 4-5 Summary of candidate species surveyed at the Development Site in 2022.

Species Credit Species	PCT and Vegetation zone	Biodiversity risk weighting	Biodiversity High	Survey Period	Survey Date	Present on site?	Vegetation zone present	Species polygon (ha)
Ammobium craspedioides *Yass Daisy*	PCT 266 Vegetation Zones 1 & 2.	2	High	August-October	Surveyed September 2022	Not present	None	0 Ha
Acacia ausfeldii Ausfeld's Wattle	PCT 266 Vegetation Zones 1 & 2.	2	High	September - November	Surveyed September 2022	Not present	None	0 Ha
Aprasia parapulchella Pink-tailed Legless Lizard	PCT 266 Vegetation Zones 1 & 2. Exotic areas	2	High	September - November	Surveyed September 2022	Yes	Vegetation Zones 1 & 2.	Vegetation Zone 1 - 3.41 ha and Vegetation Zones 2 - 6.92 ha. Habitat assessment determined species polygon based on loose rock across woodland and derived grassland vegetation zones
Burhinus grallarius *Bush Stone-curlew*	PCT 266 Vegetation Zones 1 & 2.	2	High	All year	Surveyed August 2022	Not present	None	0 Ha
Callocephalon fimbriatum Gang-gang Cockatoo	PCT 266 Vegetation Zones 1 & 2.	2	High	October – January	Surveyed December 2022	Not present	None	0 Ha
Calyptorhynchus lathami Glossy Black-Cockatoo	PCT 266 Vegetation Zones 1 & 2.	2	High	January - September	Surveyed September 2022	Not present	None	0 Ha

Species Credit Species	PCT and Vegetation zone	Biodiversity risk weighting	Biodiversity High	Survey Period	Survey Date	Present on site?	Vegetation zone present	Species polygon (ha)
Euphrasia arguta	PCT 266 Vegetation Zones 1 & 2.	3	Very High	November - March	Surveyed December 2022	Not present	None	0 Ha
Grevillea wilkinsonii Tumut Grevillea	PCT 266 Vegetation Zones 1 & 2.	3	Very High	October	Surveyed September 2022 (late in the month). Very few shrubs on site.	Not present	None	0 Ha
Haliaeetus leucogaster White-bellied Sea-Eagle	PCT 266 Vegetation Zones 1 & 2.	2	High	July - December	Surveyed September 2022	Not present	None	0 Ha
Hieraaetus morphnoides Little Eagle	PCT 266 Vegetation Zones 1 & 2.	1.5	Moderate	August - October	Surveyed September 2022	Not present	None	0 Ha
Keyacris scurra Key's Matchstick Grasshopper	PCT 266 Vegetation Zones 1 & 2.	2	High	March – May August - December	Surveyed December 2022	Not present	None	0 Ha
Lophoictinia isura Square-tailed Kite	PCT 266 Vegetation Zones 1 & 2.	1.5	Moderate	September-January	Surveyed September 2022	Not present	None	0 Ha
Ninox connivens Barking Owl	PCT 266 Vegetation	2	High	May - December	Surveyed August 2022	Not present	None	0 Ha

Species Credit Species	PCT and Vegetation zone	Biodiversity risk weighting	Biodiversity High	Survey Period	Survey Date	Present on site?	Vegetation zone present	Species polygon (ha)
	Zones 1.							
Phascogale tapoatafa Brush-tailed Phascogale	PCT 266 Vegetation Zones 1	2	High	December - June	Surveyed December 2022	Not present	None	0 Ha
Petaurus norfolcensis Squirrel Glider	PCT 266 Vegetation Zones 1.	2	High	All year	Surveyed September 2022	Not present	None	0 Ha
Phascolarctos cinereus Koala	PCT 266 Vegetation Zones 1.	2	High	All year	Surveyed August and September 2022	Not present	None	0 Ha
Polytelis swainsonii Superb Parrot (Foraging)	PCT 266 Vegetation Zones 1 & 2.	2	High	September - November	Surveyed August and September 2022	Present	Vegetation Zone 1	Foraging habitat. Confirmed by expert outside of the key breeding area
Prasophyllum sp. Wybong	PCT 266 Vegetation Zones 1 & 2.	3	Very High	September - October	Surveyed September 2022	Not present	None	0 Ha
Swainsona sericea Silky Swainson-pea	PCT 266 Vegetation Zones 1 & 2.	2	High	September - November	Surveyed September 2022	Not present	None	0 Ha
Swainsona recta Small Purple-pea	PCT 266 Vegetation Zones 1 & 2.	2	High	September - November	Surveyed September 2022	Not present	None	0 Ha

Species Credit Species	PCT and Vegetation zone	Biodiversity risk weighting	Biodiversity High	Survey Period	Survey Date	Present on site?	Vegetation zone present	Species polygon (ha)
Synemon plana *Golden Sun Moth*	PCT 266 Vegetation Zones 1 & 2.	1.5	Very High	November - December	Surveyed December 2022 into January 2023 (due to seasonal variation)	Not present	None	0 Ha
Tyto novaehollandiae Masked Owl	PCT 266 Vegetation Zones 1.	2	High	May - August	Surveyed August 2022	Recorded on site	Vegetation Zone 1	1.81 ha of Vegetation Zone 1 and 3.29 ha of vegetation Zone 2. Species polygon based on 100m buffer of all HBTs with hollows =/>20cm

4.4.4 Candidate species survey effort and results

The candidate species survey effort is outlined below based on target fauna group and survey requirements. The survey timing and results are in Table 4-6.

Bird Surveys (White-bellied Sea-eagle, Little Eagle, Square-tailed Kite, Gang-Gang Cockatoo, Superb Parrot, Grey Falcon)

The bird surveys were completed for the White-bellied Sea-eagle, Little Eagle, Square-tailed Kite, Gang-Gang Cockatoo, Superb Parrot and Grey Falcon applying the area search and point survey methods outlined in the guidelines (Commonwealth of Australia 2010). The survey method involves recording the presence, number of individuals of each taxon detected at randomly selected survey points. Each point was a survey of approximately 20 minutes. NGH ecologists undertook morning and afternoon surveys in suitable habitat for all the targeted bird species, where the visibility distance was high. An incidental species listed was created between point survey locations and during other site surveys. The survey results are provided in Appendix D.

The area search method involved an area of suitable habitat for the Gang-gang Cockatoo. NGH ecologists undertook area searches on 12/12/2022 of about 2ha area. This involved systematically searching a two hectares area whilst frequently stopping or moving to investigate sightings, calls or signs of presence of birds in the immediate area.

Spotlighting for Mammals and Nocturnal birds.

Spotlighting was used to detect Koala and Squirrel Glider or combined with call playback and a follow up spotlight for nocturnal birds. Each species survey method is described below.

Mammals Koala

In addition to the koala SATs, spotlighting was undertaken by NGH ecologists over two nights in September 2022. Four ecologists walked koala transects approximately 200 metres in length (or longer) (Department of Planning and Environment, 2022). Given the sparse nature of canopy trees in the development site, all woodland habitat across the entire development site of was covered over both survey nights.

NGH ecologists undertook surveys using a LED Lensor headtorch with 1000 lumens at brightest. Each person walked approximately 2.5km per night, (total of approx. of 20km in total over two nights).

The survey results are provided in Appendix D.

Squirrel Glider

The Squirrel Glider survey effort was completed on foot over two nights by four NGH ecologists for more than one hour each night. The total number of hours was eight survey hours. The NGH ecologists undertook surveys using a LED Lensor headtorch with 1000 lumens at brightest for more than one hour with a hand-held spotlight of appropriate power for the conditions. This survey effort must be conducted on two separate nights along a traverse of at least one kilometre (NSW Department of Planning and Environment, 2004). Each ecologist walked approximately 2.5km per night (total of approx. of 20km over two nights).

Koala SATS

The Koala Spot Assessment Technique (SAT) (Department of Planning and Environment, 2022)– involves assessing the presence of koala scat within a prescribed search area. The development site is 55.47 ha which is >50 ha therefore the required SAT spacings are 250 metres apart. The total number of SAT sites required for an area of suitable habitat is determined by dividing the approximate number of hectares by 6.25 (for 250 m grid spacing). Therefore, the number of SATs required for this site was 9. Each SAT grid has a centre tree, and the nearest 29 trees of any species are assessed. For this site, this would require a survey of 266 trees in the Woodland vegetation zone of PCT 266. The Woodland habitat tree canopy is quite sparse with only 230 trees; therefore, each tree was assessed. The search under each tree for the SAT includes undertaking a radial search for koala scat beneath each of the 30 marked trees, within a prescribed search area extending 1 m from the base of each tree. Scat search effort is a minimum of two person-minutes for each tree. NGH ecologists undertook searches with a brief inspection of the undisturbed litter or grass and grass like growth form cover within the 1 m search area. Where no koala scats are detected, a more thorough inspection of the search area, involving disturbance by hand of the litter or grass and grass like growth form cover, was undertaken.

Parallel Field Traverses for Flora (Small purple-pea, Silky swainsona pea, Yass Daisy, Tumut Grevillea, Ausfelds Wattle, *Prasophyllum* sp. Wybong, *Euphrasia arguta, Zieria obcordata*)

NGH ecologists undertook the targeted flora surveys in accordance with the survey guidelines for threatened plants and their habitats (DPIE 2020). The threatened flora surveyed included Small purple-pea, Silky Swainsona pea, Yass Daisy, Tumut Grevillea, Ausfelds Wattle, *Prasophyllum* sp. Wybong, *Euphrasia arguta, Zieria obcordata.* The survey method was walking parallel field transects approximately 10m apart (as no dense vegetation areas present) covering the development footprint for each species (NSW Government, 2020). No threatened flora were recorded in the surveys in September 2022.

Tumut Grevillea

The Tumut Grevillea (*Grevillea wilkinsonii*) has a highly restricted distribution and is currently known to occur in two locations. The first being a 6km stretch of the Goobarragandra River approximately 20 km east of Tumut. The second is a small population that occurs on the boundary of two private properties at Gundagai, both of which are over 340 kilometres to the south (NSW Government, 2022).

The Tumut Grevillea flowers from mid-September to mid-October. The habitat of the Tumut Grevillea occur in close proximity to water, in open sunny areas, with altitudes between 310 m and 340 m of altitude in the Goobarragandra site (NSW Government, 2022). At the Gundagai site the habitat which the Tumut Grevillea occurs on a steep hill on Serpentinite rock. No steep hills, Serpentine rock, or close proximity to water occur in the development site. There are no known records of the Tumut Grevillea within the 10 km locality to the development site. According to BioNet and BAM Calculator (2020), survey effort for the Tumut Grevillea should occur during the month of October to ensure appropriate identifying when the plants are flowering.

The September 2022 flora surveys conducted by NGH, determined that the preferred habitat for the Tumut Grevillea was absent from the site and there was an absence of shrubs (including Grevilleas) across the development footprint. Although the optimal survey period for Tumut Grevillea is October, the flora survey was completed in late September and the species in known to flower September to October. In addition to this assessment, there are no records within the

locality and the nearest known population occurs over 340 km to the south, therefore the species was determined to be absent from site.

Camera Traps (Brush-tailed Phascogale)

Camera traps were used to survey for Brush-tailed Phascogale in the development footprint. Under the survey guidelines, four camera traps need to be installed for the first hectare and two cameras for each hectare after that. For a five-hectare area, 12 cameras are required. In consultation with BCD and the species expert, NGH proposed to install 12-14 cameras traps in the Woodland area (vegetation zone 1) of the development footprint covering five hectares. A total of 15 camera traps were installed. The camera locations extended into the development site as it was difficult to find suitable stems for the cameras and bait in the development footprint. The tree selection for the camera trap required canopy trees close to a second stem/branch for the bait station. Due to the large distance between the trees, the camera traps were set up where suitable trees could be found. There were many trees with suitable hollows that were small (<10cms) or moderate (10-20cms). The cameras were installed at 1.5 metres above the ground to prevent contact with the grazing cattle. The bait consisted of oats, honey and peanut butter in an enclosed trap. Baits were replaced in early January 2023. The cameras were installed for 4 weeks starting in December 2022 and retrieved in January 2023.

The fauna species recorded can be found in Appendix D.

Call playback (Barking Owl, Masked Owl, Bush-stone Curlew, Squirrel glider)

Call playback followed by spotlighting was used to survey for Barking Owl, Masked Owl, Bush-stone Curlew and Squirrel Glider for the August 2022 survey. The distance between the call playback sites for nocturnal birds is 800-1km apart or 2-4 km for Bush Stone-curlew (NSW Department of Planning and Environment, 2004). The minimum repetitions for each species is as follows:

- Barking Owl. - at least 5 visits per site, on different nights
- Masked Owl - 8 visits per site
- Bush Stone-curlew - conducted during the breeding season.

The call playback procedure for nocturnal birds when broadcasting needs to follow the following steps (Commonwealth of Australia, 2010):

- Recorded vocalisations were broadcast for each species from two locations (one for Bush Stone-curlew). The sites were at either end of the development site.
- At each broadcast location, the initial period included a quiet listening time period whilst scanning the surrounding area (using a spotlight if at night) and listening for unsolicited calls.
- Broadcast the call of the target species for a predetermined period of time, usually between 10–20 seconds depending on the species.
- Listen for the response or appearance of the target taxon for a predetermined period of time, usually between 30–60 seconds.
- The broadcast and listening sequence may be repeated up to about five times at each station. Broadcast calls were not continued if the target species was detected or impacted the individual behaviour towards other individuals or the observer.
- Each species was broadcast separately.

- Spotlighting occurred after the call playback sequence to check for birds that were attracted but did not vocalise.

Barking Owl, Masked Owl and Squirrel glider

NGH ecologists undertook call play back surveys involving 10 minutes quiet time, 10 minutes intermittent call playback and 10 minutes spotlighting, with two ecologists at three site locations.

No Barking Owls or Squirrel Gliders were recorded during the August and September 2022 surveys.

A Masked Owl was observed and heard on the first night on the 1/8/2022 at the Squirrel Glider call playback site (in the centre of the site) (see Figure 4-4). No Masked Owls were observed or heard vocalising the following three survey nights (survey nights 2-4). Masked Owls have a large home range of 1000 ha (DPE 2017) and it is likely the Masked Owl was called in due to the call playback occurring.

The hollow requirements for Masked Owl include large hollows (>20 cm in diameter) in living or dead trees 3 metres above the ground for breeding (DEC 2006). All Hollow bearing trees were marked within the development site and development footprint and no pellets or evidence for the Masked Owl were recorded. However, a species polygon (100 metre buffer) was created based on all suitable hollow bearing trees in the development footprint.

Bush-stone Curlew

NGH ecologists undertook call play back surveys for Bush-stone Curlew for four nights at one location as the distance between sites is a minimum of 2-4 km. There was limited logs, litter and debris limiting suitable habitat for Bush Stone-curlew. The call playback involved: 10 minutes quiet time, 10 minutes intermittent call playback, 10 mins spotlighting, with two ecologists. No Bush-stone Curlew recorded.

The survey results are found in Appendix D.

Pink-tailed Legless Lizard

NGH ecologists undertook surveys for Pink-tailed Legless Lizard using the rock turning method on two separate days covering suitable habitat within the development site (47.87 ha). The development site has three areas with rocky outcrops at the top of the hills consisting of embedded and exposed rocks. The remaining areas of the Woodland and Derived Grassland areas of PCT 266 consisted of loose scattered rocks. These areas were mapped as habitat for the Pink-tailed Legless Lizard.

Based on the Biodiversity Assessment Method Survey Guide for Threatened Reptiles (DPE 2022) the minimum survey requirements for this species for rock turning includes turning over a minimum of 200 suitably sized rocks for every 5 ha of suitable habitat. The suitably sized rocks includes rocks that are:

- 300 mm wide and 50 mm deep
- 100–150 mm wide, 120–220 mm long, 50–150 mm deep
- Survey replicates 4 per 50ha.

Based on the development site and the rocky habitat, the rocky outcrops were the initial focus areas and surveys moved outwards from these locations into woodland and derived grassland areas. The Pink-tailed Legless Lizards were recorded. Two individuals were recorded during the

rock turning surveys and a third incidentally near Goolma Road. It was noted the high presence of ants under the scattered and loosely exposed rocks which provides a key food source for the Pink-tailed Legless Lizard. These areas were mapped. The survey results are found in Appendix D.

Invertebrate transect (Golden Sun Moth, Key's Matchstick Grasshopper)

The Golden Sun Moth and Keys Matchstick Grasshopper surveys required the following weather conditions for surveys:

- Warm to hot day (above 20 degrees Celsius by 10:00 am)
- Survey during the warmest part the day (that is, 1000 to 1400 hrs)
- Clear or mostly cloudless sky
- Still or relatively still wind conditions during the survey period
- At least two days since rain
- Survey over at least four suitable days, at approximately weekly intervals

These survey requirements follow the Significant Impact Guidelines for the Critically Endangered Golden Sun Moth (*Synemon plana*) (2009) which were also approved as the appropriate survey conditions for Keys Matchstick Grasshopper.

The closest reference site to Wellington is located near Koorawatha NSW which is approximately three hours south of the development site. It was not possible to monitor reference sites prior to undertaking the surveys, therefore the optimal survey conditions determined the day for the weekly intervals. The spring of 2022 was very wet and the survey conditions for the two invertebrates started in Mid-December. This extended the third and fourth survey for Golden Sun Moth into January 2023. The Golden Sun Moth flying period usually occurs between late October and early January and varies annually and geographically. The best indicator of key survey period is the presence of flying males at known local sites. Reference sites should be monitored during the expected flying period and used to guide survey timing at the target site.

NGH Senior Ecologist monitored weather conditions and flight times at other locations to determine the best survey times. There was a record flight of the Golden Sun Moth in Beaufort on 02/01/2023 with activity peaking after 12 noon when temperature was in 30's and cloud cover approximated 40%. This information was from the Ecological Consultants Association (ECA) Victoria (2022).

The survey method included recording all individuals seen while walking 100m transects spaced 10m apart in suitable habitat identified as being impacted by the development.

The areas of suitable habitat in the development footprint included locations where there was a presence of *Austrostipa spp.* and *Rytidosperma spp*. grasses for Golden Sun Moth. The derived grassland areas between the proposed BESS location and the substation were the areas with the most suitable habitat.

Suitable habitat for Key's Matchstick Grasshopper based on NSW Government Threatened Biodiversity Data Collection (TBDC) (2022) includes open woodland, derived native grassland and grassland that includes relatively undisturbed *Themeda triandra* and/or dense patches of *Chrysocephalum apiculatum*. These two plant species were not recorded on site, however the survey areas for the Key's Matchstick Grasshopper and Golden Sun Moth were similar and therefore the two species were surveyed for simultaneously (i.e., the Woodland habitat was determined not to be suitable habitat for both species).

The survey methods for Key's Matchstick Grasshopper involved walking through the derived grassland areas (PCT 266 Vegetation Zone 2), observing flora species and disturbing the

vegetation slightly to increase species movement to improve detectability. The transects were 10m apart and up to 100m long.

NGH confirmed identification with the species expert and determined none of the target threatened species were present.

The survey results are provided in Appendix D.

Table 4-6 Survey results and survey effort

Survey Method	Candidate Species	Optimal Survey Period (BAM)	Survey dates	Number of person hours	Result
Call Play-back	Barking Owl	May - December	Barking Owl: 2 locations 1/08/2022 2 locations 2/08/2022 2 locations 3/08/2022 2 locations 4/08/2022	8 hours	None detected
	Masked Owl	May - August	Masked Owl: 2 locations 1/08/2022, 2 person hours 1 location 2/8/2022, 1 person hour 1 location 3/8/2022, 1 person hour 1 location 4/8/2022, 1 person	5 hours	Masked Owl observed and heard on 1/8/2022 at squirrel glider call playback site. Next 3 nights the call play backs were carried out here, but no more threatened species observed or heard.
	Bush Stone-curlew	January - December	Bush-stone Curlew: 1 location 1/08/2022 1 location 2/08/2022 1 location 3/08/2022 1 location 4/08/2022	4 hours	None detected
	Squirrel Glider	January - December	Squirrel glider: 2 locations 1/08/2022 2 locations 2/08/2022	4 hours	None detected
Spotlighting	Koala	January - December	Koala: 19/09/2022 20/09/2022	15 hours	None detected
	Squirrel Glider	January - December	Squirrel glider: 19/09/2022 20/09/2022	15 hours	None detected
Koala SATs		January - December	SAT surveys:	5 hours 36 minutes	None detected

Survey Method	Candidate Species	Optimal Survey Period (BAM)	Survey dates	Number of person hours	Result
			02/08/2022, 1pm – 2.46pm, 1hr 46min one person hours 03/08/2022, 9.27am – 10.49am, 1hr 22mins one person hours NGH SAT method: 21/9/2022 3.25pm – 5.06pm 22/9/2022 9.00am – 9.48am		
Diurnal Bird Surveys: Point and area methods.	White-bellied Sea-eagle, Little Eagle, Glossy-black Cockatoo Square-tailed Kite, Grey Falcon and Superb Parrot	White-bellied Sea-eagle: July – December Little Eagle: August – October Glossy-black Cockatoo: January – September Square-tailed Kite: September – January Grey Falcon: N/A Superb Parrot: September - November	White-bellied Sea-eagle, Little Eagle, Glossy-black Cockatoo Square-tailed Kite, Grey Falcon and Superb Parrot: 19/09/2022, 4.30pm 20/09/2022, 9am 20/09/2022 4.25pm 21/09/2022 7.16am 22/09/2022 8.05am 22/09/2022 3.25pm	4 hours 20mins	Targeted species identified: Superb Parrot Threatened species not targeted but identified: Turquoise Parrot
	Gang-Gang Cockatoo:	October - January	Gang-Gang Cockatoo: 12/12/2022 approximately 6.10am - 7.09am (2ha area survey) 12/12/2022 8.45pm 13/12/2022 7.39am 13/12/2022 7.02pm 14/12/2022 7.40am 14/12/2022 8.42pm 15/12/2022 7.20am	5 hours	Threatened species not targeted but identified: Diamond Firetail (heard during 2ha area survey on 12/12/2022)
Parallel field traverses	Small purple-pea, Silky Swainsona pea,	*Prasophyllum* sp. Wybong:	Small purple-pea, Silky Swainsona pea, Yass	6 hours 28 mins	None detected

Survey Method	Candidate Species	Optimal Survey Period (BAM)	Survey dates	Number of person hours	Result
	Yass Daisy, *Prasophyllum* sp. Wybong, Tumut Grevillea, Ausfelds Wattle:	September – October Yass Daisy, Small Purple-pea, Silky Swainson-pea: September – November Tumut Grevillea: October Ausfeld's Wattle: August – October	Daisy, *Prasophyllum* sp. Wybong, Tumut Grevillea, Ausfelds Wattle: 20/09/2022: 1.30pm – 2pm 3.44pm– 3.53 pm 3.59pm – 4.06pm 22/10/2022: 10.40am – 11.40am 12.00 – 2.30pm		
	Euphrasia arguta	November - March	*Euphrasia arguta*: 12/12/2022 (near substation. Also assessing where suitable to do KMG and GSM surveys). 13/12/2022 (BESS site. Also assessing area for EPBC quality and suitable areas for KMG and GSM)	13 hours	None detected
Camera traps	Brush-tailed Phascogale:	December - June	Brush-tailed Phascogale: 14/12/2022 – camera set up 5&6/01/2023 - changed baits/changed low charge batteries Collected cameras:	30 nights	None detected
Invertebrate Transects	Golden Sun Moth Key's Matchstick Grasshopper:	November - December	Golden Sun Moth: 13/12/2022 20/12/2022 06/01/2023 12/01/2023	30.5 hours (includes Key's Matchstick Grasshopper surveys)	None detected

Survey Method	Candidate Species	Optimal Survey Period (BAM)	Survey dates	Number of person hours	Result
		March - December	Key's Matchstick Grasshopper: 13/12/2022 20/12/2022	15 hours	None detected
Reptiles	Pink-tailed Legless-lizard	September - November	Pink-tailed Legless-lizard: 2 locations on 19/09/2022 7 locations on 20/09/2022	6 hours	Pink-tailed legless lizard found at two survey locations, plus one location incidentally

Figure 4-1 Flora survey effort and targeted survey locations map

Figure 4-2 Mammal survey effort and targeted survey locations map

Figure 4-3 Invertebrate survey effort and targeted survey locations map

Figure 4-4 Bird survey effort and species polygon for Masked Owl

Figure 4-5 Pink-tailed Legless Lizard Habitat and species polygon

5. Matters of National Environmental Significance

An EPBC Act Protected Matters Report was generated on the 28/07/2022 to identify Matters of National Environmental Significance (MNES) that have the potential to occur within 10 km of the Development Footprint (Appendix B.1). Those relevant to this BDAR include:

- Wetlands of International Importance
- Threatened Ecological Communities
- Threatened species
- Migratory species

The potential for these MNES to occur at the site are discussed below.

5.1 Ramsar Wetlands of International Importance

The EPBC Protected Matters Report identified the following four Ramsar Wetlands of International Importance upstream of the Development Site:

- Banrock Station wetland complex 800 - 900km
- The Macquarie Marshes 150 - 200km
- Riverland 700 - 800km upstream
- The Coorong and Lakes Alexandrina and Albert Wetland 900 - 1000km

The physically closest Ramsar Wetland of International Importance is the Macquarie Marshes, approximately 218km north (which is downstream of the Macquarie River at Wellington, NSW). The ephemeral drainage lines in the development site connect to the Macquarie River. The Macquarie River feeds the Macquarie Marshes; therefore, mitigation measures are required to provide erosion and sediment control to protect waterway connections in the catchment.

5.2 Threatened Ecological Communities (TECs)

The EPBC Protected Matters Report identified four Threatened Ecological Communities considered likely to occur in the locality. These communities were:

- *Natural Temperate Grassland of the South Eastern Highlands (Critically Endangered under the EPBC Act)*
- *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Critically Endangered under the EPBC Act)*
- *Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia (Endangered under the EPBC Act)*
- *Poplar Box Grassy Woodland on alluvial Plains (Endangered under the EPBC Act)*

White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Critically Endangered under the EPBC Act) is the only TEC likely to occur on site as it is associated with PCT 266. Further assessment was undertaken in Zone 1 PCT 266 Woodland and Zone 2 PCT 266 Grassland. The additional assessment determined that the species diversity was too low to qualify as this TEC. A summary of the key diagnostic characteristics and minimum condition requirements for this EPBC listed TEC are provided in Table 5-1.

An Assessment of Significance (AoS) was not required.

Table 5-1 EPBC Criteria for White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland against associated PCTs within the development site

EPBC Requirement	PCT 266 Woodland	PCT 266 Grassland
Is, or was previously, at least one of the most common overstorey species White Box, Yellow Box or Blakely's Red Gum.	Yes – White Box is dominant in the overstorey.	Yes - White Box was present in the past.
Does the patch have a predominantly native understory?	**Yes –** predominately native understorey (plot 8, 6)	**Yes** – predominately native understorey (in plot 2, 3, 4, 5, 7) (not in plot 1)
Is the patch 0.1ha or greater in size?	**Yes**	**Yes**
Are there 12 or more native understorey species present (excluding grasses)? At least one must be an important species.	**No** **Plot 6 has highest ground cover diversity = 9 native non-grass species.** **Important species:** Queensland Bluegrass Slender Tick-trefoil	No
If yes: The criteria is met for this TEC	**No**	No
If no, see rows below:		
Is the patch 2ha or greater in size?	**Yes**	**Yes**
Does the patch have an average of 20 or more mature trees per hectare? **OR** **Is there natural regeneration of the dominant overstorey eucalypts?**	**No** – less than 20 trees per hectare **No** – no regeneration due to grazing occurring	**No** – less than 20 trees per hectare **No** – no regeneration due to grazing occurring
If yes: The criteria is met for this TEC **If no: the criteria in not met for this TEC**	No	No

5.3 Threatened species

The EPBC Protected Matters Report identified 34 threatened species, including 13 birds, four fishes, five mammals, two reptiles and 10 plants, that have the potential to occur within the search area. The full list of species is provided in the Habitat Evaluation Table in Appendix B.2. Refer to Section 7.5 for further impact assessment of threatened species.

The survey effort outlined in section 4.4.4 of this BDAR meets the EPBC survey guidelines requirements for the MNES species listed as candidate species in the BAM Calculator.

Note: The only discrepancy with the EPBC guidelines is for the Superb Parrot. The EPBC guidelines recommend using the area search or transect method for the Superb Parrot, along with 4 days surveying with a total of 12 hours. NGH ecologists used the point survey method. This species was seen incidentally and during targeted surveys in August and September 2022 which covered 4 days and more than 12 hours of surveying.

5.4 Migratory species

The EPBC Protected Matters Report identified 11 listed migratory species with the potential to occur within the search area. The full list of species is provided in the Habitat Evaluation Table in Appendix B.2. None of these species are considered likely to utilise habitat found within the Development Footprint.

6. Avoid and Minimise Impacts

6.1 Avoiding and Minimising Impacts on Biodiversity Values

6.1.1 Modes or technologies that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed mode or technology

The proposal is for a battery energy storage system which would result in less energy needed to be supplied from coal-fired power stations and non-renewable energy sources.

The lithium-ion ('Li-ion') battery is currently the preferred technology for storing energy generated from wind and solar sources (Nova Acacdemy of Science, 2017). The shift to Li-ion batteries is because of their greater energy density (which means they are smaller and lighter), longer expected life spans and ability to undergo deeper discharges, reducing the capacity required (Research, Helen Lewis, 2016).

Li-ion battery cells provide the optimal combination of:

- Proven ability to complement to renewable energy generation developments
- Ability to support the network to increase renewable energy penetration
- Ability to provide energy during periods of peak demands
- Minimal environmental impact
- Safety and ease of integration
- Demonstration and maturity of technology
- Value for money.

Once the BESS reaches the end of its operational life (30-35 years), the development site can be re-established to its previous condition.

6.1.2 Routes that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed route

The proposed Development Footprint layout has been located and designed to include the current track within the development site where possible. The entrance would be developed in exotic vegetation along the roadside, and low condition grassland within the development site.

There is an existing entrance on Goolma Road, however for construction purposes this entrance was not suitable due to sight distance issues and the current speed limit. To meet these road safety requirements, the entrance was moved approximately 50 metres south west of the existing entrance (towards Wellington township). The entrance access route joins the existing track and exits this track to travel directly towards the BESS footprint. The route has been selected to avoid as many trees as possible and minimise rock removal and ground disturbance. The amended route avoids five hollow bearing trees.

6.1.3 Alternative locations that would avoid or minimise impact on biodiversity values and justification for selecting the proposed location

The Project is located within a Renewable Energy Zone (REZ) (Central-West Orana). This area has been identified as having significant national and state-wide potential to produce renewable energy. By virtue of its location, it is well placed to support renewable energy projects.

The Development Footprint is zoned SP2 (Infrastructure) under the Dubbo Regional Local Environmental Plan (LEP 2022). While the site has been utilised predominantly for grazing, it was selected as it shares a boundary with the Transgrid substation, and its zoning is highly appropriate for the BESS. The location also avoids the need for third-party easements and long transmission lines.

6.1.4 Alternative sites within a property on which the proposal is located that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed site

BCD were consulted on 20 May 2022 with regard to minimising impacts and considered the structural woodland to be higher biodiversity value than the derived grassland and exotic areas. The proponent has moved the BESS as far north as possible and orientated the BESS east – west as much as possible to minimise impacts on structural woodland and keep the transmission line impact area as low as possible.

The BESS location includes impacts on PCT 266 vegetation zones 1 and 2. Vegetation Zone 1 is PCT 266 Woodland that includes 3.66 ha and vegetation zone 2 (PCT 266 derived grassland) impacts 6.96 ha. The total impacted area is 10.62 ha. The woodland habitat (vegetation zone 1) will impact 37 hollow bearing trees in the development footprint. A total of 220 hollow bearing trees were recorded across the development site. There were 24 hollow bearing trees with large hollows suitable for Masked Owl. A species polygon was created for Masked Owl and the large trees with hollows were avoided as much as practical. The BESS impact area includes partially embedded rocky outcrops and loose rocks providing habitat for Pink-tailed Legless Lizard covering 10.33 ha. A species polygon has been created to generate species credits to offset the impact on this species. The BESS has been positioned on the flattest area and as close to the substation as possible (on the fence boundary) to the north. This position limits the requirements for extensive transmission line (either overhead or underground) or earthmoving.

6.1.5 Efforts made to avoid and minimise impacts (including prescribed impacts) to biodiversity values through proposal design

The development footprint consists of modified PCT 266 Woodland (3.66 ha) and PCT 266 Derived Grassland (6.96 ha). The area allocated for the BESS and access track current land use is cattle grazing. The woodland area in the development site is 28.47 ha, however the woodland area extends beyond the development site and connects to other woodland areas further north. The woodland area is considered to have higher biodiversity value and therefore has been avoided as much as possible, for example the access track will utilise open areas and the BESS development footprint has been designed to be located as close to the substation as possible. This has minimised the impacts on the woodland area by only impacting the northern portion of the development footprint and much of the woodland area will continue to support habitat for flora and fauna and minimise fragmentation of the woodland area.

6.1.6 Other site constraints proponent has considered in determining the location and design of the proposal.

The proposal would be located in close proximity to the existing substation, the Wellington Solar Farm, Wellington North Solar Farm and the Wellington BESS (to the east of the substation).

7. Assessment of Impacts

7.1 Direct Impacts

The construction and operational phases of the proposal have the potential to impact biodiversity values at the site that cannot be avoided. This would occur through direct impacts, such as habitat clearance (and associated noise and disturbance) and ongoing existence of infrastructure (which may create barriers to movement and generate noise and disturbance). These are summarised in Table 7-1.

Table 7-1 Direct impacts to biodiversity during the construction and operational phases

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence
Direct impacts					
Clearing for Development Footprint	A total of 10.62 ha, which includes a 25m buffer around the infrastructure layout.	One off event	Construction (permanent impact)	• PCT 266 'White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion' • 37 Hollow bearing trees • Pink-tailed Legless-lizard habitat • Masked Owl • Superb Parrot (foraging) • Grey Headed Flying Fox (foraging)	Total loss of: • 3.66 ha of PCT 266 Woodland Low – Good condition • 6.96 ha of PCT 266 Poor condition • 2.6 ha exotic vegetation
Displacement of resident fauna from vegetation clearing	A total of 10.62 ha, of which includes a 25m buffer around the infrastructure layout.	One off event	Construction (permanent impact)	• Pink-tailed Legless-lizard • Masked Owl • Superb Parrot (foraging) • Grey Headed Flying Fox (foraging)	Displacement to native fauna through vegetation clearing expected to impact on the threatened species mentioned, small common ground dwelling mammals (e.g., native mice and rats), reptiles, and possibly common birds relying on tree canopies/hollows for nesting sites.
Injury or death of fauna	A total of 10.62 ha, of which includes a 25m buffer around the infrastructure layout.	one-off event	Construction	• Pink-tailed Legless-lizard	Possible loss of native fauna through vegetation clearing expected to impact on the threatened species mentioned, small common ground dwelling mammals (e.g., native mice and rats), reptiles, and possibly common birds relying on tree canopies/hollows for nesting sites.

7.1.1 Changes in vegetation integrity scores

The clearing proposed will generally reduce the vegetation integrity scores in two zones to zero, as shown in Table 7-2 below.

Table 7-2 Current and future vegetation integrity scores for each vegetation zone within the Development Site

Zone ID	PCT/Zone	EEC and/or threatened species habitat?	Area Impacted (ha)	Current vegetation Integrity Score	Future vegetation Integrity Score
1	266_Woodland_Low-Good	Yes	3.66	12.6	0
2	266_Grassland_Low	Yes	6.96	0.9	0

7.1.2 Loss of species credit species habitat or individuals

The loss of habitat includes rocky areas of suitable habitat for the Pink-tailed Legless Lizard and Hollow bearing trees which provide suitably sized breeding hollows for Masked Owl. The species polygons are outlined in Table 7-3.

Table 7-3 Summary of species credits habitat loss in the development site

Species Credit Species	Biodiversity risk weighting	Species Polygons
Pink-tailed Legless-lizard	2	3.42 ha 266_Woodland_Low-Good 6.92 ha 266_Grassland_Low
Masked Owl	2	1.81 ha 266_Woodland_Low-Good 3.29 ha 266_Grassland_Low

The full Biodiversity Credit Report generated by the BAM Calculator is provided in Appendix C.

7.1.3 Loss of hollow-bearing trees

A total of 220 hollow-bearing trees (HBT's) were identified within the Development Site. Thirty-seven of these trees are expected to be directly impacted by the works.

Any HBT clearing would be avoided as much as possible and if they need to be removed qualified ecologists are required to undertake pre-clearing surveys and supervise felling of HBT.

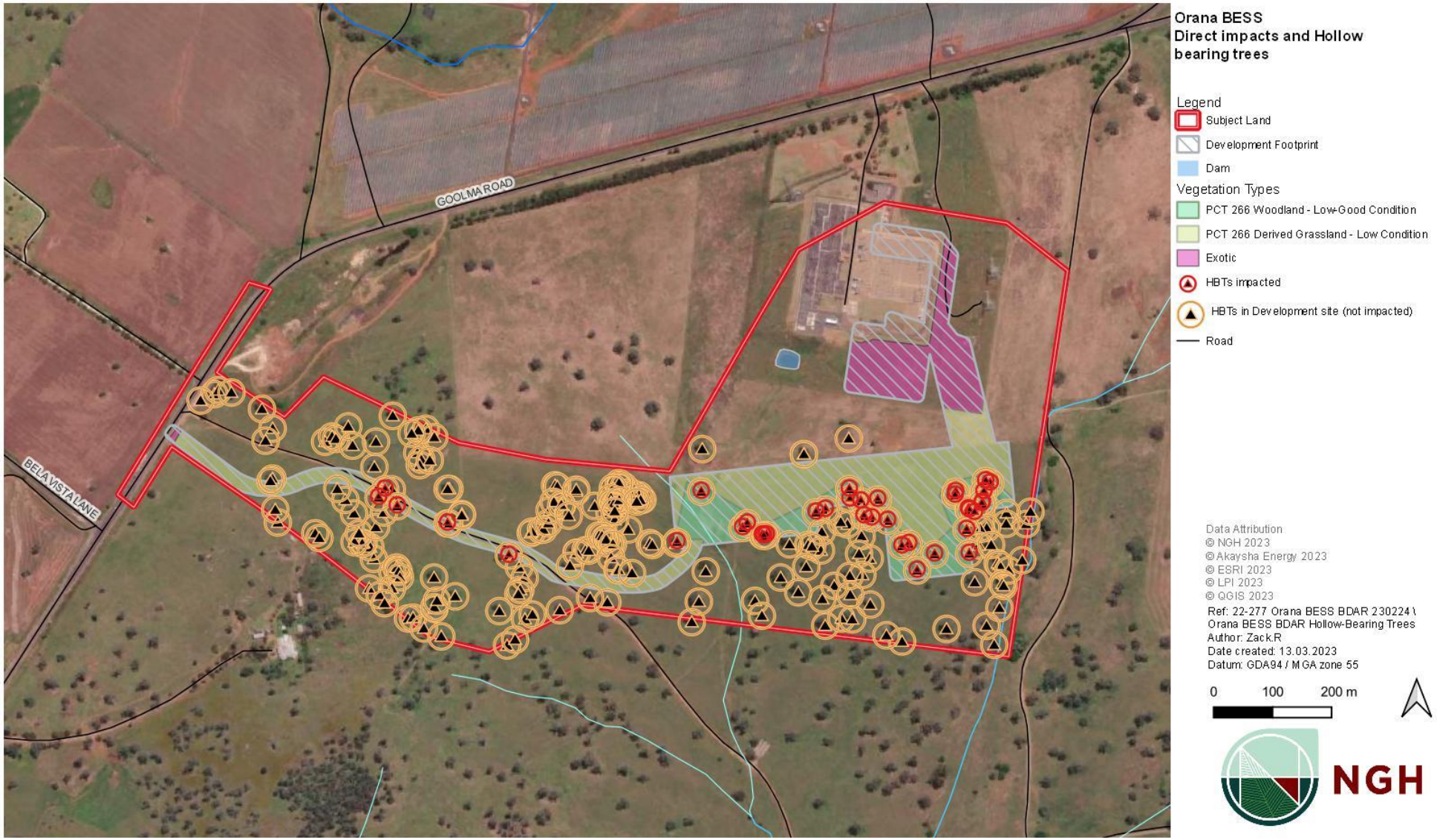


Figure 7-1 Direct impacts including loss of HBTs.

7.2 Indirect Impacts

Indirect impacts of the proposal are anticipated during construction and operation. During construction, these include potential for soil and water contamination, generation of dust, light or noise. These are generally considered to be highly manageable and affect minimal additional impact areas temporarily.

Note: A 25m buffer for constructability[1] has been included within the Development Footprint

Once operational, fences and additional tracks may fragment and create barriers between habitat and affect fauna movement. Table 7-4 details the type, frequency, intensity, duration and consequence of the direct and indirect impacts of the proposal.

Table 7-4 Potential Indirect impacts to biodiversity during the construction and operational phases

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
Indirect impacts (those listed below are included in the BAM)					
Inadvertent impacts on adjacent habitat or vegetation	Patches of woodland and grassland to the south, west and east of the site: • PCT 266 'White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion'	Rare	Operational phase: Long-term.	• PCT 266 'White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion' • Masked Owl • Pink-tailed Legless Lizard • Superb Parrot (foraging) • Grey Headed Flying Fox (foraging)	Potential impacts to connectivity for fauna between patches of native vegetation. The risk of fauna impacts is considered low, as the proposed clearing of native vegetation is minimal, with large patches being retained. Weed management would be occurring to help with the maintenance of native vegetation.
Reduced viability of adjacent habitat due to edge effects	Patches of woodland and grassland to the south, west and east of the site: • PCT 266 'White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion'	Rare	Operational phase: Long-term.	• PCT 266 'White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion' • Pink-tailed Legless Lizard • Masked Owl • Superb Parrot (foraging)	Impacts to viability of adjacent habitat due to edge effects may be managed with weed management.

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
Reduced viability of adjacent habitat due to increased noise	Patches of woodland and grassland to the south, west and east of the site: • PCT 266 'White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion'	Rare	Construction Phase: Short – term.	• PCT 266 'White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion' • Hollow bearing trees • Pink-tailed Legless-lizard • Masked Owl Superb Parrot (foraging) • Grey Headed Flying Fox (foraging)	Disturbances to native fauna through excessive dust, noise and light during construction.
Transport of weeds and pathogens from the site to adjacent vegetation	Patches of woodland and grassland to the south, west and east of the site: PCT 266 'White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion'	Irregular	Construction and operation: long-term	• PCT 266 'White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion'	The introduction of new weed outbreaks and pathogens on surrounding habitat as a result of the development is considered manageable. Spread of weeds and pathogens will be limited by restricting the use of vehicles to roads.
Increased risk of starvation, exposure and loss of shade or shelter	Patches of woodland and grassland to the south, west and east of the site: PCT 266 'White Box grassy woodland in the upper slopes sub-region of the NSW South Western	Rare	Construction Phase: Short-term.	• Pink-tailed Legless-lizard • Masked Owl • Superb Parrot (foraging)	Loss of woodland and grassland habitat presents the risk of starvation, exposure and loss of shade or shelter for resident fauna. This risk is minimised by mitigation measures described in Section 8.1.

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
	Slopes Bioregion'				
Loss of breeding habitat	Patches of woodland and grassland to the south, west and east of the site: • PCT 266 'White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion'	Rare	Construction Phase	• Hollow bearing trees • Pink-tailed Legless-lizard • Masked Owl	Breeding habitat - hollows, rocky outcrops, scattered rocks and tussock grasses have been identified within the Development Footprint.
Inhibition of nitrogen fixation and increased soil salinity	N/A	Rare	Operation Phase	N/A	It is unlikely that any adverse impact on soil microbial life and soil salinity will be made through the development and on-going operation. There is strong argument that by reducing the agricultural management intensity and providing microclimates beneath the arrays, that soil health and the persistence of ground cover throughout the year will improve.
Fertilizer drift	Patches of woodland and grassland to the south, west and east of the site: • PCT 266 'White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes	Rare	Operation Phase	N/A	Unlikely to impact on-site PCTs and surrounding vegetation, as no fertilizer application is expected as a result on the development.

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
	Bioregion'				
Rubbish dumping	Entire site and surrounding vegetation.	Rare	Construction Phase: Short-term.	• PCT 266 'White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion' • Pink-tailed Legless Lizard	Contamination of surrounding habitat with rubbish associated with construction if this is not managed.
Wood collection	All wooded vegetation within in site and surrounding areas.	Rare	Operation	• PCT 266 'White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion'	Potential to result in reduced habitat for birds, reptiles, insects and fungi.
Removal and disturbance of rock, including bush rock	Scattered through majority of the site	Rare	Operation	• Pink-tailed Legless-lizard	Reduced habitat for the Pink-tailed Legless-lizard
Increase in predators	Entire site and surrounding vegetation.	Rare	Operation	• PCT 266 'White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion' • Pink-tailed Legless-lizard	Domestic/Feral cats, foxes and other feral predators could increase due to increasing habitat edges created by development increasing movement capacity and success of feral predators.

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
Increase in pest animal populations	Entire site and surrounding vegetation.	Rare	Operation	• PCT 266 'White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion'	Unlikely to impact PCTs, however increased human activity within the Development Footprint has the potential to introduce pest animals.
Changed fire regimes	Entire site and surrounding vegetation.	Rare	Operation	• PCT 266 'White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion' • Pink-tailed Legless-lizard	Moderate risk of increased fire frequency given use of vehicles and machinery which may cause sparks or leak fuel on dry vegetation. This risk is considered low, as vehicles will be restricted to tracks.
Disturbance to specialist breeding and foraging habitat (e.g., beach nesting for shorebirds)	N/A	Rare	Operation	• PCT 266 'White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion' • Pink-tailed Legless-lizard • Masked Owl	Impacts to specialist breeding and foraging habitat- Hollow bearing trees suitable for Masked owl would be removed. Rocks used throughout life cycle for Pink-tailed Legless-lizard would be removed.

7.3 Prescribed Impacts

Table 7-5 Prescribed biodiversity impacts

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
Prescribed biodiversity impacts (those listed below are included in the BAM)					
Impact on threatened entities associated with karst, caves, crevices, cliffs, rocks and other geological features of significance	10.62 ha	Operation period of BESS	Operation period of BESS	• Pink-tailed Legless-lizard	Loss of rocky habitat for the Pink-tailed Legless-lizard in development site through inappropriate storage of machinery, equipment and infrastructure. Driving over open paddocks and rocky habitat.
Impacts on habitat of threatened entities associated with human made structures or non-native vegetation	2.6ha (this is the total extent of the exotic area within the development footprint	Operation period of BESS	Operation period of BESS	• No manmade structures in the Development Site or Footprint • Non-native vegetation flora is foraging habitat for Superb Parrot.	Minimal impact for Superb Parrot

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
Impacts on connectivity of habitat of threatened entities	10.62 ha (development footprint area)	Operation period of BESS	Operation period of BESS	• PCT 266 'White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion' • Pink-tailed Legless-lizard • Masked Owl • Superb Parrot and • Grey-headed Flying Fox	Connectivity may be impacted from construction of the BESS and access track, for the Pink-tailed Legless-lizard by reducing suitable habitat given the species cryptic nature and living underground. The Masked Owl, Superb Parrot and Grey-headed Flying Fox are able to move further distances so the proposal is unlikely to have an impact that could cause a decline in these species to decrease connectivity of foraging habitat as a result of constructing the BESS.
Impacts on water quality, water bodies and hydrological processes that sustain threatened entities.	Unknown	Construction and decommissioning	Construction and decommissioning	See ecosystem credit species in section 4.1 (excluding Regent Honeyeater, Swift Parrot and Large Bent-winged Bat). • PCT 266 'White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion' • Pink-tailed Legless-lizard • Masked Owl	Construction and decommissioning of the BESS would disturb soils and potentially lead to sediment or other pollutants being present in runoff, mobilising and entering local waterways or waterbodies, adversely impacting on water quality. Mitigation measures to help maintain water quality are mentioned in the EIS including the implementation of a sedimentation control plan, a spill control plan and progressive rehabilitation where possible. With these mitigation measures in place the works are unlikely to have an impact that could cause a decline in a threatened species.

Nature of impact	Extent	Frequency	Duration and timing	TEC, threatened species and habitats likely to be affected	Consequence for bioregional persistence
Impacts of wind turbine strikes on protected animals identified in subsection 6.1.5 of the BAM.	N/A	N/A	N/A	N/A	N/A
Impacts of vehicle strike to threatened fauna or flora that are a part of a TEC	Internal track	Irregular	During construction and operation	See ecosystem credit species in section 4.1 (excluding Regent Honeyeater, Swift Parrot and Large Bent-winged Bat). • PCT 266 'White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion' • Pink-tailed Legless-lizard • Masked Owl	The installation of access track to the BESS and other infrastructure may increase the likelihood of vehicle strike to a minor extent. The risk to fauna can be mitigated by regulating speed limits. Given the speed limit of the access road would likely be relatively low, the likelihood of vehicle strike is still considered low risk.

7.4 Impacts to Biodiversity Values that are Uncertain

There may be some impacts to biodiversity that cannot be predicted. If this occurs, they can be addressed using the adaptive management strategy, refer to section 8.2.

The Pink-tailed Legless Lizard is a cryptic species that lives mainly underground. There is limited knowledge of how the species moves through the landscape. The uncertainty is knowing if all individuals have been found or potentially relocated prior to construction. To reduce uncertainty, a Pink-tailed Legless Lizard management plan is proposed as part of the mitigation to ensure the species is appropriately surveyed and managed prior to and during construction.

7.5 Impacts to Matters of National Environmental Significance

An EPBC Act habitat evaluation (Appendix B) was undertaken for species and threatened ecological communities predicted to occur within the broader study locality (10 km radius). The evaluation details understanding of this sites' habitat, based on vegetation and flora and fauna surveys documented in Sections 3 and 4. EPBC Act Assessments of Significance (AoS) were completed in early planning stages for species that had potential to be impacted by the development (Appendix B). An EPBC referral is being prepared for the Pink-tailed Legless-lizard. This section addresses potential impacts to EPBC listed TECs, threatened and migratory species specifically.

7.5.1 Threatened Ecological Communities

NGH surveys confirmed that no threatened ecological communities identified through the PMST as having potential to occur, were present within the Development Footprint. The vegetation community present does not meet the EPBC Act criteria for the critically endangered ecological community White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

7.5.2 Threatened Species

There were 15 MNES listed species that were determined likely to occur due to geographical location and suitable habitat. Based on the survey efforts (refer Section 4.4) the following species are unlikely to occur:

- Wybong (*Prasophyllum* sp. Wybong) - Critically Endangered
- Small Purple-pea (*Swainsona recta*) - Endangered
- *Zieria obcordata* - Endangered
- *Euphrasia arguta* - Critically Endangered
- Tumut Grevillea *(Grevillea wilkinsonii)* – Endangered
- Yass Daisy (*Ammobium craspedioides*) - Vulnerable
- Gang-Gang Cockatoo (*Callocephalon fimbriatum*) – Endangered
- Koala (*Phascolarctos cinereus*) - Endangered
- Swift Parrot (*Lathamus discolor*) - Critically Endangered
- Golden Sun Moth (*Synemon plana*) – Vulnerable
- Key's Matchstick Grasshopper (*Keyacris scurra*) – Endangered
- Grey Falcon (*Falco hypoleucos*) - Vulnerable

Targeted Surveys determined the following species were present on site:

- Pink-tailed Legless Lizard (*Aprasia parapulchella*) – Vulnerable
- Superb Parrot (*Polytelis swainsonii*) – Vulnerable
- Grey-headed Flying-fox (*Pteropus poliocephalus*) – Vulnerable

Assessments of Significance according to the EPBC Act Significant Impact Guidelines 1.1 determined the following species not likely to be impacted by the proposed works (Appendix B):

- Striped Legless Lizard (*Delma impar)* - vulnerable
- Superb Parrot (*Polytelis swainsonii*) – Vulnerable

- Grey-headed Flying-fox (*Pteropus poliocephalus*) – Vulnerable
- Swift Parrot (*Lathamus discolor*) - Critically Endangered

Pink-tailed Legless Lizard

The Pink-tailed Legless Lizard was identified during the September targeted survey and opportunistically. Due to the AoS determining the proposal is likely to significantly impact this species a referral to the Minister is required.

The assessments of significance determined the Pink-tailed Legless Lizard (*Aprasia parapulchella*) likely to be impacted by the proposed works (Appendix B.3) based on the following:

- the proposal will directly impact 10.33 hectares in the development footprint based on the proposed development, however the suitable habitat for the species within the development site is 48.29 hectares, therefore the habitat available for the Pink-tailed Legless Lizard will be reduced but it will not be fragmented or completely removed.
- The development footprint for the Orana BESS is located in the northern part of the development site and will reduce the extent of the Pink-tailed Legless Lizard habitat but it will not separate the populations into two areas causing further fragmentation or restricting the breeding cycle of the species.

A Pink-tailed Legless Lizard management plan has been proposed as a mitigation measure and will comprise:

- An assessment of potential relocation strategies (locations and timing)
- Further consultation with species experts to minimise impact prior to construction
- An unexpected finds protocol for the construction phase of the project:

7.5.3 Migratory Species

A habitat assessment was conducted for migratory species listed in the PMST results. None of these species are considered likely to occur onsite, as detailed in Appendix B.2.

7.5.4 Assumptions and Limitations

Climatic conditions may influence the species present within the Development Site at any one time (see Section 4.4.1 for weather condition during surveys). Where survey has been undertaken for candidate species requiring confirmation of presence or absence, this has been done employing appropriate methods and timing, as require under the BAM. Nevertheless, it is an unavoidable limitation that not all species that utilise an area will be detected. This is generally due to their cryptic nature or mobility and unpredictable movement throughout their habitat and prevailing drought conditions. The results in this assessment are based on the proper application of the BAM and therefore are considered sufficient to inform the development of the project's mitigation strategies and offset obligation.

The calculation of HBTs, in particular the size and number of hollows, was made from ground level. It is possible that some hollows are present that were not visible from ground level, which may result in underestimates of the number of hollows (Gibbons and Lindenmayer 2000). Additional mitigation has been recommended to address this limitation.

8. Mitigating and Managing Impacts

8.1 Mitigation Measures

A general summary of the key measures required to mitigate the impacts of the proposal are provided below. Mitigation measures proposed to manage impacts, including proposed techniques, timing, frequency, responsibility for implementing each measure, risk of failure, and an analysis of the consequences of any residual impacts are provided in Table 8-1.

8.1.1 Direct Impacts (clearing of vegetation and habitat)

1. Clearing activities will be timed to avoid critical life cycle events, such as breeding and nursing.
2. Particular tree felling protocols will be in place for HBT. A clearing protocol for hollow bearing trees has been included in Appendix E.
3. clearing protocols will include pre-clearing surveys, daily surveys and staged clearing
4. There will be relocation of habitat features (fallen timber, hollow logs and scattered/partially embedded rock) from within the Development Footprint to provide supplementary habitat for displaced fauna.
5. Clearing will be supervised by an ecologist or trained fauna spotter catcher to allow for resident fauna to relocate or be relocated where required.

8.1.2 Indirect impacts

Adoption of clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance, including:

a. chainsaw to be used over heavy machinery to remove native vegetation for partial clearing where possible
b. using noise barriers, or daily/seasonal timing of construction and operational activities to reduce impacts of noise
c. using light shields, or daily/seasonal timing of construction and operational activities to reduce impacts of light spill
d. using adaptive dust management and monitoring programs to control air quality
e. scheduling the timing of construction activities to avoid impacts (e.g., timing the construction for when particular species known to, or likely to use the habitat on the site, are not breeding or nesting)
f. erecting temporary fencing to protect significant environmental features.
g. using hygiene protocols to prevent the spread of weeds or pathogens between infected and uninfected areas
h. training staff and conducting site briefings to communicate environmental features to be protected and measures to be implemented
i. preparing a vegetation management plan to regulate activity in vegetation and habitats adjacent to residential developments. The plan may include controls on rubbish disposal, wood collection, fire management, and disturbance to nests and other niche habitats

j. providing for the ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation habitat on, or adjacent to, the development or clearing site or land to be biodiversity certified.

8.1.3 Prescribed Impacts

a. Ensure imbedded and exposed rock are excluded from the construction footprint through exclusion fencing
b. Use of temporary fencing to protect significant environmental features.
c. Erosion and sediment control measures for reducing impacts on water quality, water bodies and hydrological processes that sustain threatened entities.
d. Introduce speed limits to reduce vehicle strike

Table 8-1 Mitigation measures proposed to avoid and minimise impacts on native vegetation and habitat.

Mitigation measure/Action	Proposed techniques/Outcome	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
Displacement of resident fauna through vegetation clearing and habitat removal						
Completion of Biodiversity Management Plan to minimise impacts on biodiversity.	The Biodiversity Management Plan needs to include the following: • Hollow-bearing tree protocol (Appendix E) • Pink-tailed Legless Lizard management plan • Masked Owl management plan • Identification of temporary fencing location based on the development footprint. • Unexpected Finds Protocol • Staff training and induction measures which include Maked Owl, Pink-tailed Legless Lizard, Superb Parrot and Grey-headed Flying Fox, Diamond Firetail and Turquoise Parrot. • Management of biodiversity mitigation measures for indirect and prescribed impacts.	Pre-clearance Pre-construction	One off	Construction contractor	High	Risk to injure or harm native wildlife without appropriate mitigation measures implemented
timing works to avoid critical life cycle events such as breeding or nursing	Hollow bearing tree removal should be timed to avoid breeding season for the highest number of species such as Masked Owl. Rock removal to be completed when Pink-tailed Legless Lizard is not breeding	Pre-clearance surveys prior to construction	One off	Construction contractor	Low	High risk and consequences could include injury or death to hollow dependent fauna particularly Masked Owl or Pink tailed Legless Lizard.
Masked Owl management plan	• Pre-clearance surveys of HBTs to determine if Masked Owl are breeding on site. • Avoid HBT removal if any Masked Owl breeding on site • Ecologist present during tree removal • Threatened species protocol	Pre-construction	Regular	Construction contractor	High	High risk and consequences could include injury or death to Masked Owl o

Mitigation measure/Action	Proposed techniques/Outcome	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
Pink-tailed Legless Lizard management plan	• Consultation with the species expert to determine timing for relocation of this species prior to construction • Any proposed relocation undertaken by an appropriately qualified ecologist • Pre-clearance surveys • Relocation of scattered rocks in the development site from the development footprint by an experienced ecologist • Threatened species protocol for managing individuals if construction occurs when species are likely to be underground • Avoid creation of rock piles. Rocks should be loosely scattered in the development site • Avoid any relocation during breeding season (December -March)	Sept-Nov Autumn (warmer months)	Regular	Construction contractor	High	Pink-tailed Legless Lizard is a cryptic species and if the pre-clearance surveys are done in wet, sool or hot weather the species may be further underground ad not appropriately managed prior to construction works begin.
instigating clearing protocols including pre-clearing surveys, daily surveys and staged clearing, the presence of a trained ecological or licensed trained spotter catcher during clearing events	Staged clearing, supervised by Ecologist or trained spotter catcher to allow for resident fauna to relocate or be relocated where required. A hollow bearing tree clearing protocol has been included in Appendix E for the 37 HBTs. The clearing protocol includes pre-clearance surveys and a protocol for managing fauna during clearing or if any harm or injury may occur but also how to avoid and minimise harm to wildlife.	Construction	Regular	Construction contractor	Moderate	High risk and consequences could include injury or death of fauna

Mitigation measure/Action	Proposed techniques/Outcome	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
relocation of habitat features (fallen timber, hollow logs and e rock) from within the Development Site.	All rock, fallen timber and hollow logs should be relocated outside of the construction area under the supervision of an Ecologist or spotter catcher.	Construction	Regular	Construction contractor	Low	Moderate risk and consequences could include loss of some species not being able to relocate to suitable habitat due to exposure or predation.
Induct all staff prior to construction to identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance.	Approved clearing limits to be clearly delineated with temporary fencing or similar prior to construction commencing.	Prior to and during construction	Regular	Construction Contractor	High	Low risk of inadvertent clearing of native vegetation and fauna habitat intended for conservation onsite
Indirect impacts on native vegetation and habitat						
clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance; for example, removal of native vegetation by chainsaw, rather than heavy machinery, is preferable in situations where partial clearing is proposed	Documented clearance protocols to mark and protect vegetation to be retained. · Use handheld machinery where possible and have elevated work platform check hollows prior to tree felling	Preconstruction	Regular	Construction contractor	High	With effective implementation of this protocol, risk is considered low.

Mitigation measure/Action	Proposed techniques/Outcome	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
Install temporary fencing to protect significant environmental features such as riparian zones	Prior to construction commencing, exclusion fences and signage would be installed around habitat to be retained.	Construction	Regularly	Construction Contractor	Low	None
hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas	Ensure machinery and equipment as clean and free from pathogens and weeds prior to entering site	Construction	Regular	Construction contractor	Moderate	With effective implementation of this protocol, risk of weed invasion is considered low.
Preparation of a Biodiversity Management Plan (BMP) for the site	BMP to include: How to remove and dispose of vegetation and topsoil containing weeds declared under the Biosecurity Act 2015 during and after construction. Reporting any occurrences of pathogens such as Myrtle Rust and Phytophthora.	Construction, operation	One off	Developer	Moderate	New weeds into the site, plant diseases and inappropriate species establish which could affect adjoining native vegetation and fauna habitat. With effective implementation of this protocol, risk is considered low.
Prescribed biodiversity impacts						
Sediment barriers and spill management procedures to control the quality of water runoff released from the site into the receiving environment	An erosion and sediment control plan would be prepared and implemented.	Construction	Regular	Construction Contractor	Moderate	Impacts may occur to waterway if erosion and sedimentation control plan not implemented.

Mitigation measure/Action	Proposed techniques/Outcome	Timing	Frequency	Responsibility	Risk of failure	Risk and consequences of residual impacts
Use of temporary fencing to protect significant environmental features.	Exclusion fencing	Pre-construction Construction	Regular	Construction Contractor	Moderate	Injury or death to wildlife.
Introduce speed limits to reduce vehicle strike	Reduced speed limit	Pre-construction Construction	Regular	Construction Contractor	Moderate	Damage to vehicles. Injury or death to wildlife.

8.2 Adaptive Management Strategy for uncertain biodiversity impacts

Adaptive management during construction and operation will be receptive to any new and relevant data that may arise through ongoing assessment and monitoring and is key to the successful implementation of the relevant management plans. This will allow ongoing flexibility to manage objectives, allow for relevant feedback and modifications. Construction management plans will contain management plans for flora and fauna, which will have an adaptive management component. This includes measures to monitor predicted impacts of vehicle/train strikes, thresholds for species mortality, based on relevant literature, which will trigger adaptive management actions, and any measures proposed to mitigate potential impacts.

9. Serious and Irreversible Impacts (SAII)

The principles used to determine if a development will have serious and irreversible impacts, include impacts that:

- Will cause a further decline of the species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to be in a rapid rate of decline, or
- Will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to have a very small population size, or
- Impact on the habitat of a species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to have a very limited geographic distribution, or
- Impact on a species or ecological community that is unlikely to respond to measures to improve habitat and vegetation integrity and is therefore irreplaceable.

9.1 Potential Serious and Irreversible Impact Entities

9.1.1 Threatened ecological communities

PCT 266 under the BC Act, is associated with the TEC *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregion.* This TEC is considered a SAII TEC and impacts to this SAII TEC have been avoided where possible, with a maximum of 10.62 ha proposed to be impacted. Clearing within this zone is not expected to have a significant impact on the community, given the large majority of the patch being retained (78% of TEC within the Development Site retained).

9.1.2 Threatened species

Targeted surveys were carried out for Tumut Grevillea (*Grevillea wilkinsonii*) and *Euphrasia arguta*. These two species were not detected. Therefore, no SAII listed threatened species will be impacted and require further assessment.

9.1.3 Data and Information used in SAII Assessment

The following information sources were used in the SAII Assessments:

- DPE Threatened Species Profile (2022). White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions.
- NSW threatened Species Scientific Committee (TSSC), (2020) Final determination - White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland, NSW Government
- Threatened Biodiversity Database Collection (TBDC), NSW Government accessed at https://www.environment.nsw.gov.au/AtlasApp/Default.aspx June 2022

- Commonwealth Conservation Advice – Box Gum Grassy Woodland and derived native grasslands

White Box – Yellow Box Blakely's Red Gum Woodland (Box-Gum Woodland)

An assessment of the impacts to Box-gum Woodland was undertaken in Table 9-1.

Table 9-1 Box Gum Woodland SAII Assessment

Criteria for assessment of TECs at risk of serious and irreversible impacts
The assessor is required to provide further information regarding the impacts on each TEC at risk of SAII. This must include the actions and measures taken to avoid the direct and indirect impact on the TEC at risk of an SAII.

PCT 266 occurs within the development site for the proposed BESS. It occurs as PCT 266 Woodland (28.47 ha) and PCT 266 Derived Grassland (19.82 ha). PCT 266 covers 48.30 ha of the development site. The VIS for woodland was 12.6, the VIS for the grassland was considerably lower, 0.9. Therefore, no ecosystem credits were generated.
 	
Direct impacts to the TEC have been avoided where possible. During the design phase there have been a number of footprint iterations. The final development footprint has a 25 m buffer from the indicative infrastructure layout which is considered a worst case scenario.
 	
The proposed development footprint covers an area of 14.77 ha, (which includes a 25m buffer from the infrastructure lay out).
 	
Based on the development footprint having a 25 m buffer the total amount of TEC to be impacted is 10.62 ha, which consists of 3.66 ha of PCT 266 Woodland and 6.97 ha of PCT 266 Derived Grassland. This equates to 21.99 % of the TEC in the Development Site. The large majority, approximately 37.68 ha (78.01%) of TEC within the Development Site would be retained.
The areas impacted are modified and have been subject to historic clearing and grazing for agriculture. Where Box-Gum Woodland would be directly impacted, ecosystem credits have been generated. As outlined in Section 10:
 	
Indirect Impacts
To prevent indirect impacts to the retained Box-Gum Woodland, the following would occur:
• Complete a Construction Environmental Management Plan (CEMP), to include:
  ○ Ensure construction site has permanent exclusion fencing to ensure no accidental vegetation removal occurs in the adjacent Box-Gum woodland.
  ○ Ensure no stockpiling or storage of equipment, soil or rubbish occurs in the adjacent Box-Gum woodland.
  ○ As part of a site induction, inform construction staff these areas are exclusion zones and therefore not to be disturbed.
  ○ Place logs from trees that are to be removed in the development site in the Woodland areas to be retained.

1. The assessor must consult the TBDC and/or other sources to report on the current status of the TEC, including: **a. Evidence of reduction in geographic distribution (Principle 1, clause 6.7(2)(a) BC Regulation) as the current total geographic extent of the TEC in NSW AND the estimated reduction in geographic extent of the TEC since 1970 (not including impacts of the proposal).**

Criteria for assessment of TECs at risk of serious and irreversible impacts

Principle 1, clause 6.7(2)(a) BC Regulation states 'It will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline…'

According to the Final Determination to list the TEC as Critically Endangered (NSW Threatened Species Scientific Committee, 2020), the distribution of Box Gum Woodland is not restricted. The extent of occurrence of the TEC is estimated at 702,800 square km based on a minimum convex polygon enclosing known occurrences of the community using the method of assessment recommended by IUCN (NSW Threatened Species Scientific Committee (NSW TSSC), 2020).

Box-Gum Woodland geographical distribution in NSW extends from the Queensland border (west of the Great Dividing Range) to the Victorian border in the south. Box-Gum Woodland extends from the far south east coast of NSW to Balranald in the west of NSW. The IBRA regions in NSW include the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina.

The reduction in geographic distribution is defined as greater than or equal to 80% in ten years or three generations (NSW Department of Planning and Environment (NSW DPE), 2020). The estimated reduction in geographic extent of the TEC since 1970 is not defined in the TBDC. The Box-Gum Woodland community has undergone a large decline in geographic distribution due to widespread clearing and degradation throughout its range which has left remnants typically fragmented, isolated and often with understories highly modified (NSW Threatened Species Scientific Committee (NSW TSSC), 2006). Approximately three quarters of the distribution of Box-Gum Woodland occurs in NSW (NSW Threatened Species Scientific Committee (NSW TSSC), 2006). The following losses were attributed during the 2009-2018 periods (NSW Threatened Species Scientific Committee (NSW TSSC), 2020):

- Clearing of Grassy Woodlands from Agriculture:
  - 2009 – 2016 an average of 395ha annually
  - 2016 -2017 an average of 654 ha annually
  - 2017 -2018 an average of 1,344 ha annually
- Clearing of Grassy Woodlands from Infrastructure:
  - 2009 -2016 an average of 155 ha annually
  - 2016 -2017 an average of 216 ha annually
  - 2017 -2018 an average of 589 ha annually

The percent reduction in extent of PCT 266 is estimated at 94% (NSW Department of Planning and Environment (NSW DPE), 2021). Data listed in the PCT description gives an estimated 800,000ha occurring pre-European times and 50 000 ha as the current extent (BioNet Vegetation Classigication - PCT data, 2021). According to the current information, PCT 266 has been cleared mainly for agriculture (NSW Department of Planning and Environment (NSW DPE), 2021). For example, previous surveys conducted by Prober & Thiele (1993) estimate only 0.01% of White Box woodland south of Molong remains relatively unmodified.

The current threats to further clearance of Box-Gum Woodland include clearing, timber harvesting, firewood cutting, grazing, weed invasion, fire, soil disturbance and increased nutrient loads, soil acidification, salinity, and loss of connectivity with other vegetated areas (Department of Environment and Climate change, 2007).

This SAII entity does not have any listed thresholds, therefore, any impact to this entity could be considered a SAII by the decision maker.

b. Extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes (Principle 2, clause 6.7(2)(b) BC Regulation) indicated by:

Criteria for assessment of TECs at risk of serious and irreversible impacts
i. Change in community structure **ii. Change in species composition** **iii. Disruption of ecological processes** **iv. Invasion and establishment of exotic species** **v. Degradation of habitat** vi. **Fragmentation of habitat.**
Principle 2 (b) states 'it will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size…' There is 48.30 ha of Box-Gum Woodland within the Development Site, consisting of 28.47 ha of PCT 266 woodland and 19.82 ha of PCT 266 Derived Grassland. Previous land clearing and land management in the development site has reduced the community structure and species composition. All vegetation within the development footprint would be removed/disturbed, hence 10.62 ha (21.99% of the Development Site) of the current community structure and species composition of the TEC would be lost. All canopy species (*E. albens*) would be removed in the development footprint of Zone 1 reducing seed sources of local genetic provenance. Zone 2 Derived grassland is comprised of common disturbance tolerant understory species and no significant species would be lost to the retained areas of TEC. Approximately 24.81 ha of Zone 1 PCT 266 Woodland and 12.86 ha of Zone 2 Grassland would remain in the Development Site (78.01%). There is potential for ecological process disruptions in the retained TEC due to edge effects. However, the TEC currently undergoes ecological process disruption from agricultural activities. Grazing of native vegetation and modified pastures has occurred at the Development Site. Grazing is associated with ground compaction, erosion, and ground enrichment of the topsoil, leading to degradation of the lower stratum. This has led to structural and compositional degradation and partial failure of the native lower stratum to regenerate. There is potential for weed invasion and establishment and degradation of habitat in the remaining TEC area due to the creation of edge effects and increased disturbance. The Box-Gum Woodland as PCT 266 grassland in the development site is considered highly modified due to the generally high presence of exotic groundcover and low native flora diversity and abundance (most plots contained less than 50% diversity except for plot 4 - 50% diversity but exotic cover dominant and plot 5 - had higher native diversity and cover). The Vegetation Integrity score for Zone 2 was 0.9. The introduction and establishment of exotic species has led to the degradation and fragmentation of habitat in this locality. These changes have been occurring since European settlement and the introduction of agriculture, rather than from the proposed development. Connectivity of the TEC would be maintained within the Development Site and surrounding areas given the design of the Development Footprint and no areas of retained TEC would become isolated.
c. Provide evidence of restricted geographic distribution (Principle 3, clause 6.7(2)l BC Regulation), based on the TEC's geographic range in NSW according to the: **i. Extent of occurrence** **ii. Area of occupancy** iii. **Number of threat-defined locations.**
The TEC is not listed as a SAII under Principle 3.

Criteria for assessment of TECs at risk of serious and irreversible impacts
d. Provide evidence that the TEC is unlikely to respond to management (Principle 4, clause 6.7(2)(d) BC Regulation).
The TEC is not listed as a SAII under Principle 4.
2. In relation to the impacts from the proposal on the TEC at risk of an SAII, the assessor must include data and information on: **a. The impact on the geographic extent of the TEC (Principles 1 and 3) by estimating the total area of the TEC to be impacted by the proposal** **i. In hectares** ii. **As a percentage of the current geographic extent of the TEC in NSW.**
10.62 ha of Box-Gum Woodland would be directly and indirectly impacted by the proposal through clearing for the BESS (this includes a 25m buffer around the infrastructure). This is comprised of 3.66 ha of PCT 266 Woodland and 6.97 ha of PCT 266 Derived Grassland. NSW Threatened Species Scientific Committee (2020) estimates the area of occupancy (AOO) of Box-Gum Woodland remaining in the NSW South Western Slopes IBRA Region is 151,100km2 (15,110,000ha). Approximately 10.62 ha is proposed to be removed/impacted in the Development Footprint which is less than 0.0001% of the estimated extent remaining.
b. The extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes (Principle 2) of the TEC by i. **Estimating the size of any remaining, but now isolated, areas of the TEC; including areas of the TEC within 500 m of the Development footprint or equivalent area for other types of proposals**
To estimate the remaining presence of Box-gum Woodland, NSW State Vegetation mapping, VIS_4469 (Department of Planning, Industry and Environment, 2015) and NGH mapping was used. A 500m buffer of the Development Footprint using associated PCTS, found approximately 154.5ha of Box-Gum Woodland TEC. Of this 10.62 ha of TEC would be removed/impacted, which equates to approximately 6.87% within 500m of the Development Footprint. Box-Gum Woodland does not have a limited geographical distribution. The extent of occurrence of Box-Gum Woodland in NSW extends from Queensland to Victoria. The population in NSW is scattered and fragmented throughout NSW in its known distribution.
ii. Describing the impacts on connectivity and fragmentation of the remaining areas of TEC measured by: ○ **Detailing the distance between isolated areas of the TEC, presented as the average distance if the remnant is retained AND the average distance if the remnant is removed as proposed** ○ **Estimating maximum dispersal distance for native flora species characteristic of the TEC**

Criteria for assessment of TECs at risk of serious and irreversible impacts

- **Providing other information relevant to describing the impact on connectivity and fragmentation, such as the area to perimeter ratio for remaining areas of the TEC as a result of the Development.**

The remaining areas of Box-Gum Woodland within 500 m (Figure 27) shows reasonable connectivity with no isolation of Box-Gum Woodland being caused from the proposed vegetation removal. The Box-Gum Woodland present in the development site and surrounding 500 m is fragmented within the region, being highly modified from past agricultural disturbances. Eucalypts have low seed dispersal distances, usually similar to the height of the tree. The proposal would impact seed dispersal through the clearing of 3.66ha PCT 266 Woodland.

There are no isolated areas of the TEC within the Development Site. Connectivity would not be lost with the removal of PCT 266 Woodland occurring on the edge of a woodland section and a few trees beside a current track. The Box-Gum Woodland from Zone 1 Woodland would lose a width of area varying between approximately 100m at the highest to approximately 1m at the lowest, averaging approximately 50m wide.

Box-gum Woodland Zone 1 would remain in the west, south and east.

The BESS would create a patch between Zone 2 in the north-eastern section and Zone 1 Woodland ranging between 89 m and 22 6m wide.

Zone 2 Grassland in the far north-eastern section of the site forms an L shape. The width of the vegetation removal/disturbance here would range between 60 m and 88 m.

The TEC would continue to exist surrounding the BESS, except in the immediate far north where there is currently a substation.

iii. Describing the condition of the TEC according to the vegetation integrity score for the relevant vegetation zone(s) (Chapter 4.3), including the relevant composition, structure and function condition scores for each vegetation zone.

Table 9-2 shows the vegetation integrity scores including the composition, structure and function condition scores for vegetation zones 1 and 2 for PCT 266 that will be impacted by the development.

Vegetation Zone 2 (Derived Grassland) has low native species diversity and an absence of canopy trees and shrubs representing a vegetation zone in low condition. The vegetation integrity score of <15 reflects the low diversity in this vegetation zones composition, structure and function. This vegetation integrity score is categorically too low to generate offsets.

Vegetation Zone 1 (Woodland) has a vegetation integrity score of 12.6. This is low due to the absence of native shrubs and understory species and is not high enough to generate ecosystem credits.

Table 9-2 SAII Box-Gum Woodland impacted

Zone ID	Zone Description	Impact Area	Composition score	Structure score	Function score	Vegetation Integrity Score
1	PCT 266 Woodland	3.66	33.2	11.9	5.1	**12.6**
2	PCT 266 Derived Grassland	6.97	53	1.4	0	**0.9**

Where the TBDC indicates data is 'unknown' or 'data deficient' for a TEC for criterion listed in Subsection 9.1.1 (2), the assessor must record this in the BDAR or BCAR.

Criteria for assessment of TECs at risk of serious and irreversible impacts
The estimated reduction in geographic extent of the TEC since 1970 is not defined in the TBDC

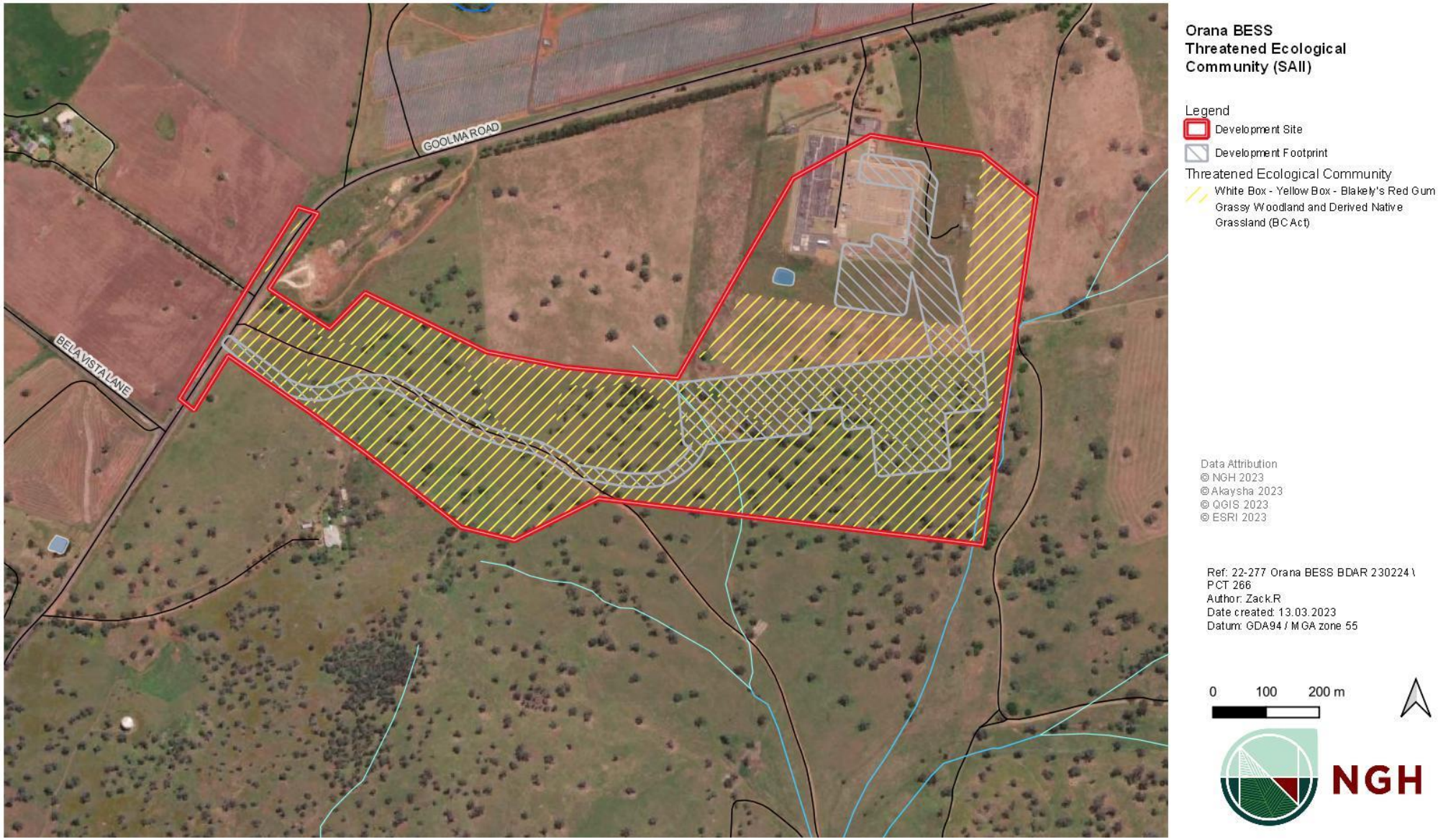


Figure 9-1 Threatened Ecological Community (SAII Box-gum Woodland) within the development site.

10. Offset Requirement

10.1 Impacts Requiring Offset

10.1.1 Ecosystem credits including scattered trees

An offset is required for all impacts of development on PCTs that are associated with:

a) a vegetation zone that has a vegetation integrity score ≥15 where the PCT is representative of an endangered or critically endangered ecological community, or

b) a vegetation zone that has a vegetation integrity score of ≥17 where the PCT is associated with threatened species habitat (as represented by ecosystem credits), or is representative of a vulnerable ecological community, or

c) a vegetation zone that has a vegetation integrity score ≥20 where the PCT is not representative of a TEC or associated with threatened species habitat.

The PCTs and vegetation zones requiring offset, and the ecosystem credits required, are documented in Table 10-1 and mapped in Figure 10-1. The associated credit classes for ecosystem credits generated are detailed in Table 10-2 below.

Table 10-1 PCTs and vegetation zones that require offsets

Zone ID	PCT ID	PCT name	Zone area (ha)	Vegetation integrity score	Ecosystem credits required
1	266_Woodland_Low-Good	266	3.66	12.6	0
2	266_Grassland _Low	266	6.97	0.9	0

10.1.2 Species credits

The species credits generated by the BAM Calculator are provided in Table 10-2.

Table 10-2 Candidate species requiring offsets

Species Credit Species	Biodiversity risk weighting	Area of habitat for species polygons	Species credits required	Suitable IBRA Subregion for offset
Aprasia parapulchella **Pink-tailed Legless Lizard**	2	6.92 ha (Veg Zone 2) 3.42 ha (Veg Zone 1)	26	Any in NSW
Tyto novaehollandiae **Masked Owl**	2	1.81 ha (Veg Zone 1) 3.29 ha (Veg Zone 2)	12	Any in NSW

10.1.3 Offsets required under the EPBC Act

The Pink-tailed Legless-lizard has been identified as having the potential to be impacted by the development. As such, the proposal requires a referral to the Commonwealth Minister for the Environment.

Refer to Appendix A for detailed assessment for Matters of National Significance.

10.2 Impacts not Requiring Offset

Impacts to PCTs that do not meet the thresholds identified in Section 10.1.1 of the BAM do not require offsets. These include:

Zone ID	PCT ID	PCT name	Zone area (ha)	Vegetation integrity score	Ecosystem credits required
3	Exotic	0	2.6	10.6	0

Figure 10-1 Impacts requiring offsets, not requiring offsets and not requiring assessment

10.3 Areas not Requiring Assessment

No dam were assessed as part of this BDAR and therefore were not assessed.

The substation hardstand areas were not surveyed. The substation has no value to any threatened entities assessed. If something does have value to a threatened entity, then it should be assessed as a prescribed or unknown impact and mapped accordingly in relation to the entity in figure 7-1.

11. Conclusion

NGH has prepared this BDAR on behalf of the Proponent, Akaysha Pty Ltd (Akaysha) to assess the biodiversity impacts of the proposal using the Biodiversity Assessment Method (BAM, 2020) as required under the *Biodiversity Conservation Act, 2017*.

In this BDAR, biodiversity impacts have been assessed through comprehensive mapping and assessment completed in accordance with the BAM (2020). Using state vegetation mapping and on-ground vegetation stratification, one PCT was identified within the Development Site and Development Footprint:

PCT 266 White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion is divided into two vegetation zones:

- Vegetation Zone 1 Woodland PCT 266 White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion covering 28.46 hectares in the development site and 3.66 hectares in the development footprint.
- Vegetation Zone 2 Derived Grassland PCT 266 White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion covering 19.41 hectares in the development site and 6.96 hectares in the development footprint.

PCT 266 forms part of the Critically Endangered BC Act listed White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions. However due to the high exotic component, does not meet the condition thresholds for the EPBC Act equivalent of this TEC.

The development site recorded 220 hollow bearing trees. A total of 37 hollow-bearing trees were identified within the Development Footprint that will be impacted by the proposal.

Candidate species were excluded based on the absence of suitable habitat, or the results of targeted surveys. Assessments of Significance were undertaken for five EPBC listed species including Pink-tailed Legless Lizard, Striped Legless Lizard, Superb Parrot, Swift Parrot and Grey-headed Flying Fox. The AoSs concluded no significant impact for Striped Legless Lizard, Superb Parrot, Swift Parrot and Grey-headed Flying Fox. Further mitigation is required for the Pink-tailed Legless Lizard to ensure there is no significant impact and the EPBC referral process is currently underway.

Avoidance and minimisation of impacts has been conducted through the planning phases which has resulted in comprehensive mapping and assessment in accordance with the BAM, including:

- Avoidance of native vegetation by positioning the BESS on the northern boundary as close to the substation as practical.
- Avoidance of Woodland and rocky habitat that supports a population of Pink-tailed Legless Lizard
- Avoidance of Woodland habitat to reduce the loss of hollow bearing trees
- Minimising impact by utilising existing roads in the Development Footprint as much as possible.

Based on the above, the species credit requirement for Orana BESS has been defined in Table 11-1. There are no ecosystem credits generated as a result of this assessment. Mitigation

measures have been outlined to reduce the direct, indirect, and prescribed impacts to biodiversity. The credits will be retired in accordance with the Biodiversity Offset Scheme.

Table 11-1 Species credit requirement

Species Credit Species	Biodiversity risk weighting	Area of habitat for species polygons	Species credits required	Suitable IBRA Subregion for offset
Aprasia parapulchella **Pink-tailed Legless Lizard**	2	6.92 ha (Veg Zone 2) 3.42 ha (Veg Zone 1)	26	Any in NSW
Tyto novaehollandiae **Masked Owl**	2	1.81 ha (Veg Zone 1) 3.29 ha (Veg Zone 2)	12	Any in NSW

12. References

Australian Bureau of Meteorology 2019. Climate data online accessible at: http://www.bom.gov.au/climate/data/?ref=ftr http://www.bom.gov.au/climate/data/?ref=ftr

Bionet (2018) – Bionet: website for the Atlas of NSW Wildlife; accessed at www.bionet.nsw.gov.au

Commonwealth of Australia (2013) Matters of National Environmental Significance Significant Impact Guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999

Commonwealth of Australia (2021). National Recovery Plan for the Grey-headed Flying-fox *Pteropus poliocephalus*

Commonwealth of Australia (2021) National Recovery Plan for the Superb Parrot (Polytelis swainsonii)

Commonwealth Conservation Advice – Box Gum Grassy Woodland and derived native grasslands

DEC, 2004, Threatened Species Survey and Assessment: Guidelines for developments and activities (working draft), New South Wales Department of Environment and Conservation, Hurstville, NSW

Department of Environment and Conservation (NSW) (2006). NSW Recovery Plan for the Large Forest Owls: Powerful Owl (*Ninox strenua*), Sooty Owl (*Tyto tenebricosa*) and Masked Owl (*Tyto novaehollandiae*) DEC, Sydney.

Department of Planning, Industry and Environment 2020. Environment, Energy and Science. Surveying threatened plants and their habitats.

Department of the Environment (2012). Approved Conservation Advice for Koala

Department of the Environment (2014) EPBC Act Referral Guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory), Commonwealth Department of Environment, 2014

DPE (2018). Biodiversity Values Map. Accessed online https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BVMap

DPE Threatened Species Profile (2022). White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions.

Gibbons, P and Lindenmayer, D. 2000. Hollow formation in eucalypts from temperate forests in South-eastern Australia. Pacific Conservation Biology 6(3):218-228

NSW Department of Environment and Climate Change (2008). Recovery plan for the koala (Phascolarctos cinereus)

NSW threatened Species Scientific Committee (TSSC), (2020) Final determination - White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland, NSW Government

NSW Department of Planning and Environment, (2022). NSW BioNet. https://www.environment.nsw.gov.au/AtlasApp/Default.aspx

NSW Department of Planning, Industry and Environment (2022) Threatened Species Collection Database. Pink-tailed Legless Lizard

NSW Department of Planning, Industry and Environment (2022) Threatened Species Collection Database. Swift Parrot.

Office of Environment and Heritage (OEH) (2017) BioNet Vegetation Information System: Classification Database. Accessed online at http://www.environment.nsw.gov.au/research/Visclassification.htm

Office of Environment and Heritage (OEH) (2018) Koala Habitat and Feed Trees. Accessed online at https://www.environment.nsw.gov.au/topics/animals-and-plants/nativeanimals/native-animal-facts/koala/koala-habitat

Sarker S, Ghorashi SA, Forwood JK & Raidal SR (2013). Whole-Genome Sequences of Two Beak and Feather Disease Viruses in the Endangered Swift Parrot (Lathamus discolor). Genome Announcements, 1, e00842-1.

Saunders DL & Tzaros C (2011). National Recovery Plan for the Swift Parrot Lathamus discolor. Found at: http://www.environment.gov.au/resource/national-recovery-plan-swift-parrotlathamus-discolor on 16/11/2015

State Government of NSW and Department of Planning, Industry and Environment 2015. State Vegetation Type Map: Border Rivers Gwydir / Namoi Region Version 2.0. VIS_ID 4467

State Government of NSW and Department of Planning, Industry and Environment 2019.

State Government of NSW 2023, NSWS South West Slopes Retrieved on 03/03/2023. https://www.environment.nsw.gov.au/threatenedspeciesapp/AreaHabitatSearch.aspx?cmaname=NSW+South+Western+Slopes.

Threatened Species Scientific Committee (2015). Conservation Advice *Aprasia parapulchella* Pink-tailed Legless Lizard

Threatened Species Scientific Committee (2016). Conservation Advice Delma impar striped legless lizard

Threatened Species Scientific Committee (2016). Conservation Advice Lathamus discolor swift parrot. Canberra: Department of the Environment. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/744-conservation-advice-05052016.pdf. In effect under the EPBC Act from 05-May-2016.

Threatened Biodiversity Data Collection accessible via the NSW BioNet Atlas at: https://www.environment.nsw.gov.au/AtlasApp/Default.aspx?a=1

Threatened Species Scientific Committee (2020). Conservation Advice Falco hypoleucos Grey Falcon

Threatened Biodiversity Database Collection (TBDC), NSW Government accessed at https://www.environment.nsw.gov.au/AtlasApp/Default.aspx June 2022.

Appendix A BAM Plot data

A.1 BAM Plots

BAM Site Field Survey (All orange cells are for data entry, please do not edit other cells or work sheets as they contain formulas)

Project:	22 277 orana	**Plot Identifier**	1	**Pic 20x20 Head (ID)**		**Pic 20x50 Tail (ID)**		
Survey date:	20/09/2022					**Compass Orientation (head of 20x20 plot)**	57	
Recorders	Lisa Hamilton and Michelle Patrick		**PCT:**	Exotic				
GPS Easting	684510	**GPS Northing**	6399292		**Datum**	94	**Zone**	55

Landform			**Soils**			**Drainage & Slope**		
Morphology			**Soil Texture**			**Slope**		
LandF Element			**Soil Colour**			**Aspect**		
LandF Pattern			**Soil Depth**	grey loam		**Drainage**	no	
Microrelief			**Geology**			**Watercourses**	no	

Plot Disturbance

	Severity	Age	Observational Evidence
Clearing	3	o	
Cultivation	1	nr	
Soil erosion	0	nr	
Firewood	0	nr	
Grazing	0	r	
Fire Damage	0	o	
Storm Damage	0	o	
Weediness	3	r	very weedy
Other			

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use

grazing with sheep

Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)

grazing heavily werd infested

Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

none

Dominant Species outside Plot

FUNCTION

Function attributes for 1

BAM Attribute (20x20m plot)

	Stratum	Sum
Count of Native Richness	**Tree (TG)**	**0**
	Shrub (SG)	**0**
	Forb (FG)	**3**
	Grass & grasslike (GG)	**1**

BAM Attributes (1 x 1m Plots)

	Tape length	% cover	Average %	Photo ID #
Litter Cover	5m	1%	**3.2%**	
	15m	1%		
	25m	3%		
	35m	10%		

	Fern (EG)	0
	Other (OG)	0
	TOTAL	4

BAM Attribute (20x20m plot)		
Count of cover abundance (native vascular plants)	Stratum	Sum
	Tree (TG)	0
	Shrub (SG)	0
	Forb (FG)	0.3
	Grass & grasslike (GG)	0.1
	Fern (EG)	0
	Other (OG)	0
	TOTAL Native	0.4
	TOTAL 'HTE'	39

BAM Attribute (20 x 50m plot) Tree Stem Counts			
DBH (cm)	Euc	Non Euc	Hollows
>80	0	0	0
50-79	0	0	0
30-49	0	0	0
20-29	0	0	0
10-19	0	0	0
5-9	0	0	0
<5	0	0	N/A
Length of logs (m)		38.5	

	45m	1%		
Bare ground cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Cryptogam cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Rock Cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		

Total Cover (>100%)	49%
Native cover	0%
Exotic cover	45%
Other Ground Cover	3%

0.1%	63 x 63cm
0.5%	1.4 x 1.4m
1.0%	2 x 2m
5.0%	4 x 5m
25.0%	10 x 10m

COMPOSITION & STRUCTURE

Species recorded for 1

Genus	Species	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?
Carthamus	lanatus	*Carthamus lanatus*	Saffron Thistle	Asteraceae	0 dead	0	*		HTE
Bromus	diandrus	*Bromus diandrus*	Great Brome	Poaceae	30	>2000	*		HTE
Verbena	spp.	*Verbena spp.*	0	0	0.1	2	0	Forb (FG)	No
Brassica	spp.	*Brassica spp.*	Brassica	Brassicaceae	3	100	*		No
bidens	subalternans	*Bidens subalternans*	Greater Beggar's Ticks	Asteraceae	8	200	*		HTE
Conyza	bonariensis	*Conyza bonariensis*	Flaxleaf Fleabane	Asteraceae	0.1	10	*		No
Fumaria	bastardii	*Fumaria bastardii*	Bastards Fumitory	Fumariaceae	1	12	*		No
Avena	fatua	*Avena fatua*	Wild Oats	Poaceae	0.1	1	*		No
Austrostipa	Scabra	*Austrostipa scabra*	Speargrass	Poaceae	0.1	1	0	Grass & grasslike	No
Lolium	perenne	*Lolium perenne*	Perennial Ryegrass	Poaceae	0.1	1	*		No

Einadia	nutans	*Einadia nutans*	Climbing Saltbush	Chenopodiaceae	0.1	1	0	Forb (FG)	No
Lepidium	africanum	*Lepidium africanum*	Common Peppercress	Brassicaceae	0.1	2	*		No
Medicago	polymorpha	*Medicago polymorph*	Burr Medic	Fabaceae (Faboideae)	1	25	*		No
salvia	verbenaca	*Salvia verbenaca*	Vervain	Lamiaceae	0.1	1	*		No
Cerastium	glomeratum	*Cerastium glomerat*	Mouse-ear Chickweed	Caryophyllaceae	0.1	5	*		No
Hordeum	leporinum	*Hordeum leporinum*	Barley Grass	Poaceae	0.1	1	*		No
Lactuca	serriola	*Lactuca serriola*	Prickly Lettuce	Asteraceae	0.1	1	*		No
Rumex	brownii	*Rumex brownii*	Swamp Dock	Polygonaceae	0.1	5	0	Forb (FG)	No
Vicia	sativa	*Vicia sativa*	Common vetch	Fabaceae (Faboideae)	0.1	1	*		No
Acetosella	vulgaris	*Acetosella vulgaris*	Sheep Sorrel	Polygonaceae	1	10	*		HTE

BAM Site Field Survey (All orange cells are for data entry, please do not edit other cells or work sheets as they contain formulas)

Project:	22-277	**Plot Identifier**	2	**Pic 20x20 Head (ID)**		**Pic 20x50 Tail (ID)**		
Survey date:	20/09/2022					**Compass Orientation (head of 20x20 plot)**	135	
Recorders	Lisa Hamilton Michelle Patrick		**PCT:**	266 Derived Grassland				
GPS Easting	684614	**GPS Northing**	6399313		**Datum**		**Zone**	55

Landform			**Soils**			**Drainage & Slope**		
Morphology			**Soil Texture**			**Slope**	slight - quite flat	
LandF Element			**Soil Colour**	Grey-loam		**Aspect**		
LandF Pattern			**Soil Depth**			**Drainage**	None	
Microrelief			**Geology**			**Watercourses**	None	

Plot Disturbance

	Severity	**Age**	**Observational Evidence**
Clearing	3	o	historic tree clearance
Cultivation	2	o	
Soil erosion	0	o	
Firewood	0	o	
Grazing	2	r	
Fire Damage	0	o	
Storm Damage	0	o	
Weediness	3		
Other			

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use

grazing with sheep

Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)

weeds and grazing

Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

PCT is a TEC; PTLL habitat

Dominant Species outside Plot

FUNCTION

Function attributes for 2

BAM Attribute (20x20m plot)

	Stratum	**Sum**
Count of Native Richness	**Tree (TG)**	**0**
	Shrub (SG)	**0**
	Forb (FG)	**4**
	Grass & grasslike (GG)	**4**

BAM Attributes (1 x 1m Plots)

	Tape length	**% cover**	**Average %**	**Photo ID #**
Litter Cover	5m	1%	**0.9%**	
	15m	1%		
	25m	1%		
	35m	1%		

	Fern (EG)	0
	Other (OG)	0
	TOTAL	8
BAM Attribute (20x20m plot)		
Count of cover abundance (native vascular plants)	Stratum	Sum
	Tree (TG)	0
	Shrub (SG)	0
	Forb (FG)	0.8
	Grass & grasslike (GG)	7.6
	Fern (EG)	0
	Other (OG)	0
	TOTAL Native	8.4
	TOTAL 'HTE'	0

BAM Attribute (20 x 50m plot) Tree Stem Counts			
DBH (cm)	Euc	Non Euc	Hollows
>80	0	0	0
50-79	0	0	0
30-49	0	0	0
20-29	0	0	0
10-19	0	0	0
5-9	0	0	0
<5	0	0	N/A
Length of logs (m)		0	

	45m	1%		
Bare ground cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Cryptogam cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Rock Cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		

Total Cover (>100%)	**56%**
Native cover	8%
Exotic cover	47%
Other Ground Cover	1%

0.1%	63 x 63cm
0.5%	1.4 x 1.4m
1.0%	2 x 2m
5.0%	4 x 5m
25.0%	10 x 10m

COMPOSITION & STRUCTURE

Species recorded for 2

Genus	Species	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?
Lolium	perenne	*Lolium perenne*	Perennial Ryegrass	Poaceae	40	500	*		No
Salvia	verbenaca	*Salvia verbenaca*	Vervain	Lamiaceae	0.1	30	*		No
Trifolium	arvense	*Trifolium arvense*	Haresfoot Clover	Fabaceae (Faboideae)	0.5	50	*		No
austrostipa	scabra	*Austrostipa scabra*	Speargrass	Poaceae	2	30	0	Grass & grasslike	No
Lepidium	africanum	*Lepidium africanum*	Common Peppercress	Brassicaceae	0.1	20	*		No
Rumex	brownii	*Rumex brownii*	Swamp Dock	Polygonaceae	0.5	20	0	Forb (FG)	No
			0	0			0		FALSE
Marrubium	vulgare	*Marrubium vulgare*	White Horehound	Lamiaceae	0.1	3	*		No
Sonchus	oleraceus	*Sonchus oleraceus*	Common Sowthistle	Asteraceae	0.5	3	*		No
Cerastium	glomeratum	*Cerastium glomeratu*	Mouse-ear Chickweed	Caryophyllaceae	0.1	20	*		No

Lactuca	serriola	*Lactuca serriola*	Prickly Lettuce	Asteraceae	0.1	30	*		No
Oxalis	perennans	*Oxalis perennans*	0	Oxalidaceae	0.1	10	0	Forb (FG)	No
Calotis	lappulacea	*Calotis lappulacea*	Yellow Burr-daisy	Asteraceae	0.1	2	0	Forb (FG)	No
Xanthium	spinosum	*Xanthium spinosum*	Bathurst Burr	Asteraceae	dead		*		HTE
Carthamus	lanatus	*Carthamus lanatus*	Saffron Thistle	Asteraceae	dead		*		HTE
Rytidosperma	spp.	*Rytidosperma spp.*	0	Poaceae	0.1	2	0	Grass & grasslike	No
Aristida	personata	*Aristida personata*	0	Poaceae	5	25	0	Grass & grasslike	No
Medicago	polymorpha	*Medicago polymorph*	Burr Medic	Fabaceae (Faboideae)	5	200	*		No
Vicia	sativa	*Vicia sativa*	Common vetch	Fabaceae (Faboideae)	0.1	2	*		No
Hordeum	leporinum	*Hordeum leporinum*	Barley Grass	Poaceae	0.1	1	*		No
Geranium	spp.	*Geranium spp.*	0	Geraniaceae	0.1	2	0	Forb (FG)	No
Austrostipa	spp.	*Austrostipa spp.*	A Speargrass	Poaceae	0.5	30	0	Grass & grasslike	No

BAM Site Field Survey (All orange cells are for data entry, please do not edit other cells or work sheets as they contain formulas)

Project:	22-277 Orana	**Plot Identifier**	3	**Pic 20x20 Head (ID)**		**Pic 20x50 Tail (ID)**		
Survey date:	20/09/2022					**Compass Orientation (head of 20x20 plot)**	no bearing	
Recorders	Michelle Patrick and Lisa Hamilton		**PCT:**	266 Derived Grassland				
GPS Easting	683269	**GPS Northing**	6399196		**Datum**	94	**Zone**	55

Landform		**Soils**		**Drainage & Slope**	
Morphology		**Soil Texture**		**Slope**	
LandF Element		**Soil Colour**		**Aspect**	
LandF Pattern		**Soil Depth**		**Drainage**	None
Microrelief		**Geology**		**Watercourses**	None

Plot Disturbance

	Severity	Age	Observational Evidence
Clearing	2	0	
Cultivation	2	0	
Soil erosion	0	nr	
Firewood	0	nr	
Grazing	2	r	
Fire Damage	0	nr	
Storm Damage	0	nr	
Weediness	3	r	
Other			

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use

Cattle Grazing

Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)

Cattle Grazing

Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

PCT TEC, PTLL habitat

Dominant Species outside Plot

FUNCTION

Function attributes for 3

BAM Attribute (20x20m plot)

	Stratum	Sum
Count of Native Richness	Tree (TG)	0
	Shrub (SG)	0
	Forb (FG)	4
	Grass & grasslike (GG)	2

BAM Attributes (1 x 1m Plots)

	Tape length	% cover	Average %	Photo ID #
Litter Cover	5m	1%	1.2%	
	15m	1%		
	25m	2%		
	35m	1%		

	Fern (EG)	0
	Other (OG)	1
	TOTAL	7
BAM Attribute (20x20m plot)		
Count of cover abundance (native vascular plants)	Stratum	Sum
	Tree (TG)	0
	Shrub (SG)	0
	Forb (FG)	0.4
	Grass & grasslike (GG)	0.2
	Fern (EG)	0
	Other (OG)	0.1
	TOTAL Native	0.7
	TOTAL 'HTE'	10

BAM Attribute (20 x 50m plot) Tree Stem Counts			
DBH (cm)	Euc	Non Euc	Hollows
>80	0	0	0
50-79	0	0	0
30-49	0	0	0
20-29	0	0	0
10-19	0	0	0
5-9	0	0	0
<5	0	0	N/A
Length of logs (m)		0	

	45m	1%		
Bare ground cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Cryptogam cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Rock Cover	5m	2%	1.0%	
	15m	2%		
	25m	0%		
	35m	1%		
	45m	0%		

Total Cover (>100%)	**26%**
Native cover	1%
Exotic cover	23%
Other Ground Cover	2%

0.1%	63 x 63cm
0.5%	1.4 x 1.4m
1.0%	2 x 2m
5.0%	4 x 5m
25.0%	10 x 10m

COMPOSITION & STRUCTURE

Species recorded for 3

Genus	Species	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?
Lolium	perenne	*Lolium perenne*	Perennial Ryegrass	Poaceae	5	>100	*		No
Trifolium	arvense	*Trifolium arvense*	Haresfoot Clover	Fabaceae (Faboideae)	2	>100	*		No
Lepidium	africanum	*Lepidium africanum*	Common Peppercress	Brassicaceae	0.1	10	*		No
Carthamus	lanatus	*Carthamus lanatus*	Saffron Thistle	Asteraceae	0	0	*		HTE
Taraxacum	officinale	*Taraxacum officinale*	Dandelion	Asteraceae	0.2	20	*		No
Calotis	lappulacea	*Calotis lappulacea*	Yellow Burr-daisy	Asteraceae	0.1	5	0	Forb (FG)	No
Cerastium	glomeratum	*Cerastium glomeratu*	Mouse-ear Chickweed	Caryophyllaceae	0.1	>200	*		No
Bromus	hordeaceus	*Bromus hordeaceus*	Soft Brome	Poaceae	5	>1000	*		No
Conyza	spp.	*Conyza spp.*	A Fleabane	Asteraceae	0.1	>20	*		No
Hypericum	perforatum	*Hypericum perforatu*	St. Johns Wort	Clusiaceae	10	100	*		HTE

Petrorhagia	dubia	*Petrorhagia dubia*	0	Caryophyllaceae	0.1	5	*		No
Medicago	polymorpha	*Medicago polymorph*	Burr Medic	Fabaceae (Faboideae)	0.1	20	*		No
Sonchus	oleraceus	*Sonchus oleraceus*	Common Sowthistle	Asteraceae	0.1	10	*		No
Lactuca	serriola	*Lactuca serriola*	Prickly Lettuce	Asteraceae	0.1		*		No
			0	0			0		FALSE
unidentified herb	exotic herb	*#N/A*	#N/A	#N/A	0.1	1	#N/A		FALSE
Verbena	bonariensis	*Verbena bonariensis*	Purpletop	Verbenaceae	0.1	1	*		No
Rytidosperma	spp.	*Rytidosperma spp.*	0	Poaceae	0.1	1	0	Grass & grasslike	No
Austrostipa	scabra	*Austrostipa scabra*	Speargrass	Poaceae	0.1	1	0	Grass & grasslike	No
Vittadinia	cuneata	*Vittadinia cuneata*	A Fuzzweed	Asteraceae	0.1	10	0	Forb (FG)	No
Geranium	spp.	*Geranium spp.*	0	Geraniaceae	0.1	1	0	Forb (FG)	No
Desmodium	varians	*Desmodium varians*	Slender Tick-trefoil	Fabaceae (Faboideae)	0.1	15	0	Other (OG)	No
Erodium	cicutarium	*Erodium cicutarium*	Common Crowfoot	Geraniaceae	0.1	10	*		No
Rumex	brownii	*Rumex brownii*	Swamp Dock	Polygonaceae	0.1	1	0	Forb (FG)	No

BAM Site Field Survey (All orange cells are for data entry, please do not edit other cells or work sheets as they contain formulas)

Project:	22-277 Orana	**Plot Identifier**	4	**Pic 20x20 Head (ID)**		**Pic 20x50 Tail (ID)**		
Survey date:	22/09/2022					**Compass Orientation (head of 20x20 plot)**	46 NE	
Recorders	Michelle Patrick and Lisa Hamilton		**PCT:**	266 Derived Grassland				
GPS Easting	683999.3558	**GPS Northing**	6398901		**Datum**	94	**Zone**	55

Landform			**Soils**			**Drainage & Slope**		
Morphology			**Soil Texture**			**Slope**		
LandF Element			**Soil Colour**			**Aspect**		
LandF Pattern			**Soil Depth**			**Drainage**		
Microrelief			**Geology**			**Watercourses**		

Plot Disturbance

	Severity	**Age**	**Observational Evidence**
Clearing	3	0	historic clearing in places
Cultivation	1	0	historic pasture improvement
Soil erosion	0	0	
Firewood	0	0	
Grazing	3	r	grazing by cattle
Fire Damage	0	0	
Storm Damage	0	0	
Weediness	3	r	lots of annual extoic clovers and grasses
Other			

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use

grazing by cattle

Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)

grazing by cattle

Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

Dominant Species outside Plot

FUNCTION

Function attributes for 4

BAM Attribute (20x20m plot)

	Stratum	**Sum**
Count of Native Richness	**Tree (TG)**	**0**
	Shrub (SG)	**0**
	Forb (FG)	**9**
	Grass & grasslike (GG)	**9**

BAM Attributes (1 x 1m Plots)

	Tape length	**% cover**	**Average %**	**Photo ID #**
Litter Cover	5m	5%	**2.4%**	
	15m	2%		
	25m	1%		
	35m	3%		

	Fern (EG)	0
	Other (OG)	1
	TOTAL	19

BAM Attribute (20x20m plot)		
Count of cover abundance (native vascular plants)	Stratum	Sum
	Tree (TG)	0
	Shrub (SG)	0
	Forb (FG)	2.9
	Grass & grasslike (GG)	2.7
	Fern (EG)	0
	Other (OG)	1
	TOTAL Native	6.6
	TOTAL 'HTE'	1

BAM Attribute (20 x 50m plot) Tree Stem Counts			
DBH (cm)	Euc	Non Euc	Hollows
>80	0	0	0
50-79	0	0	0
30-49	0	0	0
20-29	0	0	0
10-19	0	0	0
5-9	0	0	0
<5	0	0	N/A
Length of logs (m)		0	

	45m	1%		
Bare ground cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Cryptogam cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Rock Cover	5m	1%	0.4%	
	15m	0%		
	25m	1%		
	35m	0%		
	45m	0%		

Total Cover (>100%)	31%
Native cover	7%
Exotic cover	22%
Other Ground Cover	3%

0.1%	63 x 63cm
0.5%	1.4 x 1.4m
1.0%	2 x 2m
5.0%	4 x 5m
25.0%	10 x 10m

COMPOSITION & STRUCTURE

Species recorded for 4

Genus	Species	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?
Cerastium	glomeratum	*Cerastium glomeratu*	Mouse-ear Chickweed	Caryophyllaceae	0.5	>150	*		No
Trifolium	repens	*Trifolium repens*	White Clover	Fabaceae (Faboideae)	10	>1000	*		No
Carthamus	lanatus	*Carthamus lanatus*	Saffron Thistle	Asteraceae	0	0	*		HTE
Bromus	hordeaceus	*Bromus hordeaceus*	Soft Brome	Poaceae	5	500	*		No
Erodium	cicutarium	*Erodium cicutarium*	Common Crowfoot	Geraniaceae	0.1	4	*		No
Vittadinia	cuneata	*Vittadinia cuneata*	A Fuzzweed	Asteraceae	0.1	20	0	Forb (FG)	No
Austrostipa	scabra	*Austrostipa scabra*	Speargrass	Poaceae	2	100	0	Grass & grasslike	No
Taraxacum	spp.	*Taraxacum spp.*	Dandelion	Asteraceae	2	1000	0	Forb (FG)	No
Trifolium	arvense	*Trifolium arvense*	Haresfoot Clover	Fabaceae (Faboideae)	1	300	*		No
Oxalis	perennans	*Oxalis perennans*	0	Oxalidaceae	0.1	20	0	Forb (FG)	No

Bothriochloa	macra	*Bothriochloa macra*	Red Grass	Poaceae			0	Grass & grasslike	No
Desmodium	varians	*Desmodium varians*	Slender Tick-trefoil	Fabaceae (Faboideae)	1	20	0	Other (OG)	No
Lolium	perenne	*Lolium perenne*	Perennial Ryegrass	Poaceae	1	100	*		No
Sida	spp.	*Sida spp.*	0	Malvaceae	0.1	3	*	Forb (FG)	No
Aphanes	arvensis	*Aphanes arvensis*	Parsley-piert	Rosaceae	0.1	10	*		No
Conyza	spp.	*Conyza spp.*	A Fleabane	Asteraceae	2	200	*		No
Medicago	polymorpha	*Medicago polymorph*	Burr Medic	Fabaceae (Faboideae)	0.1	20	*		No
Vulpia	myuros	*Vulpia myuros*	Rat's Tail Fescue	Poaceae	0.5	100	*		No
Rumex	brownii	*Rumex brownii*	Swamp Dock	Polygonaceae	0.1	1	0	Forb (FG)	No
Petrorhagia	dubia	*Petrorhagia dubia*	0	Caryophyllaceae	0.1	5	*		No
Hordeum	leporinum	*Hordeum leporinum*	Barley Grass	Poaceae	0.1	5	*		No
Calotis	lappulacea	*Calotis lappulacea*	Yellow Burr-daisy	Asteraceae	0.2	20	0	Forb (FG)	No
Chloris	truncata	*Chloris truncata*	Windmill Grass	Poaceae	0.1	300 mostly dead	0	Grass & grasslike	No
isolepis	spp.	*Isolepis spp.*	Club-rush	Cyperaceae	0.1	1	0	Grass & grasslike	No
Euchiton	japonicus	*Euchiton japonicus*	0	Asteraceae	0.1	5	0	Forb (FG)	No
Bidens	subalternans	*Bidens subalternans*	Greater Beggar's Ticks	Asteraceae	1	200	*		HTE
Aira	spp.	*Aira spp.*	A Hairgrass	Poaceae	0.1	1	*		No
Austrostipa	verticillata	*Austrostipa verticilla*	Slender Bamboo Grass	Poaceae	0.1	3	0	Grass & grasslike	No
Wahlenbergia	spp.	*Wahlenbergia spp.*	Bluebell	Campanulaceae	0.1	3	0	Forb (FG)	No
Crassula	spp.	*Crassula spp.*	0	0	0.1	20	0	Forb (FG)	No
Enneapogon	spp.	*Enneapogon spp.*	Nineawn Grass, Bottlew	Poaceae	0.1	3	0	Grass & grasslike	No
Aristida	behriana	*Aristida behriana*	Bunch Wiregrass	Poaceae	0.1	1	0	Grass & grasslike	No
Carex	spp.	*Carex spp.*	0	Cyperaceae	0.1	1	0	Grass & grasslike	No
Lepidium	africanum	*Lepidium africanum*	Common Peppercress	Brassicaceae	0.1	1	*		No
Aristida	personata	*Aristida personata*	0	Poaceae	0.1	1	0	Grass & grasslike	No

BAM Site Field Survey (All orange cells are for data entry, please do not edit other cells or work sheets as they contain formulas)

Project:	22-277 Orana	**Plot Identifier**	5	**Pic 20x20 Head (ID)**		**Pic 20x50 Tail (ID)**		
Survey date:	22/09/2022					**Compass Orientation (head of 20x20 plot)**	78 East	
Recorders	Michelle Patrick and Lisa Hamilton		**PCT:**	PCT 266 Woodland				
GPS Easting	684109	**GPS Northing**	6398989		**Datum**	94	**Zone**	55

Landform			**Soils**			**Drainage & Slope**		
Morphology			**Soil Texture**			**Slope**	waterline	
LandF Element			**Soil Colour**	brown/red		**Aspect**		
LandF Pattern			**Soil Depth**			**Drainage**	creek	
Microrelief			**Geology**			**Watercourses**		

Plot Disturbance

	Severity	**Age**	**Observational Evidence**
Clearing	3	or	historic, land clearing
Cultivation	2	or	
Soil erosion	0	o	
Firewood	0	o	
Grazing	3	r	
Fire Damage	0	o	
Storm Damage	0	o	
Weediness	3	r	
Other	3	r	cows pugging creek line

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use

Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)

Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

Dominant Species outside Plot

FUNCTION

Function attributes for 5

BAM Attribute (20x20m plot)

	Stratum	**Sum**
Count of Native Richness	**Tree (TG)**	**0**
	Shrub (SG)	**0**
	Forb (FG)	**3**
	Grass & grasslike (GG)	**3**

BAM Attributes (1 x 1m Plots)

	Tape length	**% cover**	**Average %**	**Photo ID #**
Litter Cover	5m	1%	**1.2%**	
	15m	1%		
	25m	0%		
	35m	2%		

	Fern (EG)	0
	Other (OG)	0
	TOTAL	6
BAM Attribute (20x20m plot)		
Count of cover abundance (native vascular plants)	Stratum	Sum
	Tree (TG)	0
	Shrub (SG)	0
	Forb (FG)	0.3
	Grass & grasslike (GG)	25.1
	Fern (EG)	0
	Other (OG)	0
	TOTAL Native	25.4
	TOTAL 'HTE'	0.1

BAM Attribute (20 x 50m plot) Tree Stem Counts			
DBH (cm)	Euc	Non Euc	Hollows
>80	0	0	0
50-79	0	0	0
30-49	0	0	0
20-29	0	0	0
10-19	0	0	0
5-9	0	0	0
<5	0	0	N/A
Length of logs (m)		0	

	45m	2%		
Bare ground cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Cryptogam cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Rock Cover	5m	0%	0.2%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	1%		

Total Cover (>100%)	**32%**
Native cover	25%
Exotic cover	5%
Other Ground Cover	1%

0.1%	63 x 63cm
0.5%	1.4 x 1.4m
1.0%	2 x 2m
5.0%	4 x 5m
25.0%	10 x 10m

COMPOSITION & STRUCTURE

Species recorded for 5

Genus	Species	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?
Juncus	spp.	*Juncus spp.*	A Rush	Juncaceae	20	200	0	Grass & grasslike	No
Juncus	spp.	*Juncus spp.*	A Rush	Juncaceae	0.1	1	0	Grass & grasslike	No
Cerastium	glomeratum	*Cerastium glomeratu*	Mouse-ear Chickweed	Caryophyllaceae	0.1	50	*		No
Trifolium	repens	*Trifolium repens*	White Clover	Fabaceae (Faboideae)	0.1	100	*		No
Medicago	polymorpha	*Medicago polymorph*	Burr Medic	Fabaceae (Faboideae)	0.1	10	*		No
Agrostis	capillaris	*Agrostis capillaris*	Browntop Bent	Poaceae	0.1	10	*		HTE
Persicaria	decipiens	*Persicaria decipiens*	Slender Knotweed	Polygonaceae	0.1	3	0	Forb (FG)	No
carex	spp.	*Carex spp.*	0	Cyperaceae	5	100	0	Grass & grasslike	No
centaurium	erythraea	*Centaurium erythrae*	Common Centaury	Gentianaceae	0.1	1	*		No
lolium	perenne	*Lolium perenne*	Perennial Ryegrass	Poaceae	2.5	2000	*		No

Phalaris	aquatica	*Phalaris aquatica*	Phalaris	Poaceae	2	10	*		No
Verbena	bonariensis	*Verbena bonariensis*	Purpletop	Verbenaceae	0.1	1	*		No
Rumex	brownii	*Rumex brownii*	Swamp Dock	Polygonaceae	0.1	10	0	Forb (FG)	No
unknown herb	exotic				0.1	1			FALSE
Dichondra	repens	*Dichondra repens*	Kidney Weed	Convolvulaceae	0.1	1	0	Forb (FG)	No

BAM Site Field Survey (All orange cells are for data entry, please do not edit other cells or work sheets as they contain formulas)

Project:	22-277 Orana	**Plot Identifier**	6	**Pic 20x20 Head (ID)**		**Pic 20x50 Tail (ID)**		
Survey date:	22/09/2022					**Compass Orientation (head of 20x20 plot)**	95 East	
Recorders	Michelle Patrick and Lisa Hamilton		**PCT:**	266 Woodland				
GPS Easting	684554	**GPS Northing**	6399010		**Datum**	94	**Zone**	55

Landform			**Soils**			**Drainage & Slope**		
Morphology			**Soil Texture**			**Slope**		
LandF Element			**Soil Colour**			**Aspect**		
LandF Pattern			**Soil Depth**			**Drainage**		
Microrelief			**Geology**			**Watercourses**		

Plot Disturbance

	Severity	Age	Observational Evidence
Clearing	1	o	some past clearing - historic
Cultivation	1	o	sme historic pasture improvement
Soil erosion	0	o	
Firewood	0	o	
Grazing	3	r	grazing by cattle
Fire Damage	0	o	
Storm Damage	0	o	
Weediness	3	o	
Other			rocks - rocky outcrops

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use

grazing by cattle

Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)

grazing by cattle

Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

TEC, PTLL

Dominant Species outside Plot

FUNCTION

Function attributes for 6

BAM Attribute (20x20m plot)

	Stratum	Sum
Count of Native Richness	Tree (TG)	1
	Shrub (SG)	0
	Forb (FG)	7
	Grass & grasslike (GG)	4

BAM Attributes (1 x 1m Plots)

	Tape length	% cover	Average %	Photo ID #
Litter Cover	5m	1%	6.6%	
	15m	5%		
	25m	10%		
	35m	10%		

	Fern (EG)	0
	Other (OG)	1
	TOTAL	13
BAM Attribute (20x20m plot)		
Count of cover abundance (native vascular plants)	Stratum	Sum
	Tree (TG)	0.1
	Shrub (SG)	0
	Forb (FG)	1.6
	Grass & grasslike (GG)	0.5
	Fern (EG)	0
	Other (OG)	0.1
	TOTAL Native	2.3
	TOTAL 'HTE'	2.2

BAM Attribute (20 x 50m plot) Tree Stem Counts			
DBH (cm)	Euc	Non Euc	Hollows
>80	1	0	1
50-79	1	0	1
30-49	0	0	0
20-29	0	0	0
10-19	0	0	0
5-9	0	0	0
<5	0	0	N/A
Length of logs (m)		0.7	

	45m	7%		
Bare ground cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Cryptogam cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Rock Cover	5m	0%	0.4%	
	15m	1%		
	25m	0%		
	35m	0%		
	45m	1%		

Total Cover (>100%)	**24%**
Native cover	2%
Exotic cover	15%
Other Ground Cover	7%

0.1%	63 x 63cm
0.5%	1.4 x 1.4m
1.0%	2 x 2m
5.0%	4 x 5m
25.0%	10 x 10m

COMPOSITION & STRUCTURE

Species recorded for 6

Genus	Species	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?
Marrubium	vulgare	*Marrubium vulgare*	White Horehound	Lamiaceae	1	50	*		No
Medicago	polymorpha	*Medicago polymorph*	Burr Medic	Fabaceae (Faboideae)	3	300	*		No
Taraxacum	officinale	*Taraxacum officinale*	Dandelion	Asteraceae	2	50	*		No
Lolium	perenne	*Lolium perenne*	Perennial Ryegrass	Poaceae	2	100	*		No
Bromus	hordeaceus	*Bromus hordeaceus*	Soft Brome	Poaceae	1	50	*		No
Isolepis	spp.	*Isolepis spp.*	Club-rush	Cyperaceae	0.1	1	0	Grass & grasslike	No
Oxalis	perennans	*Oxalis perennans*	0	Oxalidaceae	1	100	0	Forb (FG)	No
Hordeum	leporinum	*Hordeum leporinum*	Barley Grass	Poaceae	2	100	*		No
Salvia	verbenaca	*Salvia verbenaca*	Vervain	Lamiaceae	0.1	2	*		No
Dichanthium	sericeum	*Dichanthium sericeu*	Queensland Bluegrass	Poaceae	0.1	20	0	Grass & grasslike	No

Crassula	spp.	*Crassula spp.*	0	0	0.1	20	0	Forb (FG)	No
Desmodium	varians	*Desmodium varians*	Slender Tick-trefoil	Fabaceae (Faboideae)	0.1	10	0	Other (OG)	No
Trifolium	arvense	*Trifolium arvense*	Haresfoot Clover	Fabaceae (Faboideae)	1	100	*		No
Erodium	cicutarium	*Erodium cicutarium*	Common Crowfoot	Geraniaceae	0.1	2	*		No
Carthamus	lanatus	*Carthamus lanatus*	Saffron Thistle	Asteraceae	0.1	10	*		HTE
Einadia	nutans	*Einadia nutans*	Climbing Saltbush	Chenopodiaceae	0.1	20	0	Forb (FG)	No
Bromus	diandrus	*Bromus diandrus*	Great Brome	Poaceae	2	200	*		HTE
Calotis	lappulacea	*Calotis lappulacea*	Yellow Burr-daisy	Asteraceae	0.1	5	0	Forb (FG)	No
Austrostipa	scabra	*Austrostipa scabra*	Speargrass	Poaceae	0.2	25	0	Grass & grasslike	No
Brassica	spp.	*Brassica spp.*	Brassica	Brassicaceae	0.1	3	*		No
Bidens	subalternans	*Bidens subalternans*	Greater Beggar's Ticks	Asteraceae	0.1	50	*		HTE
Sonchus	oleraceus	*Sonchus oleraceus*	Common Sowthistle	Asteraceae	0.2	100	*		No
Rumex	brownii	*Rumex brownii*	Swamp Dock	Polygonaceae	0.1	5	0	Forb (FG)	No
Aphanes	arvensis	*Aphanes arvensis*	Parsley-piert	Rosaceae	0.1	5	*		No
Eucalyptus	albens	*Eucalyptus albens*	White Box	Myrtaceae	0.1	2	0	Tree (TG)	No
Lactuca	serriola	*Lactuca serriola*	Prickly Lettuce	Asteraceae	0.1	3	*		No
Conyza	spp.	*Conyza spp.*	A Fleabane	Asteraceae	0.1	10	*		No
Bothriochloa	macra	*Bothriochloa macra*	Red Grass	Poaceae	0.1	10	0	Grass & grasslike	No
Vittadinia	cuneata	*Vittadinia cuneata*	A Fuzzweed	Asteraceae	0.1	5	0	Forb (FG)	No
Silybum	marianum	*Silybum marianum*	Variegated Thistle	Asteraceae	0.1	2	*		No
Plantago	varia	*Plantago varia*	0	Plantaginaceae	0.1	1	0	Forb (FG)	No

BAM Site Field Survey (All orange cells are for data entry, please do not edit other cells or work sheets as they contain formulas)

Project:	22-277 Orana	**Plot Identifier**	7	**Pic 20x20 Head (ID)**		**Pic 20x50 Tail (ID)**		
Survey date:	22/09/2022					**Compass Orientation (head of 20x20 plot)**	234 SW	
Recorders	Michelle Patrick, Lisa Hamilton, Clare Vincent	**PCT:**	266 Derived Grassland					
GPS Easting	684473	**GPS Northing**	6399063		**Datum**	94	**Zone**	55

Landform		**Soils**		**Drainage & Slope**	
Morphology		**Soil Texture**		**Slope**	
LandF Element		**Soil Colour**		**Aspect**	
LandF Pattern		**Soil Depth**		**Drainage**	
Microrelief		**Geology**		**Watercourses**	

Plot Disturbance

	Severity	Age	Observational Evidence
Clearing	3	0	historic clearing in places
Cultivation	1	0	historic pasture improvement
Soil erosion	0	0	
Firewood	0	0	
Grazing	3	r	grazing by cattle
Fire Damage	0	0	
Storm Damage	0	0	
Weediness	3	r	lots of annual extoic clovers and grasses
Other			

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use

grazing by cattle

Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)

grazing by cattle

Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

TEC, PTLL

Dominant Species outside Plot

FUNCTION

Function attributes for 7

BAM Attribute (20x20m plot)

	Stratum	Sum
Count of Native Richness	Tree (TG)	0
	Shrub (SG)	0
	Forb (FG)	6
	Grass & grasslike (GG)	4

BAM Attributes (1 x 1m Plots)

	Tape length	% cover	Average %	Photo ID #
Litter Cover	5m	1%	1.2%	
	15m	1%		
	25m	2%		
	35m	1%		

	Fern (EG)	0
	Other (OG)	0
	TOTAL	10
BAM Attribute (20x20m plot)		
Count of cover abundance (native vascular plants)	Stratum	Sum
	Tree (TG)	0
	Shrub (SG)	0
	Forb (FG)	0.6
	Grass & grasslike (GG)	0.5
	Fern (EG)	0
	Other (OG)	0
	TOTAL Native	1.1
	TOTAL 'HTE'	0.2

BAM Attribute (20 x 50m plot) Tree Stem Counts			
DBH (cm)	Euc	Non Euc	Hollows
>80	0	0	0
50-79	0	0	0
30-49	0	0	0
20-29	0	0	0
10-19	0	0	0
5-9	0	0	0
<5	0	0	N/A
Length of logs (m)		0	

	45m	1%		
Bare ground cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Cryptogam cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Rock Cover	5m	0%	0.6%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	3%		

Total Cover (>100%)	**54%**
Native cover	1%
Exotic cover	52%
Other Ground Cover	2%

0.1%	63 x 63cm
0.5%	1.4 x 1.4m
1.0%	2 x 2m
5.0%	4 x 5m
25.0%	10 x 10m

COMPOSITION & STRUCTURE

Species recorded for 7

Genus	Species	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?
Hordeum	leporinum	*Hordeum leporinum*	Barley Grass	Poaceae	5	200	*		No
Trifolium	repens	*Trifolium repens*	White Clover	Fabaceae (Faboideae)	15	300	*		No
Sonchus	oleraceus	*Sonchus oleraceus*	Common Sowthistle	Asteraceae	0.1	20	*		No
Cerastium	glomeratum	*Cerastium glomeratu*	Mouse-ear Chickweed	Caryophyllaceae	0.1	50	*		No
Oxalis	perennans	*Oxalis perennans*	0	Oxalidaceae	0.1	5	0	Forb (FG)	No
		#N/A	#N/A	#N/A	0.1	1	#N/A		FALSE
Lolium	perenne	*Lolium perenne*	Perennial Ryegrass	Poaceae	10	100	*		No
Einadia	nutans	*Einadia nutans*	Climbing Saltbush	Chenopodiaceae	0.1	2	0	Forb (FG)	No
Austrostipa	scabra	*Austrostipa scabra*	Speargrass	Poaceae	0.2	20	0	Grass & grasslike	No
Rumex	brownii	*Rumex brownii*	Swamp Dock	Polygonaceae	0.1	10	0	Forb (FG)	No

Plantago	spp.	*Plantago spp.*	Plantain	Plantaginaceae	0.1	2	0	Forb (FG)	No
Bidens	subalternans	*Bidens subalternans*	Greater Beggar's Ticks	Asteraceae	0.1	20	*		HTE
Bromus	hordeaceus	*Bromus hordeaceus*	Soft Brome	Poaceae	20		*		No
Lactuca	serriola	*Lactuca serriola*	Prickly Lettuce	Asteraceae	0.1	10	*		No
Marrubium	vulgare	*Marrubium vulgare*	White Horehound	Lamiaceae	0.1	3	*		No
Salvia	verbenaca	*Salvia verbenaca*	Vervain	Lamiaceae	0.1	15	*		No
Lepidium	africanum	*Lepidium africanum*	Common Peppercress	Brassicaceae	0.1	3	*		No
Taraxacum	officinale	*Taraxacum officinale*	Dandelion	Asteraceae	0.1	30	*		No
Vittadinia	cuneata	*Vittadinia cuneata*	A Fuzzweed	Asteraceae	0.1	5	0	Forb (FG)	No
Hypericum	perforatum	*Hypericum perforatu*	St. Johns Wort	Clusiaceae	0.1	1	*		HTE
Rytidosperma	spp.	*Rytidosperma spp.*	0	Poaceae	0.1	2	0	Grass & grasslike	No
Dichanthium	sericeum	*Dichanthium sericeu*	Queensland Bluegrass	Poaceae	0.1	10	0	Grass & grasslike	No
bothriochloa	macra	*Bothriochloa macra*	Red Grass	Poaceae	0.1	1	0	Grass & grasslike	No
Calotis	lappulacea	*Calotis lappulacea*	Yellow Burr-daisy	Asteraceae	0.1	5	0	Forb (FG)	No
Trifolium	arvense	*Trifolium arvense*	Haresfoot Clover	Fabaceae (Faboideae)	0.5	50	*		No
Conyza	spp.	*Conyza spp.*	A Fleabane	Asteraceae	0.1	5	*		No

BAM Site Field Survey (All orange cells are for data entry, please do not edit other cells or work sheets as they contain formulas)

Project:	22-277 Orana	**Plot Identifier**	8	**Pic 20x20 Head (ID)**		**Pic 20x50 Tail (ID)**		
Survey date:	22/09/2022					**Compass Orientation (head of 20x20 plot)**	264	
Recorders	Michelle Patrick, Lisa Hamilton, Clare Vincent	**PCT:**	266 Woodland					
GPS Easting	684352	**GPS Northing**	6398998		**Datum**	94	**Zone**	55

Landform			**Soils**			**Drainage & Slope**		
Morphology			**Soil Texture**			**Slope**	Hilly and rocky	
LandF Element			**Soil Colour**			**Aspect**		
LandF Pattern			**Soil Depth**			**Drainage**	Two	
Microrelief			**Geology**			**Watercourses**	None	

Plot Disturbance

	Severity	Age	Observational Evidence
Clearing	2	nr	
Cultivation	1	nr	
Soil erosion	0	0	
Firewood	0	0	
Grazing	2	r	
Fire Damage	0	0	
Storm Damage	0	0	
Weediness	2	nr	
Other			

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use

Cattle Grazing

Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)

Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

TEC, PTLL

Dominant Species outside Plot

FUNCTION

Function attributes for 8

BAM Attribute (20x20m plot)

	Stratum	Sum
Count of Native Richness	Tree (TG)	1
	Shrub (SG)	0
	Forb (FG)	3
	Grass & grasslike (GG)	2

BAM Attributes (1 x 1m Plots)

	Tape length	% cover	Average %	Photo ID #
Litter Cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		

	Fern (EG)	0
	Other (OG)	1
	TOTAL	7
BAM Attribute (20x20m plot)		
Count of cover abundance (native vascular plants)	Stratum	Sum
	Tree (TG)	10
	Shrub (SG)	0
	Forb (FG)	0.3
	Grass & grasslike (GG)	0.2
	Fern (EG)	0
	Other (OG)	0.5
	TOTAL Native	11
	TOTAL 'HTE'	0.2

BAM Attribute (20 x 50m plot) Tree Stem Counts			
DBH (cm)	Euc	Non Euc	Hollows
>80	0	0	0
50-79	1	0	1
30-49	0	0	0
20-29	0	0	0
10-19	0	0	0
5-9	0	0	0
<5	0	0	N/A
Length of logs (m)		0	

	45m	0%		
Bare ground cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Cryptogam cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Rock Cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		

Total Cover (>100%)	**34%**
Native cover	11%
Exotic cover	23%
Other Ground Cover	0%

0.1%	63 x 63cm
0.5%	1.4 x 1.4m
1.0%	2 x 2m
5.0%	4 x 5m
25.0%	10 x 10m

COMPOSITION & STRUCTURE

Species recorded for	8								
Genus	Species	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?
Eucalyptus	albens	*Eucalyptus albens*	White Box	Myrtaceae	10	2	0	Tree (TG)	No
Marrubium	vulgare	*Marrubium vulgare*	White Horehound	Lamiaceae	0.5	20	*		No
Silybum	marianum	*Silybum marianum*	Variegated Thistle	Asteraceae	0.1	6	*		No
Hordeum	leporinum	*Hordeum leporinum*	Barley Grass	Poaceae	0.1	50	*		No
Lepidium	africanum	*Lepidium africanum*	Common Peppercress	Brassicaceae	0.1	10	*		No
Austrostipa	verticillata	*Austrostipa verticilla*	Slender Bamboo Grass	Poaceae	0.1	1	0	Grass & grasslike	No
Bromus	catharticus	*Bromus catharticus*	Praire Grass	Poaceae	0.1	1	*		No
Lolium	perenne	*Lolium perenne*	Perennial Ryegrass	Poaceae	0.1	2	*		No
Oxalis	perennans	*Oxalis perennans*	0	Oxalidaceae	0.1	5	0	Forb (FG)	No
Panicum	spp.	*Panicum spp.*	Panicum	Poaceae	0.1	10	0	Grass & grasslike	No

Trifolium	arvense	*Trifolium arvense*	Haresfoot Clover	Fabaceae (Faboideae)	0.1	1to 10	*		No
Lactuca	serriola	*Lactuca serriola*	Prickly Lettuce	Asteraceae	0.1	3	*		No
Conyza	spp.	*Conyza spp.*	A Fleabane	Asteraceae	0.1	2	*		No
Vulpia	myuros	*Vulpia myuros*	Rat's Tail Fescue	Poaceae	0.1	1	*		No
bromus	diandrus	*Bromus diandrus*	Great Brome	Poaceae	0.1	1	*		HTE
Cerastium	glomeratum	*Cerastium glomeratu*	Mouse-ear Chickweed	Caryophyllaceae	0.1	1 to 10	*		No
Medicago	polymorpha	*Medicago polymorph*	Burr Medic	Fabaceae (Faboideae)	0.1	10 to 20	*		No
Sonchus	oleraceus	*Sonchus oleraceus*	Common Sowthistle	Asteraceae	0.1	10	*		No
Desmodium	varians	*Desmodium varians*	Slender Tick-trefoil	Fabaceae (Faboideae)	0.5	50	0	Other (OG)	No
Taraxacum	officinale	*Taraxacum officinale*	Dandelion	Asteraceae	0.1	5	*		No
Vittadinia	cuneata	*Vittadinia cuneata*	A Fuzzweed	Asteraceae	0.1	5	0	Forb (FG)	No
Trifolium	repens	*Trifolium repens*	White Clover	Fabaceae (Faboideae)	1	100	*		No
Bidens	subalternans	*Bidens subalternans*	Greater Beggar's Ticks	Asteraceae	0.1	10	*		HTE
Rumex	brownii	*Rumex brownii*	Swamp Dock	Polygonaceae	0.1	1	0	Forb (FG)	No
Bromus	hordeaceus	*Bromus hordeaceus*	Soft Brome	Poaceae	20	1000	*		No

BAM Site Field Survey (All orange cells are for data entry, please do not edit other cells or work sheets as they contain formulas)

Project number:	Orana 22-277	**Plot Identifier:**	9	**Pic 20x20 Head (ID#)**		**Pic 20x50 Tail (ID#)**	x	
Survey date: (01/01/2021)	14/12/2022					**Compass Orientation (head of 20x20 plot):**		
Recorders (full name):	Clare V Aleksei A		**PCT:**	Exotic		**Veg Zone condition (low, mod, high):**		
GPS Easting:	683121.225	**GPS Northing:**	6399151.081		**Datum (GDA)**	94	**Zone (54/55/56)**	55
Site location description (eg 2km west of Hay along Mid Western Highway)								

Landform			**Soils**			**Drainage & Slope**		
Morphology			**Soil Texture**	Clay -loam		**Slope**	Flat	
LandF Element			**Soil Colour**	Red		**Aspect**		
LandF Pattern			**Soil Depth**			**Drainage**		
Microrelief			**Geology**			**Watercourses**		

Plot Disturbance

	Severity	**Age**	**Observational Evidence**
Clearing			
Cultivation	0	0	
Soil erosion	0	0	
Firewood	0	0	
Grazing	0	0	
Fire Damage	0	0	
Storm Damage	0	0	
Weediness	3	R	Exotic dominated roadside
Other	0	0	

Severity: 0 = no evidence, 1=light, 2=moderate, 3=severe **Age:** R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Additional information

Current land use

roadside

Disturbances (i.e. fire, grazing,ferals, clearing, logging, soil degradation, pollution, weeds, dieback)

weedy

Significant and threatened species and communities (Note pop. size/area, structure, repro status, habit, habitat, threats, photos)

Dominant Species outside Plot

FUNCTION

Function attributes for 9

BAM Attribute (20x20m plot)

	Stratum	**Sum**
Count of Native Richness	**Tree (TG)**	**0**
	Shrub (SG)	**1**
	Forb (FG)	**8**
	Grass & grasslike (GG)	**3**
	Fern (EG)	**0**
	Other (OG)	**0**
	TOTAL	**12**

BAM Attribute (20x20m plot)

	Stratum	**Sum**
	Tree (TG)	**0**

BAM Attributes (1 x 1m Plots)

	Tape length	**% cover**	**Average %**	**Photo ID #**
Litter Cover	5m	40%	**28.2%**	
	15m	15%		
	25m	40%		
	35m	6%		
	45m	40%		
Bare ground cover	5m	11%	**25.0%**	
	15m	41%		
	25m	11%		
	35m	51%		
	45m	11%		

Count of cover abundance (native vascular plants)	Shrub (SG)	0.3
	Forb (FG)	3.6
	Grass & grasslike (GG)	1.2
	Fern (EG)	0
	Other (OG)	0
	TOTAL Native	5.1
	TOTAL 'HTE'	22.3

Cryptogam cover	5m	0%	0.0%	
	15m	0%		
	25m	0%		
	35m	0%		
	45m	0%		
Rock Cover	5m	0%	5.4%	
	15m	6%		
	25m	0%		
	35m	21%		
	45m	0%		

BAM Attribute (20 x 50m plot) Tree Stem Counts			
DBH (cm)	Euc	Non Euc	Hollows
>80	0	0	0
50-79	0	0	0
30-49	0	0	0
20-29	0	0	0
10-19	0	0	0
5-9	0	0	0
<5	0	0	N/A
Length of logs (m)		0	

Total Cover (>100%)	100%
Native cover	5%
Exotic cover	36%
Other Ground Cover	59%

0.1%	63 x 63cm
0.5%	1.4 x 1.4m
1.0%	2 x 2m
5.0%	4 x 5m
25.0%	10 x 10m

COMPOSITION & STRUCTURE

Species recorded for 9

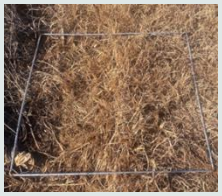
Genus	Species	Scientific Name	Common Name	Family	% Cover	Abundance	Exotic	Growth Form	High Threat?
bromus	catharticus	*Bromus catharticus*	Praire Grass	Poaceae	0.1	20	*		No
avena	spp.	*Avena spp.*	Oats	Poaceae	7	460	*		No
sida	spp.	*Sida spp.*	0	Malvaceae	0.1	2		Forb (FG)	No
lolium	spp.	*Lolium spp.*	A Ryegrass	Poaceae	0.2	100	*		No
Brassica	spp.	*Brassica spp.*	#REF!	Brassicaceae	0.2	50	*		No
sonchus	oleraceus	*Sonchus oleraceus*	Common Sowthistle	Asteraceae	0.1	10	*		No
boerhavia	dominii	*Boerhavia dominii*	Tarvine	Nyctaginaceae	0.1	8	0	Forb (FG)	No
salvia	verbenaca	*Salvia verbenaca*	Vervain	Lamiaceae	0.1	5	*		No
centaurea	calcitrapa	*Centaurea calcitrapa*	Star Thistle	Asteraceae	0.1	1	*		No
unid forb				#REF!	1	150		Forb (FG)	FALSE
Carthamus	lanatus	*Carthamus lanatus*	Saffron Thistle	Asteraceae	4	300	*		HTE
paspalum	dilatatum	*Paspalum dilatatum*	Paspalum	Poaceae	15	600	*		HTE
Zaleya	galericulata	*Zaleya galericulata*	Hogweed	Aizoaceae	0.1	150	0	Forb (FG)	No
hirschfeldia	incana	*Hirschfeldia incana*	Buchan Weed	Brassicaceae	0.1	15	*		No
Hypochaeris	spp.	*Hypochaeris spp.*	A Catsear	Asteraceae	0.1	1	*		No
hordeum	spp.	*Hordeum spp.*	A Barley Grass	Poaceae	0.1	16	*		No
rumex	crispus	*Rumex crispus*	Curled Dock	Polygonaceae	0.1	2	*		No
bidens	bipinnata	*Bidens bipinnata*	Bipinnate Beggar's Tick	Asteraceae	0.1	3	*		HTE
geranium	solanderi	*Geranium solanderi*	Native Geranium	Geraniaceae	2	30	0	Forb (FG)	No
einadia	spp.	*Einadia spp.*	0	Chenopodiaceae	0.1	1	0	Forb (FG)	No
verbena	bonariensis	*Verbena bonariensis*	Purpletop	Verbenaceae	4	60	*		No
plantago	lanceolata	*Plantago lanceolata*	Lamb's Tongues	Plantaginaceae	0.2	22	*		No
Conyza	spp.	*Conyza spp.*	A Fleabane	Asteraceae	0.2	40	*		No

dichanthium	sericeum	*Dichanthium sericeum*	Queensland Bluegrass	Poaceae	1	30	0	Grass & grasslike	No
malva	parviflora	*Malva parviflora*	Small-flowered Mallow	Malvaceae	0.1	1	*		No
urochloa	panicoides	*Urochloa panicoides*	Urochloa Grass	Poaceae	0.1	3	*		No
capsella	bursa-pastoris	*Capsella bursa-pastoris*	Shepherd's Purse	Brassicaceae	0.1	1	*		No
bromus	rubens	*Bromus rubens*	Red Brome	Poaceae	0.1	20	*		No
unid shrub			0	0	0.3	40		Shrub (SG)	FALSE
rumex	brownii	*Rumex brownii*	Swamp Dock	Polygonaceae	0.1	5	0	Forb (FG)	No
galium	aparine	*Galium aparine*	Goosegrass	Rubiaceae	0.1	2	*		No
trifolium	angustifolium	*Trifolium angustifolium*	Narrow-leaved Clover	Fabaceae (Faboideae)	0.1	2	*		No
chloris	gayana	*Chloris gayana*	Rhodes Grass	Poaceae	0.1	5	*		HTE
lepidium	spp.	*Lepidium spp.*	0	0	0.1	8	0	Forb (FG)	No
unid forb			0	0	0.1	1	*		FALSE
alternanthera	pungens	*Alternanthera pungens*	Khaki Weed	Amaranthaceae	3	600	*		HTE
phalaris	spp.	*Phalaris spp.*	0	Poaceae	0.1	15	*		No
chloris	truncata	*Chloris truncata*	Windmill Grass	Poaceae	0.1	6	0	Grass & grasslike	No
eragrostis	spp.	*Eragrostis spp.*	0	Poaceae	0.1	2		Grass & grasslike	No
medicago	spp.	*Medicago spp.*	A Medic	Fabaceae (Faboideae)	0.1	1	*		No
hypericum	perforatum	*Hypericum perforatum*	St. Johns Wort	Clusiaceae	0.1	15	*		HTE

A.2 Plot Photos

Plot number	Plot start	Plot finish	Quadrat 5m	Quadrat 15m	Quadrat 25m	Quadrat 35m	Quadrat 45m
1							
2							
3							

Plot number	Plot start	Plot finish	Quadrat 5m	Quadrat 15m	Quadrat 25m	Quadrat 35m	Quadrat 45m
4							
5							
6							

Plot number	Plot start	Plot finish	Quadrat 5m	Quadrat 15m	Quadrat 25m	Quadrat 35m	Quadrat 45m
7							
8							
9 (Exotic)							

Appendix B Commonwealth MNES Assessment

B.1 Protected Matters Search Report

Australian Government
Department of Agriculture, Water and the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 07-Oct-2022

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	34
Listed Migratory Species:	11

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	3
Commonwealth Heritage Places:	1
Listed Marine Species:	18
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	3
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar Wetlands)		[Resource Information]
Ramsar Site Name	Proximity	Buffer Status
Banrock station wetland complex	800 - 900km upstream from Ramsar site	In feature area
Riverland	700 - 800km upstream from Ramsar site	In feature area
The coorong, and lakes alexandrina and albert wetland	900 - 1000km upstream from Ramsar site	In feature area
The macquarie marshes	150 - 200km upstream from Ramsar site	In feature area

Listed Threatened Ecological Communities			[Resource Information]
For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps. Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.			
Community Name	Threatened Category	Presence Text	Buffer Status
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community likely to occur within area	In feature area
Natural Temperate Grassland of the South Eastern Highlands	Critically Endangered	Community may occur within area	In buffer area only
Poplar Box Grassy Woodland on Alluvial Plains	Endangered	Community may occur within area	In feature area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area	In feature area

Listed Threatened Species			[Resource Information]
Status of Conservation Dependent and Extinct are not MNES under the EPBC Act. Number is the current name ID.			
Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Callocephalon fimbriatum Gang-gang Cockatoo [768]	Endangered	Species or species habitat may occur within area	In buffer area only
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo [67036]	Vulnerable	Species or species habitat known to occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area	In buffer area only
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Polytelis swainsonii			
Superb Parrot [738]	Vulnerable	Species or species habitat known to occur within area	In feature area
Rostratula australis			
Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
FISH			
Galaxias rostratus			
Flathead Galaxias, Beaked Minnow, Flat-headed Galaxias, Flat-headed Jollytail, Flat-headed Minnow [84745]	Critically Endangered	Species or species habitat may occur within area	In feature area
Maccullochella macquariensis			
Trout Cod [26171]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Maccullochella peelii			
Murray Cod [66633]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Macquaria australasica			
Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area	In feature area
MAMMAL			
Chalinolobus dwyeri			
Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Dasyurus maculatus maculatus (SE mainland population)			
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area	In feature area
Nyctophilus corbeni			
Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)			
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat known to occur within area	In feature area
Pteropus poliocephalus			
Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
PLANT			
Androcalva procumbens [87153]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Austrostipa wakoolica [66623]	Endangered	Species or species habitat may occur within area	In feature area
Euphrasia arguta [4325]	Critically Endangered	Species or species habitat may occur within area	In feature area
Lepidium aschersonii Spiny Pepper-cress [10976]	Vulnerable	Species or species habitat may occur within area	In feature area
Prasophyllum petilum Tarengo Leek Orchid [55144]	Endangered	Species or species habitat may occur within area	In feature area
Prasophyllum sp. Wybong (C.Phelps ORG 5269) a leek-orchid [81964]	Critically Endangered	Species or species habitat may occur within area	In feature area
Swainsona recta Small Purple-pea, Mountain Swainson-pea, Small Purple Pea [7580]	Endangered	Species or species habitat known to occur within area	In feature area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area	In feature area
Vincetoxicum forsteri listed as Tylophora linearis [92384]	Endangered	Species or species habitat may occur within area	In feature area
Zieria obcordata Granite Zieria [3240]	Endangered	Species or species habitat may occur within area	In buffer area only
REPTILE			
Aprasia parapulchella Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Delma impar Striped Legless Lizard, Striped Snake-lizard [1649]	Vulnerable	Species or species habitat may occur within area	In feature area

Listed Migratory Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Terrestrial Species			
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area	In feature area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat may occur within area	In buffer area only
Migratory Wetlands Species			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Gallinago hardwickii			
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area	In feature area
Numenius madagascariensis			
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State	Buffer Status
Communications, Information Technology and the Arts - Australian Postal Corporation		
Commonwealth Land - Australian Postal Commission [13256]	NSW	In buffer area only
Communications, Information Technology and the Arts - Telstra Corporation Limited		
Commonwealth Land - Australian Telecommunications Commission [13255]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [13257]	NSW	In buffer area only

Commonwealth Heritage Places [Resource Information]

Name	State	Status	Buffer Status
Historic			
Wellington Post Office	NSW	Listed place	In buffer area only

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Bubulcus ibis as Ardea ibis			
Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area overfly marine area	In feature area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area overfly marine area	In buffer area only
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Myiagra cyanoleuca			
Satin Flycatcher [612]		Species or species habitat likely to occur within area overfly marine area	In feature area
Neophema chrysostoma			
Blue-winged Parrot [726]		Species or species habitat known to occur within area overfly marine area	In feature area
Numenius madagascariensis			
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Rhipidura rufifrons			
Rufous Fantail [592]		Species or species habitat may occur within area overfly marine area	In buffer area only
Rostratula australis as Rostratula benghalensis (sensu lato)			
Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area

Extra Information

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Narrabri to Wellington gas transmission pipeline	2011/5913	Controlled Action	Completed	In feature area
Wollar to Wellington 330kV Transmission Line Project	2005/2202	Controlled Action	Post-Approval	In buffer area only
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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B.2 MNES Habitat Assessment

Species	Habitat	Presence of habitat	Likelihood of Occurrence	Possible Impact
Flora				
Androcalva procumbens EPBC – V	Endemic to NSW, mainly confined to the Dubbo-Mendooran-Gilgandra region, but also in the Pilliga and Nymagee areas. Grows in sandy sites, often along roadsides. Recorded in *Eucalyptus dealbata* and *Eucalyptus sideroxylon* communities, *Melaleuca uncinata* scrub, under mallee eucalypts with a *Calytrix tetragona* understorey, and in a recently burnt Ironbark and Callitris area. Also, in *Eucalyptus fibrosa* subsp. *nubila, Eucalyptus dealbata, Eucalyptus albens* and *Callitris glaucophylla* woodlands north of Dubbo. Other associated species include *Acacia triptera, Callitris endlicheri, Eucalyptus melliodora, Allocasuarina diminuta, Philotheca salsolifolia, Xanthorrhoea species, Exocarpos cupressiformis, Leptospermum parvifolium* and *Kunzea parvifolia*. It has been recorded colonising disturbed areas such as roadsides, the edges of quarries and gravel stockpiles and a recently cleared easement under power lines.	Absent. No sandy soils on site	Low	Unlikely
A spear-grass *Austrostipa wakoolica* EPBC – E	Confined to the floodplains of the Murray River tributaries of central-western and south-western NSW, it grows in open woodland on grey, silty clay or sandy loam soils; habitats include the edges of a lignum swamp with box and mallee; creek banks in grey, silty clay; mallee and lignum sandy-loam flat; open Cypress Pine forest on low sandy range; and a low, rocky rise. Associated species include *Callitris glaucophylla, Eucalyptus microcarpa, E. populnea, Austrostipa eremophila, A. drummondii, Austrodanthonia eriantha* and *Einadia nutans*.	Absent. No suitable habitat.	Low	Unlikely
Euphrasia arguta EPBC – CE	Plants from the Nundle area have been reported from eucalypt forest with a mixed grass and shrub understorey; here, plants were most dense in an open disturbed area and along the roadside, indicating the species had regenerated following disturbance. *Euphrasia arguta* has an annual habit and has been observed to die off over the winter months, with active growth and flowering occurring between January and April.	Suitable habitat present on site	Low Targeted surveys undertaken December 2022	Unlikely. No plants detected

Species	Habitat	Presence of habitat	Likelihood of Occurrence	Possible Impact
Spiny Peppercress *Lepidium aschersonii* EPBC – V	Found on ridges of gilgai clays dominated by Brigalow (A*cacia harpophylla*), Belah (*Casuarina cristata*), Buloke (*Allocasuarina luehmanii*) and Grey Box (*Eucalyptus microcarpa*). In the south has been recorded growing in Bull Mallee (E*ucalyptus behriana*). Often the understorey is dominated by introduced plants. The species grows as a component of the ground flora, in grey loamy clays. Vegetation structure varies from open to dense, with sparse grassy understorey and occasional heavy litter. Occurs in the marginal central-western slopes and north-western plains regions of NSW (and potentially the south western plains).	Absent. No suitable habitat	Low	Unlikely
Tarengo Leek Orchid *Prasophyllum petilum* EPBC – E	Grows in open sites within Natural Temperate Grassland at the Boorowa and Delegate sites. Also grows in grassy woodland in association with *Poa labillardierei, Eucalyptus aggregata* and *Leptospermum* spp. near Queanbeyan and within the grassy ground layer dominated by *Themeda* under Box-Gum Woodland at Ilford (and Hall, ACT). Natural populations are known in NSW, near Boorowa, Queanbeyan area, at Hall in the ACT, Ilford, Delegate and a new population c.10 km west of Muswellbrook. This species has also been recorded at Bowning Cemetery where it was experimentally introduced, though it is not known whether this population has persisted.	Absent. No suitable habitat	Low	Unlikely
Wybong *Prasophyllum sp. Wybong* EPBC – CE	Endemic to NSW, it is known from near Ilford, Premer, Muswellbrook, Wybong, Yeoval, Inverell, Tenterfield, Currabubula and the Pilliga area. Known to occur in open eucalypt woodland and grassland.	Suitable habitat present on site	Low Targeted surveys undertaken in September 2022.	Unlikely. No plants detected
Small Purple-pea *Swainsona recta* EPBC – E	Before European settlement it occurred in the grassy understorey of woodlands and open forests dominated by *Eucalyptus blakelyi, E. melliodora, E. rubida* and *E. goniocalyx.* Grows in association with understorey dominants that include *Themeda triandra, Poa* spp. and *Austrostipa* spp. Recorded historically from places such as Carcoar, Culcairn and Wagga Wagga where it is probably now extinct. Populations still exist in the Queanbeyan and Wellington-Mudgee areas. Also known from the ACT and a single population of four plants near Chiltern in Victoria.	Suitable habitat present on site	Low Targeted surveys undertaken in September 2022.	Unlikely. No plants detected
Austral Toadflax *Thesium austral*	Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast, in very small populations scattered across eastern NSW, along the coast, and	Suitable habitat present on site	Low Outside known	Unlikely. No plants detected

Species	Habitat	Presence of habitat	Likelihood of Occurrence	Possible Impact
EPBC – V	from the Northern to Southern Tablelands. It is also found in Tasmania and Queensland and in eastern Asia. Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. Often found in association with Kangaroo Grass (*Themeda triandra*).		range, no records	
Zieria obcordata EPBC – E	Grows in eucalypt woodland or shrubland dominated by species of Acacia on rocky hillsides, and in *Eucalyptus/Callitris* dominated woodland with an open, low shrub understorey, on moderately steep, mainly west to north-facing slopes in sandy loam amongst granite boulders. Altitude range is 500 to 830m. Associated species include *Eucalyptus blakelyi, Brachychiton populneus* and *Acacia implexa* woodland with pockets of low shrub understorey. Also, in *E. goniocalyx, E. blakelyi, E. macrorhyncha, A. doratoxylon, A. vestita* and *Callitris glaucophylla* woodland with a shrubby understorey. Understorey species include *Pandorea pandorana, Isotoma axillaris, Westringia eremicola, Leucopogon attenuatus, Dillwynia sericea, Olearia ramulosa, Stypandra glauca, Stellaria pungens, Acacia vestita, Melichrus urceolatus, Cryptandra amara, Lepidosperma, Styphelia, Kunzea, Haloragis* and *Cheilanthes* species. Occurs at two sites; near Wellington and Crackerjack Rock/Rock Forests area NW of Bathurst.	Marginal Lack of associated Eucalypts	Moderate In geographical range, Marginal habitat No records in locality (10kms).	Unlikely. No plants detected
Threatened Ecological Communities				
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia EPBC – E	This is the most common form of the ecological community that comprises a tree layer and a native understorey with a varying proportion of shrubs, grasses and herbs. This grassy woodland form has a tree canopy that is dominated or co-dominated by Grey Box (Eucalyptus microcarpa). Derived native grassland can also occur. It mostly occurs from central NSW, through northern/central Victoria into eastern South Australia	Absent No Grey Box present on site.	Absent	Unlikely
Natural Temperate Grassland of the South Eastern	Natural Temperate Grassland of the South Eastern Highlands is normally treeless and is dominated by native perennial tussock grasses up to a 1 m high. The dominant species depends on drainage patterns, soil characteristics and/or disturbance history and include Themeda triandra (Kangaroo grass), Poa sieberiana (snowgrass) and Poa	Absent. No Natural Temperate Grassland plant	Absent	Unlikely

Species	Habitat	Presence of habitat	Likelihood of Occurrence	Possible Impact
Highlands EPBC – CE	labillardierei (Common tussock grass) in areas that have been lightly grazed and Austrostipa bigeniculata (Kneed Speargrass), Austrostipa scabra (Slender Speargrass), Bothriochloa macra (Red grass) and Rytidosperma (Wallaby grass) species in areas with higher grazing pressure.	communities present on site.		
Poplar Box Grassy Woodland on Alluvial Plains EPBC – E	This community covers native grassy eucalypt woodland where poplar/Bimble box is the main tree canopy species present. Other tree species may occasionally occur depending on the characteristics of the site, these include Callitris glaucophylla (white cypress pine), Casuarina cristata (Belah), Eucalyptus coolabah (Coolibah), Eucalyptus largiflorens (black box), Eucalyptus melanophloia (silver-leaved ironbark), Eucalyptus microcarpa (inland grey box) and Eucalyptus pilligaensis (narrow-leaved grey box).	Absent. No Poplar Bimble Box present.	Absent	Unlikely
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland EPBC – CE	The ecological community can occur either as woodland or derived native grassland (i.e., grassy woodland where the tree overstorey has been removed). It is characterised by a species-rich understorey of native tussock grasses, herbs and scattered shrubs (where shrub cover comprises less than 30% cover), and a dominance or prior dominance of White Box (Eucalyptus albens) and/or Yellow Box (E. melliodora) and/or Blakely's Red Gum (E. blakelyi) trees.	Present. PCT 266 present on site.	High, further assessment undertaken for this EPBC TEC.	Unlikely. Criteria not met for EPBC TEC condition thresholds See Section 5 for EPBC results
Aves				
Regent Honeyeater *Anthochaera phrygia* EPBC – CE	Inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak, that inhabit woodlands that support a significantly high abundance and species richness of bird species, and have large numbers of mature trees, high canopy cover and abundance of mistletoes. Every few years non-breeding flocks are seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests, particularly on the central coast and occasionally on the upper north coast. Recently recorded in urban areas around Albury where woodlands tree species such as Mugga Ironbark and Yellow Box were planted 20 years ago. A generalist forager, although mainly feeds on the nectar from a relatively small number of eucalypts that produce high volumes of nectar e.g., Mugga Ironbark, Yellow Box, White Box and Swamp Mahogany. Other tree species may be regionally important e.g., Lower Hunter Spotted Gum forests support regular breeding events. Flowering of associated species such as *Eucalyptus eugenioides* and other Stringybark species, and *E. fibrosa* can also	Foraging habitat present - White Box, however, not on important area map	Low	Unlikely

Species	Habitat	Presence of habitat	Likelihood of Occurrence	Possible Impact
	contribute important nectar flows at times. Nectar and fruit from *Amyema miquelii, A. pendula* and *A. cambagei* are also utilised. When nectar is scarce, lerp and honeydew can comprise a large proportion of the diet. The species breeds between July and January in Box-Ironbark and other temperate woodlands and riparian gallery forest dominated by River Sheoak. Nests in horizontal branches or forks in tall mature eucalypts, mistletoes and Sheoaks. In NSW the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands.			
Australasian Bittern *Botaurus poiciloptilus* EPBC – E	Favours permanent freshwater wetlands with tall, dense vegetation, particularly *Typha* spp. and *Eleocharis.* Hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails. Feeding platforms may be constructed over deeper water from reeds trampled by the bird; platforms are often littered with prey remains. Breeding occurs in summer from October to January; nests are built in secluded places in densely vegetated wetlands on a platform of reeds; there are usually six olive-brown eggs to a clutch. Mainly found in shallow wetlands (less than 1 m deep) with dense growth of rushes or sedges.	Absent. No suitable habitat	Low	Unlikely
Calidris ferruginea *EPBC – CE*	Generally, occupies littoral and estuarine habitats, and in NSW is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes and lagoons on the coast and sometimes inland. It forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed. Roosts on shingle, shell or sand beaches; spits or islets on the coast or in wetlands; or sometimes in salt marsh, among beach-cast seaweed, or on rocky shores. Feeds on worms, molluscs, crustaceans, insects and some seeds. Distributed around most of the Australian coastline (including Tasmania). It occurs along the entire coast of NSW, particularly in the Hunter Estuary, and sometimes in freshwater wetlands in the Murray-Darling Basin. Inland records are probably mainly of birds pausing for a few days during migration.	Absent. No suitable habitat	Low	Unlikely
Gang-gang Cockatoo *Callocephalon fimbriatum* *BC - V*	In spring and summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas. May also occur in sub-alpine Snow Gum (*Eucalyptus pauciflora)* woodland and occasionally in temperate rainforests. In NSW, it is distributed from the south-east coast to the Hunter region, inland to the Central Tablelands and south-west slopes, and regularly in the ACT. It is rare at the extremities	Suitable foraging habitat present on site	Low Targeted surveys undertaken December 2022	Unlikely. No individuals recorded

Species	Habitat	Presence of habitat	Likelihood of Occurrence	Possible Impact
	of its range, with isolated records known from as far north as Coffs Harbour and as far west as Mudgee.			
Grey Falcon Falco hypoleucos *EPBC – V*	Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast, and near wetlands where surface water attracts prey. Preys primarily on birds, especially parrots and pigeons, using high-speed chases and stoops; reptiles and mammals are also taken. Utilises old nests of other birds of prey and ravens, usually high in a living eucalypt near water or a watercourse; peak laying season is in late winter and early spring. Sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. Believed to be extinct in areas with more than 500mm rainfall in NSW.	Marginal habitat. Wooded watercourses for breeding prefers semi-arid areas where rainfall <500mm pa. Wellington is 600-870mm pa	Marginal habitat. No records in Bionet locality (10kms)	Unlikely to be found in Wellington area.
Painted Honeyeater Grantiella picta *EPBC – V*	Nomadic and occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. Inhabits Boree/ Weeping Myall (*Acacia pendula*), Brigalow (*A. harpophylla*) and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus *Amyema.* Nest from spring to autumn in a small, delicate nest hanging within the outer canopy of drooping eucalypts, she-oak, paperbark or mistletoe branches.	Marginal Box present but mistletoe is not present which is the preferred feed tree	Low Lack of mistletoe in feed trees	Low impact. Able to move through landscape
White-throated Needletail Hirundapus caudacutus *EPBC – V*	Arrive in Australia from their breeding grounds in the northern hemisphere in about October each year and leave somewhere between May and August. Are non-breeding migrants in Australia. Breeding takes place in northern Asia.	Foraging habitat present on site	Marginal	Low Primarily aerial species
Swift Parrot Lathamus discolor *EPBC – CE*	Breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes. Migrates to the Australian south-east mainland between March and October. No breeding in NSW. Favoured feed trees include winter flowering species such as Swamp	Feed trees present on site	Not in important area map so breeding does not occur here, but the	Unlikely however AoS completed. No significant impact.

Species	Habitat	Presence of habitat	Likelihood of Occurrence	Possible Impact
	Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*.		preferred feed tree is present	
Malleefowl *Leipoa ocellata* *EPBC – V*	Predominantly inhabit mallee communities, preferring the tall, dense and floristically rich mallee found in higher rainfall (300 - 450 mm mean annual rainfall) areas. Utilises mallee with a spinifex understorey, but usually at lower densities than in areas with a shrub understorey. Less frequently found in other eucalypt woodlands, such as Inland Grey Box, Ironbark or Bimble Box Woodlands with thick understorey, or in other woodlands such dominated by Mulga or native Cypress Pine species. Prefers areas of light sandy to sandy loam soils and habitats with a dense but discontinuous canopy and dense and diverse shrub and herb layers. Incubate eggs in large mounds that contain considerable volumes of sandy soil.	Absent. No suitable habitat	Low	Unlikely
Eastern Curlew *Numenius madagascariensis* *EPBC – CE*	In NSW, occurs across the entire coast but is mainly found in estuaries such as the Hunter River, Port Stephens, Clarence River, Richmond River and ICOLLs of the south coast. Generally, occupies coastal lakes, inlets, bays and estuarine habitats, and in NSW is mainly found in intertidal mudflats and sometimes saltmarsh of sheltered coasts. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. Forages in or at the edge of shallow water, occasionally on exposed algal mats or waterweed, or on banks of beach-cast seagrass or seaweed. Roosts on sandy spits and islets, especially on dry beach sand near the high-water mark, and among coastal vegetation including low saltmarsh or mangroves. May also roost on wooden oyster leases or other similar structures. Is carnivorous, mainly eating crustaceans.	Absent. No suitable habitat	Low	Unlikely
Superb Parrot *Polytelis swainsonii* *EPBC – V*	Inhabit Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest. In the Riverina, the birds' nest in the hollows of large trees (dead or alive) mainly in tall riparian River Red Gum Forest or Woodland. On the South West Slopes nest trees can be in open Box-Gum Woodland or isolated paddock trees. Species known to be used are Blakely's Red Gum, Yellow Box, Apple Box and Red Box. Nest in small colonies, often with more than one nest in a single tree. Breed September-January. May forage up to 10 km from nesting sites, primarily in grassy box woodland. Feeds in trees and understorey shrubs and on the ground and their diet consists mainly of grass seeds, herbaceous plants, fruits, berries, nectar, buds, flowers, insects and grain. On the South-western Slopes their core breeding area is roughly bounded by Cowra and Yass in the east, and Grenfell, Cootamundra and Coolac in the west. Birds breeding in this	Habitat present on site - PCT 266	High (recorded in August and September 2022)	Yes, AoS completed. The area is not considered breeding habitat. It is considered critical feeding habitat. The National Recovery Plan states that 'if removal of habitat

Species	Habitat	Presence of habitat	Likelihood of Occurrence	Possible Impact
	region are mainly absent during winter, when they migrate north to the region of the upper Namoi and Gwydir Rivers. The other main breeding sites are in the Riverina along the corridors of the Murray, Edward and Murrumbidgee Rivers where birds are present all year round. It is estimated that there are less than 5000 breeding pairs left in the wild.			critical to the survival cannot be avoided or mitigate, then an offset should be provided'.
Australian Painted Snipe Rostratula Australia *EPBC – E*	A small freshwater wader restricted to Australia. Most records are from the south east, particularly the Murray Darling Basin, with scattered records across northern Australia and historical records from around the Perth region in Western Australia. In NSW many records are from the Murray-Darling Basin including the Paroo wetlands, Lake Cowal, Macquarie Marshes, Fivebough Swamp and more recently, swamps near Balldale and Wanganella and wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds. The nest consists of a scrape in the ground, lined with grasses and leaves.	Absent. No suitable habitat	Low	Unlikely
Migratory				
Sharp-tailed Sandpiper *Curlew Sandpiper* *Calidris acuminata* *EPBC – M*	The Sharp-tailed Sandpiper spends the non-breeding season in Australia. Most of the population migrates to Australia, mostly to the south-east and are widespread in both inland and coastal locations and in both freshwater and saline habitats.	Absent. No suitable habitat	Low	Unlikely
Common Sandpiper Actitis hypoleucos EPBC – M	Found along all coastlines of Australia and in many areas inland. The population that migrates to Australia breeds in the Russian far east. Roost sites are typically on rocks or in roots or branches of vegetation, especially mangroves. The species utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats. The Common Sandpiper has been recorded in estuaries and deltas of streams, as well as on banks farther upstream; around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties. The muddy margins utilised by the species	Absent. No suitable habitat	Low	Unlikely

Species	Habitat	Presence of habitat	Likelihood of Occurrence	Possible Impact
	are often narrow and may be steep. The species is often associated with mangroves, and sometimes found in areas of mud littered with rocks or snags The species is known to perch on posts, jetties, moored boats and other artificial structures, and to sometimes rest on mud or 'loaf' on rocks.			
Pectoral Sandpiper Calidris melanotos *EPBC – M*	In NSW, it is widespread, but scattered. Records exist east of the Great Divide, from Casino and Ballina, south to Ulladulla. West of the Great Divide, the species is widespread in the Riverina and Lower Western regions. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. The species is usually found in coastal or near coastal habitat but occasionally found further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. The species has also been recorded in swamp overgrown with lignum.	Absent. No suitable habitat	Low	Unlikely
Fork-tailed Swift *Apus pacificus* EPBC – M	The Fork-tailed Swift is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher. In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and also over islands and sometimes well out to sea. They also occur over settled areas, including towns, urban areas and cities. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes. The sometimes occur above rainforests, wet sclerophyll forest or open forest or plantations of pines (Higgins 1999). They forage aerially, up to hundreds of metres above ground, but also less than 1 m above open areas or over water. They often occur in areas of updraughts, especially around cliffs. They are said to search along edges of low-pressure systems, which assist flight. Low-flying Swifts are said to be precursors of unsettled weather, possibly because insect prey fly at a lower altitude when the air is humid and when the air density is low (Cameron 1952). They sometimes feed aerially among tree-tops in open forest (Higgins 1999). They probably roost aerially but are occasionally observed to land (Higgins 1999). They were once recorded roosting in trees, using a bare exposed branch emergent above the foliage (Newell 1930). Sometimes they loaf in the air, by allowing strong winds to support them (Boehm 1939). There have been rare records of loafing elsewhere including Swifts briefly resting on ground (Campbell 1900) and alighting on wire netting of a tennis court (Wheeler 1959). Once, one was seen attempting to land on the wall of a lighthouse (Scarff 1990).	Suitable habitat present on site.	Marginal Mainly aerial species	Unlikely

Species	Habitat	Presence of habitat	Likelihood of Occurrence	Possible Impact
Latham's Snipe Gallinago hardwickii *EPBC – M*	Usually inhabit open, freshwater wetlands with low, dense vegetation (e.g., swamps, flooded grasslands or heathlands, around bogs and other water bodies). Known to occur in the upland wetlands of the New England Tablelands and Monaro Plateau.	Absent. No suitable habitat	Low	Unlikely
Yellow Wagtail Motacilla flava *EPBC – M*	Occupies a range of damp or wet habitats with low vegetation, from damp meadows, marshes, waterside pastures, sewage farms and bogs to damp steppe and grassy tundra. In the north of its range, it is also found in large forest clearings. Breeds from April to August, although this varies with latitude.	Marginal	Marginal	Unlikely
Satin Flycatcher Myiagra cyanoleuca *EPBC – M*	Found along the east coast of Australia in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests. Nests in loose colonies of two to five pairs nesting at intervals of about 20-50 m apart. It builds a broad-based, cup-shaped nest of shredded bark and grass, coated with spider webs and decorated with lichen. The nest is placed on a bare, horizontal branch, with overhanging foliage, about 3-25 m above the ground.	Absent. No suitable habitat	Low	Unlikely
Rufous Fantail Rhipidura rufifrons *EPBC – M*	Found in rainforest, dense wet forests, swamp woodlands and mangroves, preferring deep shade, and is often seen close to the ground. During migration, it may be found in more open habitats or urban areas. Builds a small compact cup nest, of fine grasses bound with spider webs, that is suspended from a tree fork about 5 m from the ground. The bottom of the nest is drawn out into a long stem.	Absent. No suitable habitat	Low	Unlikely
Mammals				
Large-eared Pied Bat Chalinolobus dwyeri *EPBC – V* *BC – V* *NC - V*	Found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Petrochelidon ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features. Found in well-timbered areas containing gullies. Females have been recorded raising young in maternity roosts from November to January in roof domes in sandstone caves and overhangs. They remain loyal to the same cave over many years. Forages for small, flying insects below the forest canopy. Likely to hibernate through the coolest months.	Absent. No suitable habitat	Low	Unlikely

Species	Habitat	Presence of habitat	Likelihood of Occurrence	Possible Impact
maculatus Spot-tailed Quoll Dasyurus maculatus *EPBC – E* *BC - E*	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites. Use communal 'latrine sites', often on flat rocks among boulder fields, rocky cliff-faces or along rocky stream beds or banks. The range of the Spotted-tailed Quoll has contracted considerably since European settlement. It is now found in eastern NSW, eastern Victoria, south-east and north-eastern Queensland, and Tasmania. Only in Tasmania is it still considered relatively common.	Absent. No suitable habitat	Low	Unlikely
Corben's Long-eared Bat Nyctophilus corbeni *EPBC – V* *BC – V* *NC - V*	Overall, the distribution coincides approximately with the Murray Darling Basin with the Pilliga Scrub region being the distinct stronghold for this species. Inhabits a variety of vegetation types, including mallee, buloke *Allocasuarina leuhmanni* and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland. Roosts in tree hollows, crevices, and under loose bark. Mating takes place in autumn with one or two young born in late spring to early summer.	Suitable habitat present on site.	Low	Unlikely
Koala Phascolarctos cinereus *EPBC – V* *BC – V* *NC - V*	In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. Inactive for most of the day, feeding and moving mostly at night. Spend most of their time in trees but will descend and traverse open ground to move between trees. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size. Generally solitary but have complex social hierarchies based on a dominant male with a territory overlapping several females and sub-ordinate males on the periphery.	Suitable habitat present on site.	Low Targeted surveys undertaken August and September 2022.	Unlikely. No individual recorded.
Grey-headed Flying-fox Pteropus poliocephalus *EPBC – V* *BC - V*	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and commonly found in gullies, close to water, in vegetation with a dense canopy. Individual camps may have tens of thousands of animals and are used for mating, giving birth and rearing young. Annual mating commences in January and a single young is born in October or November. Site fidelity to camps is high; some camps have been used for over a	Suitable habitat present on site.	High Seen during site visit August 2022	Yes, AOS completed. Significant impact unlikely

Species	Habitat	Presence of habitat	Likelihood of Occurrence	Possible Impact
	century. Can travel up to 50km from the camp to forage; commuting distances are more often <20 km. Feed on the nectar and pollen of native trees, in particular *Eucalyptus, Melaleuca* and *Banksia,* and fruits of rainforest trees and vines. Also forage in cultivated gardens and fruit crops.			
Reptiles				
Pink-tailed Legless Lizard Aprasia parapulchella *EPBC – V* *BC - V*	Known from the Central and Southern Tablelands, and the South Western Slopes. A concentration of populations in the Canberra/Queanbeyan Region, Cooma, Yass, Bathurst, Albury and West Wyalong. Inhabits sloping, open woodland areas with predominantly native grassy ground layer, particularly those dominated by Kangaroo Grass (*Themeda triandra*). Sites are typically well-drained, with rocky outcrops or scattered, partially buried rocks. Commonly found beneath small, partially embedded rocks and appear to spend considerable time in burrows below these rocks; the burrows have been constructed by and are often still inhabited by small black ants and termites. Feeds on the larvae and eggs of the ants with which it shares its burrows.	Present in Grassy and rocky habitat	High Seen during site visit September	Yes, AoS completed, Significant impact likely. Referral required
Striped Legless Lizard *Delma impar* *EPBC – V* *BC - V*	Occurs in the Southern Tablelands, the South West Slopes, the Upper Hunter and possibly on the Riverina. Populations are known in the Goulburn, Yass, Queanbeyan, Cooma, Muswellbrook and Tumut areas. Also occurs in the ACT, Victoria and south-eastern South Australia. Found mainly in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component. Habitat is where grassland is dominated by perennial, tussock-forming grasses such as Kangaroo Grass *Themeda triandra*, spear-grasses *Austrostipa* spp., Poa tussocks *Poa* spp., and occasionally wallaby grasses *Austrodanthonia* spp. Sometimes present in modified grasslands with a significant content of exotic grasses. Sometimes found in grasslands with significant amounts of surface rocks, which are used for shelter. Sometimes utilises dried cowpats for shelter. Actively hunts for spiders, crickets, moth larvae and cockroaches.	Suitable habitat present on site	Marginal. No records but in geographic range	Yes, AoS completed. Significant impact unlikely
Invertebrates				
Synemon plana Golden Sun Moth	NSW populations are found in the area between Queanbeyan, Gunning, Young and Tumut. Historical distribution extended from Bathurst (central NSW) through the NSW	Suitable habitat present on site	Marginal. No records but in	Unlikely. No individuals recorded.

Species	Habitat	Presence of habitat	Likelihood of Occurrence	Possible Impact
EPBC – CR *BC - V*	Southern Tablelands, through to central and western Victoria, to Bordertown in eastern South Australia. Occurs in Natural Temperate Grasslands and grassy Box-Gum Woodlands in which ground layer is dominated by wallaby grasses Austrodanthonia spp. Grasslands dominated by wallaby grasses are typically low and open - the bare ground between the tussocks is thought to be an important microhabitat feature, as it is typically these areas on which the females are observed displaying to attract males. Habitat may contain several wallaby grass species, which are typically associated with other grasses particularly. Found in Wallaby grass (Rytidosperma sp), Speargrass (Austrostipa sp) or Chilean needlegrass (Nassella neesiana).		geographic range in EPBC databases. However, may occur in areas associated with PCT 266. Surveys undertaken	

B.3 Assessment of Significance

B3.1 Vulnerable

The *Environment Protection and Biodiversity Conservation Act 1999* specifies factors to be considered in deciding whether a development is likely to significantly affect Endangered Ecological Communities, threatened species and migratory species, listed at the Commonwealth level. These assessments characterise the significance of likely impacts associated with the proposal on the following **Vulnerable** species:

Birds

- Superb Parrot (*Polytelis swainsonii)*

Mammals

- Grey Headed Flying-fox (*Pteropus poliocephalus)*

Reptiles

- Striped Legless Lizard (*Delma impar)*
- Pink-tailed Legless Lizard (*Aprasia parapulchella)*

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An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:
a) Will the action lead to a long-term decrease in the size of an important population of a species?
Superb Parrot The Significant impact guidelines (2013) state the following: *An 'important population' is a population that is necessary for a species' long-term survival and recovery.* *This may include populations identified as such in recovery plans, and/or that are:* *• key source populations either for breeding or dispersal* *• populations that are necessary for maintaining genetic diversity, and/or* *• populations that are near the limit of the species range*. The Superb Parrot was recorded during the August and September 2022 surveys and the EPBC species distribution shows the species is likely to occur to in the Wellington region. There are 7 BioNet records (including 4 recent records, 2012, 2015, 2x 2020) within 10km of the development site. Wellington area is considered foraging habitat. The key breeding areas are located as follows (National Recovery Plan 2021): • South-west slopes including the areas of Molong, Rye Park, Yass, Coolac, Cootamundra and Young (NSW). • The Murrumbidgee River, between Wagga Wagga and Toganmain Station, extending north to Goolgowi (north of Darlington Point and the Murrumbidgee River);

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• Murray and Edward Rivers east of Barmah and Millewa State Forest to the south of Taylors Bridge in NSW and Victoria. The development site is approximately 60km north of the Molong key breeding area. Parrots will forage up to 9km from their nest sites. In the Riverina, this species are known to nest in HBTs with many hollow branches in loose colonies (National Recovery Plan, 2021) The development site lies approximately 1.5 km north of the Macquarie River. There is potential nesting trees on site and a male seen with its' head sticking out of a hollow where birds were mostly seen congregating during the week of the September field survey. The tree was a White Box (*Eucalyptus albens*). White Box is a potentially nesting tree although this has not been adequately researched (National Recovery Plan, 2021). Consultation with BCD occurred, and the species expert confirmed breeding habitat at this site unlikely (BCD pes comms, 2022). The site is not at the limit of the species range. The Superb Parrot's range extends from the core breeding areas around Grenfell and Yass to the northern parts of NSW during the winter migration. The development will not impact the breeding or dispersal for this species. It is unknown from current research and information available what the limitations or significance is for the Superb Parrot's genetic diversity. The presence of the Superb Parrot in winter at this location shows it is part of the species migration forage route as it moves north. The proposal is not considered an action that would lead to a long-term decrease in the size of an important population of this species. Due to the presence of Superb Parrots, it has been recommended that a HBT Removal Protocol be followed.
Grey-headed Flying-fox The Significant impact guidelines (2013) state the following: *An 'important population' is a population that is necessary for a species' long-term survival and recovery*. *This may include populations identified as such in recovery plans, and/or that are:* • *key source populations either for breeding or dispersal* • *populations that are necessary for maintaining genetic diversity, and/or* • *populations that are near the limit of the species range*. This species is considered to be 'a single, mobile population' according to the National Recovery Plan (2021). During the August site visit 2 Grey-headed flying-foxes were seen adjacent to the development site roosting in a tree (with canopy leaning into the development site). There are 6 recent BioNet records within 3.7km of the development site. The National Flying-fox Monitoring Viewer (Department of Climate Change, Energy, the Environment and Water (2022) shows there are two camps in Wellington, within 2.6km of the development site. This species is known to fly up to 40km to forage, and they migrate when there are changes in the quantity of food (Commonwealth of Australia, 2021). One study found the mean distance for it to travel from the camp to forage and back to the same camp to be 10.9km (Commonwealth of Australia, 2021). Loss of roosting and foraging habitat is the main threat to this species (Commonwealth of Australia, 2021). There is approximately 28.47 ha of the suitable foraging species, PCT 266 Woodland habitat dominated by White Box in the development site and 3.66 ha of this woodland habitat would be impacted by the proposed works. According to state vegetation mapping there is approximately 6052 ha of associated PCTs present within a 10km radius (which encompasses the proposal area) of the 2

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camp sites located in Wellington. Removal of 3.66 of PCT 266 Woodland habitat is unlikely to contribute to the long term decline of the Grey-headed Flying Fox population.
Striped Legless Lizard The Significant impact guidelines (2013) state the following: *An 'important population' is a population that is necessary for a species' long-term survival and recovery.* *This may include populations identified as such in recovery plans, and/or that are:* *• key source populations either for breeding or dispersal* *• populations that are necessary for maintaining genetic diversity, and/or* *• populations that are near the limit of the species range* The Conservation Advice (2016) states: *The understanding of fine scale population structure is limited and difficult to assess given the fragmented and disturbed nature of the species habitat and the difficulty in detecting the species due to its cryptic nature. For these reasons it is considered that when one or more individuals are found on a site that they are a member/s of an important population.* While the development site is not mentioned on the 'important population' list in the Conservation Advice (DoE 2016) more research may determine more areas. The Conservation Advice (2016) states 'All populations of the striped legless lizard are likely to be important for the species recovery'. The Species Profile (DPE 2022) distribution mapping shows the development site occurs within the subregion where this species is known to occur and the SPRAT profile (DCCEEW 2022), mapping shows the species or its habitat is likely to occur. There are no BioNet records in the Wellington region and the nearest record is 278km away from the development site. Striped Legless Lizard are known to occur in White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (DoE 2016). This TEC occurs on site. This species is a grassland specialist '*found only in areas of native grassland and nearby grassy woodland and exotic pasture*' (DoE, 2016). The proposal area is a degraded woodland with derived grassland due to historic tree removal. Under state vegetation mapping there are no PCT grasslands adjacent to this site. The modified understorey in the Woodland area continues to the derived grassland areas suggesting PCT 266 has been modified due land use change for agriculture pursuits since European settlement. The site has high structural complexity in some locations, and surface rocks, which are favourable for this species (DoE, 2021). A targeted survey was not undertaken for this species however rocks were turned during the pink-tailed legless lizard surveys and if the species was present, it is likely to have been found during these targeted surveys. The rock turning was for partially imbedded rocks, though some surface rocks were also turned (surface rocks are used by Striped Legless Lizard to hide and/or breed). During this time the Striped legless lizard was not identified. Given the above the proposal area is not considered likely to accommodate this species, it is unlikely the species would occur here and therefore the action would not lead to a long-term decrease in the size of an important population of a species.
Pink-tailed Legless Lizard (PTLL)

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There is no recovery plan for this species and the Conservation Advice (2015) does not mention an 'important population'. The significant impact guidelines (2013) state the following:

An 'important population' is a population that is necessary for a species' long-term survival and recovery.

This may include populations identified as such in recovery plans, and/or that are:

• key source populations either for breeding or dispersal

• populations that are necessary for maintaining genetic diversity, and/or

• populations that are near the limit of the species range.

Key source populations and populations necessary for maintaining genetic diversity have not been identified in the Conservation Advice (2015). The development site is not at the limit of this species range. This species is known to occur in isolated habitats in NSW and Victoria. The development site is within a priority management area (DPE, 2022). However, further research is required to guide the criteria of an important population/s across the extent of occurrence of the Pink-tailed Legless Lizard. The PTLL lives underground and highly cryptic making the species difficult to detect and to ascertain movement in the landscape. The species have been recorded to move above ground occasionally, though they spend most of the time underground (Commonwealth of Australia, 2021). The NSW Conservation Advice (2015) has not determined the distance the species may move throughout the landscape. The ACT Conservation Advice (2020) states the more information is needed on local movements and increase understanding of movements above ground.

The development footprint contains patches of rocky outcrops, scattered partially buried rocks throughout the site and grassy areas. The proposal involves the removal/disturbance of approximately 10.33 ha of suitable habitat for this species. Given the cryptic nature of this species and the suitable habitat found on site, Th proposed works has the potential to have a significant impact on this population at this location. However, the proposal is unlikely to have a significant impact on the overall population and lead to a long-term decrease in the size this population.

b) Will the action reduce the area of occupancy of an important population of a species?

Superb Parrot

The area of occupancy based on the ICUN grid method, determined the area of occupancy for the Superb Parrot to be 5360 km^2 covering west of the Great Dividing Range in NSW, the Riverina and Victoria (TSSC 2016). The proposed development will not reduce the area of occupancy for the Superb Parrot. The development proposes to remove 3.66 hectares of Woodland habitat (PCT 266) which is considered foraging habitat for the Superb Parrot.

Grey-headed Flying-fox

The Grey-headed Flying-fox is found from Bundaberg in Queensland to Melbourne in Victoria and from the western slopes to coast in NSW, it has also been found in South Australia (Commonwealth of Australia 2021). The Grey-headed Flying-fox is a frugivore and nectarivore that feed in tree canopies. It inhabits vegetation communities including, closed and open woodlands, rainforests, open forests, Melaleuca swamps and Banksia woodlands. It is also known to feed on commercial fruit crops and in urban areas on introduced tree species The blossom of Eucalypts is one of its primary food sources. They migrate depending on food source availability (Commonwealth of Australia 2021). This species is highly mobile and is known to forage up to 40km from camps (Commonwealth of Australia, 2021). Around 3.66 ha of woodland habitat (PCT 266) with suitable feed trees (White Box) impacted by the

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proposal, however state vegetation mapping estimates 6052 ha of Woodland habitat persists in the locality of the development site therefore the area of occupancy will not be significantly reduced as a result of the proposed clearing works identified in this proposal.
Striped Legless Lizard The striped legless lizard area of occupancy occurs in isolated populations throughout the Australian Capital Territory (ACT), north-eastern, central and south-western Victoria (Vic), south-eastern South Australia (SA), and south-eastern New South Wales (NSW) with some outlying records in Gilgandra and Muswellbrook (Threatened Species Scientific Committee, 2016). It is a grassland specialist, that is only found in areas of native grassland and nearby grassy woodland and exotic pasture. The primary habitat is encompassed by four nationally threatened ecological communities. One of these is White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Threatened Species Scientific Committee, 2016). This TEC is present on site however is considered of low vegetation quality which indicates the habitat is not preferrable for the Striped Legless Lizard. The species was not identified during the targeted surveys and therefore not considered present on site. The proposed works are not considered to result in a reduction of the area of occupancy of an important population.
Pink-tailed Legless Lizard The Pink-tailed Legless Lizard area of occupancy occurs in Victoria, the Australian Capital Territory (ACT) and New South Wales (NSW), It is found along the foothills of the western slopes of the Great Dividing Range between Gunnedah in NSW and Bendigo in Victoria in patchy distributions (Threatened Species Scientifc Committee, 2015). It is known in widespread but isolated locations in the South Western Slopes, Central and Southern Tablelands and the South Western Slopes (Threatened Species Scientifc Committee, 2015). This species inhabits grassy woodland and woodland communities, primary and secondary grassland, and generally found in sloping sites that contain rocky outcrops or scattered, partially buried rocks (Threatened Species Scientifc Committee, 2015). Individuals are most commonly found sheltering under these rocks and spend considerable time in ant burrows below these rocks, which are considered important foraging and shelter sites (Wong et al 2011; Department of the Environment 2013; NSW OEH 2014). Microhabitat attributes, such as rockiness and the presence of ground-layer species, especially native grasses, are the principal determinants of occurrence (Department of the Environment 2013). A cover of predominantly native grasses, particularly kangaroo grass (*Themeda australis*), characterises the majority of sites (Jones 1992; 1999), although vegetation affiliations in Victoria are less clear (Roberston and Heard 2008).
c) Will the action fragment an existing important population into two or more populations?
Superb Parrot The Superb Parrot is highly mobile, and the suitable habitat within the development footprint is approximately 13.22ha. The proposal would not fragment an existing important population into two or more populations.
Grey-headed Flying-fox The area of occupancy and the mobility of this species, the proposal is unlikely to separate this species into two or more populations.

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Striped Legless Lizard

The species was not identified during the fauna surveys and therefore considered absent; therefore, the proposed works are unlikely to separate this species into two or more populations.

Pink-tailed Legless Lizard

Given the size of the proposed BESS works, the potential disturbance area, the habit for this species to live predominantly underground, and the lack of information on the movement of this species, as a precautionary approach, the proposal would reduce the extent of local area on site but not fragment an existing important population into two or more populations.

d) Will the action adversely affect habitat critical to the survival of a species?

Superb Parrot

The National Recovery Plan for the Superb Parrot (2021), states the following:

Habitat critical to the survival of a species or ecological community refers to areas that are necessary:

- *For activities such as foraging, breeding, roosting, or dispersal.*
- *For the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);*
- *To maintain genetic diversity and long-term evolutionary potential; and*
- *For the re-introduction of populations or recovery of the species or ecological community.*

Habitat critical to the survival of the Superb Parrot is divided into their breeding and foraging habitat, foraging, and habitat for the long-term maintenance of the species.

The habitat on site is considered foraging habitat. Superb Parrots were seen foraging on the ground and in trees during the August and September 2022 site visits.

Habitat for the long-term maintenance of the species

The site is not part of a KBA nor part of the projected south-eastward range shift.

Given the above it may be considered that the habitat to be removed is not critical habitat. The proposal would involve the removal of approximately 37 HBTs within an area of up to 3.66ha of Woodland to be cleared/disturbed.

The National Recovery Plan states that '*if removal of habitat critical to the survival cannot be avoided or mitigate, then an offset should be provided'. The site is considered foraging habitat for the Superb Parrot, which is considered offset under ecosystem credits, however the vegetation integrity scores were too low to generate ecosystem credits, but the loss of foraging habitat is 3.66 which is unlikely to impact critical habitat for this species.*

Breeding habitat:

Box-Gum woodland is one of the main habitat types utilised for this species for breeding. Box-gum woodland is present in the development site as PCT 266.

The National Recovery Plan for the Superb Parrot (2021), states the following:

Superb Parrots are obligate hollow nesters with a preference for rare hollow characteristics. As a guide, habitat critical to the survival should include trees with:

Assessment of Significance MNES
• *A diameter at breast height of around 113 cm,* • *Tree height between 12 to 24 m;* • *Hollow with entrance diameter of 8-12 cm;* • *Hollow with a depth of 59-122 cm;* • *Hollow with a floor diameter of 15-22 cm; and* • *Hollows that are located on a branch or stem with a diameter of 36-49 cm*. These trees had the following characteristics: • All between 60cm and approximately 100cm diameter. • Approximate height of 10 -14m • Hollows between 8-12cm • Unknown depth and floor diameter. A male was seen in one of the hollows during the September survey, and 2 pairs were seen during the August survey flying out of 2 different HBTs (these 3 trees are outside of the development footprint). Consultation with BCD confirmed the site is not considered breeding habitat for the superb parrot (BCD pes comms 2022)
Grey-headed Flying-fox The National Recovery Plan (2021) mentions vegetation communities with plants flowering in winter - spring are important foraging habitat for the Grey-headed Flying Fox. White Box flowers August to February and therefore provides foraging habitat for the Grey-headed Flying Fox during this period. There is approximately 28.47 ha of the suitable foraging habitat in the development site and based on state vegetation mapping in the locality an additional 6052 ha of associated PCTs present within a 10km radius. Therefore, removal of 3.66 ha of this woodland habitat, the proposal is not considered an action that would significantly adversely affect habitat critical to the survival of this species.
Striped Legless Lizard *Delma impar* (Striped legless lizard) Conservation Advice (2016) lists a number of factors to determine if an area is critical habitat. Based on the conservation advice and assessment of this species as part of this AoS, the development site does not provide critical habitat required for the survival of the species based on the following information: • The proposal area does not provide breeding habitat, • The species is absent • The proposal area does not occur at the edge of the known/likely distribution • The proposal area, is not part of a newly discovered range extension and has been subjected to adverse practices in the last 10 years.
Pink-tailed Legless Lizard
The significant impact guidelines (2013) states the following: '*Habitat critical to the survival of a species or ecological community' refers to areas that are necessary:* • *for activities such as foraging, breeding, roosting, or dispersal* • *for the long-term maintenance of the species or ecological community (including the maintenance of* *species essential to the survival of the species or ecological community, such as pollinators)*

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• *to maintain genetic diversity and long term evolutionary development, or* • *for the reintroduction of populations or recovery of the species or ecological community.* PCT 266 provides grassy woodland and derived grassland habitat with imbedded, partially embedded or scattered rocks for the Pink-tailed Legless Lizard. The Pink-tailed Legless Lizard was found under partially buried rocks, scattered rocky sites or rocky outcrops in the woodland and grassland habitat. The development site provides suitable habitat for foraging, breeding and dispersal for the Pink-tailed Legless Lizard, however the proposed impacted area will only impact 10.62 ha in the northern part of the development site. The development site where PTLL habitat has been determined covers 28.47 ha which extends beyond these mapped areas. Therefore, the proposal is likely to reduce the suitable habitat for the Pink-tailed Legless Lizard at this location but unlikely to adversely affect critical habitat to the survival of the species. Recent communication with a Herpetologist (D Michael (2022) suggests that the presence of rocks may not be a limiting factor for the presence of this species. Therefore, appropriate mitigation measure are required to ensure the species persists in this location outside of the area that is not impacted by the proposal. The mitigation measures include completion of a Pink-tailed Legless Lizard Management Plan that incorporates the following: • Consultation with the species expert to determine timing for relocation of this species prior to construction • Any proposed relocation undertaken by an appropriately qualified ecologist • Relocation of scattered rocks in the development site from the development footprint by an experienced ecologist • Threatened species protocol; for managing individuals if construction occurs when species are likely to be underground • Avoid creation of rock piles. Rocks should be loosely scattered in the development site • Avoid any relocation during breeding season (December -March)
e) Will the action disrupt the breeding cycle of an important population?
Superb Parrot The proposal will not disrupt the breeding cycle for the Superb Parrot. The species was identified during the winter period and the area is not considered a key breeding area for this species. The impact would be considered a loss of foraging habitat.
Grey-headed Flying-fox The females breed once a year generally from October to December (Commonwealth of Australia 2021) And the site contains White Box which is suitable for foraging. Two individuals seen during the August site visit indicate the development footprint is used for foraging. Two camps are located within approximately 2.6km away. According to state vegetation mapping there is approximately 6052 ha of associated PCTs present within a 10km radius (which encompasses the proposal area) of the 2 camp sites located in Wellington. Given the above the proposal would not interfere with the breeding cycle of this species.
Striped Legless Lizard

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An important population is not considered to occur in the development site.
Pink-tailed Legless Lizard This species likely lays its' eggs in ant nests, they have two eggs per breeding time and eggs laid in summer (Conservation Advice 2015). Eggs hatch and young appear in March. The proposed works involve impact to approximately 10.33ha of suitable habitat for this species including ground cover and rock removal. Regardless of works time the breeding cycle would be impacted either due to direct impact on eggs or fatalities of the adults during construction works. Mitigation measures have been included to minimise these impacts.
f) Will the action modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?
Superb Parrot State Vegetation Mapping shows approximately 427ha of PCTs as suitable foraging habitat for the Superb Parrot within 1500m. The proposal would result in an approximate removal of <0.01% (within 1500 metres of the development site). The site is highly modified Woodland that provides foraging habitat for the Superb Parrot. These small incremental losses throughout the Parrots foraging range can contribute to a decline in availability of foraging habitat over a longer period of time. These losses are usually offset through ecosystem credits to ensure availability and quality of habitat is retained. The vegetation quality on site is considered low quality (i.e., the VIS does not generate credits) therefore the removal of 3.66 ha of Woodland habitat will not lead to a decline of the Superb Parrot Given the above the proposal is not considered an action that would significantly modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Grey-headed Flying-fox This species is known to travel up to 40km from its camp to forage (one study found the mean distance for it to travel from the camp to forage and back to the same camp to be 10.9km) and migrate when there is change in the quantity and location of feed resources (Commonwealth of Australia, 2021). While there would be approx. 3.66ha of woodland with suitable feed trees removed for the proposal, approximately 28.47 (87.14%) would remain in the development site. According to state vegetation mapping there is approximately 6052 ha of associated PCTs present within a 10km radius (which encompasses the proposal area) of the 2 camp sites located in Wellington. Given the above the proposal is not considered an action that would significantly modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Striped Legless Lizard The habitat is not a grassland or surrounded by grassland according to SVM mapping which indicates the habitat is not preferrable. The species was not identified during surveys. The proposal area is not considered likely to accommodate this species, hence an important population for this species is considered not to occur.
Pink-tailed Legless Lizard The proposal involves the removal/disturbance of approximately 10.33ha of suitable habitat for this species which will decrease the availability of habitat at this location, however, the development site

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and immediate vicinity to the development footprint does provide habitat for the species. The development site covers 47.48 ha where 37.15 ha will be retained therefore the species will continue to persist at this location. The initial steps undertaken to avoid and minimise impact to native vegetation as part of the development of this proposal has reduced the impact on PTLL habitat by locating the development to the north and using existing access tracks during construction. This has limited impacts on PTLL habitat and avoided woodland vegetation and rocky outcrops. These measures have limited the extent of vegetation removal where it is unlikely the PTLL is unlikely to continue to decline.

g) Will the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?

The proposal has the potential to contribute to the spread of invasive species, mainly through the clearing of vegetation and transfer and introduction of plant material and soil on machinery. Mitigation measures have been recommended to prevent the spread of weeds on site. The proposal would therefore be unlikely to result in invasive species that are harmful to these species becoming established in their potential habitat.

Increased edge effects can lead to introduction of the Noisy Miner which compete with breeding and foraging resources. Although this species was identified on site it is unlikely to be a KTP for the Pink-tailed Legless Lizard, Superb Parrot or Grey-headed Flying Fox.

Feral cats and red foxes are threats to the Pink-tailed Legless Lizard. It is likely these predators are already on site given it is agricultural land. The works are not predicted to increase the numbers of these predators.

h) Will the action introduce disease that may cause the species to decline?

The proposal has the potential to contribute to the spread of disease through the transfer and introduction of plant material and soil on machinery. Mitigation measures have been recommended to prevent the spread of disease on site. The proposal would therefore be unlikely to result in disease which may cause any of the above-mentioned species to decline.

Psittacine Beak and Feather Disease (PBFD) is a disease that parrots can spread and die from. Reduction in nest hollows may increase competition for nest trees which may increase the transmission of this virus (National Recovery Plan, 2021). However, the site is not considered breeding habitat for the Superb parrot so it is unlikely this disease will impact the species.

i) Will the action interfere substantially with the recovery of the species?

Superb Parrot

The National Recovery Plan for the Superb Parrot (2021) lists the following strategies:

- Identify, protect, manage and strategically restore Superb Parrot breeding, foraging and movement habitats, at the local, regional and landscape scales
- Define, monitor, reduce and manage threats to the Superb Parrot at the local, regional and landscape scales
- Expand and sustain ecologically meaningful monitoring to track changes in Superb Parrot distribution, habitat use and population size, including developing and applying techniques to measure the success of recovery actions

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• Improve understanding of Superb Parrot movement ecology across multiple scales to better target protection and restoration measures • Engage local communities and stakeholders in Superb Parrot conservation • Coordinate, review and report on Superb Parrot recovery progress The proposal would involve the removal of approximately 3.66 ha of woodland foraging area including 37 HBTs. Given there is approximately 183 HBTs to remain in the vicinity and likely to be more in the surrounding landscape and that 427ha of associated PCTs is mapped under SVM within 1500m of the site, it is not likely to interfere substantially with any of these objectives.
Grey-headed Flying-fox The National Recovery Plan (2021) list the following recovery objectives: 1. Identify, protect and increase native foraging habitat that is critical to the survival of the Grey-headed Flying-fox. 2. Identify, protect and increase roosting habitat of Grey-headed Flying-fox camps. 3. Determine trends in the Grey-headed Flying-fox population so as to monitor the species' national distribution, habitat use and conservation status. 4. Build community capacity to coexist with flying-foxes and minimise the impacts on urban settlements from new and existing camps while avoiding interventions to move on or relocate entire camps. 5. Increase public awareness and understanding of Grey-headed Flying-foxes and the recovery program and involve the community in the recovery program where appropriate. 6. Improve the management of Grey-headed Flying-fox camps in areas where interaction with humans is likely. 7. Significantly reduce levels of licenced harm to Grey-headed Flying-foxes associated with commercial horticulture. 8. Support research activities that will improve the conservation status and management of Grey-headed Flying-foxes. 9. Reduce the impact on Grey-headed Flying-foxes of electrocution on power lines, and entanglement in netting and on barbed-wire. Habitat, including roosting and foraging, loss is mentioned as the primary threat to this species. This proposal would involve the removal of approximately 3.66ha of foraging habitat. According to state vegetation mapping there is approximately 6052 ha of associated PCTs present within a 10km radius (which encompasses the proposal area) of the 2 camp sites located in Wellington. The works are not predicted to impact the recovery of this species.
Striped Legless Lizard The proposal is not predicted to interfere with the recovery of this species.
Pink-tailed Legless Lizard The following conservation actions area listed in the NSW Conservation Advice (2015): <u>Habitat loss, disturbance and modifications</u> • Identify sites not protected in conservation reserves and seek to secure the protection and conservation management of sites on which long-term conservation relies. • Identify and implement approaches to avoid/reduce the removal of rocks in order to preserve

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habitat integrity (e.g., erect signage, manage access to habitat).

- Implement management actions that reduce the modification of vegetation (e.g., prohibit slashing, ploughing and pasture improvement).
- Ensure that the disturbance of habitat by recreational activities is minimised through a combination of education, on-site advisory signs, and the restriction of certain activities.

Invasive species

- Develop and implement predator control programmes in line with the Department of the Environment's *Threat abatement plan for predation by feral cats* (Department of the Environment 2015) and the *Threat abatement plan for predation by European red fox* (DEWHA 2008). Programmes should address feral animal control on and adjacent to known sites and responsible pet ownership. Programmes should consider the potential for an amplified rate of predation from these species following fire.
- Implement or improve weed control, including for escaped pasture species.

Impact of domestic species

- If livestock grazing occurs in the area, ensure land owners/managers use an appropriate management regime and density that does not detrimentally affect this species and manage total grazing pressure at important sites through exclusion fencing or other barriers.

Fire

- If, as a result of research, fire and certain fire regimes are found to be a threat, incorporate this information into fire management plans across the species' range.

Stakeholder engagement

- Ensure land managers are aware of the species' occurrence and encourage implementation of threat reduction measures.
- Provide landholders with information on minimising adverse impacts as a result of grazing and reducing the modification of native vegetation.
- Promote community understanding and support through public education and the provision of advice.

These works are unlikely to impact the recovery of this species with the removal of their habitat rather than preservation.

Conclusion

Grey -headed flying-fox, Striped legless lizard, Superb Parrot:

The impacts of the proposal on the assessed threatened species listed under the EPBC Act are considered to be manageable. A significant impact is considered unlikely based on the following conclusions:

- The amount of habitat to be removed or disturbed by the proposal is relatively small in the local context and surrounding connectivity features.
- Incremental fragmentation of the woodland habitat would occur in a modified landscape.
- No known substantial contribution to any key threatening process would be expected.
- No impact to any important population is expected by the proposed works.

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- Mitigation measures have been recommended to minimise potential impacts to threatened species.
- The principle to avoid minimise and offset have been applied to impacted habitat.

Pink-tailed Legless Lizard:

A significant impact is not considered likely based on the following conclusions:

- the proposal will not lead to a long-term decrease in the size of the population.
- the proposal will not reduce the area of occupancy of an important population for this species.
- These works will reduce surveyed habitat from 47.48 ha to 37.15 ha however the proposal will not separate the population into two populations and the northern extend of proposal area has been impacted whilst avoiding as much of the surveyed habitat as possible.
- The breeding cycle has the potential to be impacted either due to direct loss of eggs or fatalities of the adults during construction works.
- the proposal would not significantly modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline across its range However mitigation measures are required to minimise the loss of the species at the proposed location. The mitigation measures include completion of a Pink-tailed Legless Lizard Management Plan that incorporates the following:
    - Consultation with the species expert to determine timing for relocation of this species prior to construction
    - Any proposed relocation undertaken by an appropriately qualified ecologist
    - Relocation of scattered rocks in the development site from the development footprint by an experienced ecologist
    - Threatened species protocol; for managing individuals if construction occurs when species are likely to be underground
    - Avoid creation of rock piles. Rocks should be loosely scattered in the development site
    - Avoid any relocation during breeding season (December -March)

B3.2 Endangered and Critically Endangered Species

The *Environment Protection and Biodiversity Conservation Act 1999* specifies factors to be considered in deciding whether a development is likely to significantly affect Endangered Ecological Communities, threatened species and migratory species, listed at the Commonwealth level. These assessments characterise the significance of likely impacts associated with the proposal on the following **Endangered and Critically Endangered** species:

Swift Parrot *Lathamus discolor* – Critically Endangered.

An action is likely to have a significant impact on an Endangered or Critically Endangered species if there is a real chance or possibility that it will:
a) lead to a long-term decrease in the size of a population
Potential foraging habitat for the Swift Parrot occurs within the proposal area in the form of White Box (*Eucalyptus albens*) woodland. There is one BioNet record approximately 6.5km from the proposal area in 2014, at Mt Arthur Reserve. The Swift Parrot does not breed on mainland Australia, therefore only foraging habitat for this species occurs within the development site. The species migrates to the south-east of mainland Australia during autumn and winter feeding on flowering Eucalypts. The critical survival of this species is protection of nesting sites in Tasmania and retaining Eucalypts or revegetating with preferred flowering gums in mainland Australia in known foraging areas. One of the favoured winter flowering plants of this species is White Box (*Eucalyptus albens*), which present in the proposal area. As a part of the proposal, the development footprint will impact 3.66 ha of PCT 266 White Box woodland including 37 preferred feed trees. The development site will retain 24.81 ha of White Box woodland and within 1500 metres of the development site covers 691 ha of additional potential foraging habitat according to state vegetation mapping. Therefore the proposed impact on Woodland habitat will be <0.01% of woodland foraging habitat found within 1500m of development site. This species is also migratory, hence highly mobile. Given this, the works are not predicted to lead to a long term decrease in the size of its population. To avoid indirect impacts from the loss of flowering Eucalypts at the site, ongoing management of the adjacent woodland vegetation could include natural regeneration and revegetation. This species requires careful consideration as part of any works as it is critically endangered. Given the record of this species is migratory and recorded within 6.5km of the site and one of the preferred feed trees is present it is recommended a pre-clear survey is conducted by a qualified ecologist prior to vegetation removal works if planned in autumn-winter.
b) **Will the action reduce the area of occupancy of the species?**
The Conservation Advice (TSSC 2016) mentions the area of occupancy for this species for breeding fluctuates based on research conducted by Webb from 2009-2014. Fire, forestry practices, sugar glider predation and land clearing reduce the area of occupancy in Tasmania available for breeding for the Swift Parrot. The area of occupancy for Swift Parrot is complex due to the breeding and migration of the species. However, the proposal will not impact any breeding habitat. The extent of occurrence for Swift Parrot including migratory foraging habitat is 57,000 km^2 (Tasmania and mainland Australia) (TSSC 2016). The development site is considered part of the extent of occurrence for the Swift Parrot and the site is not located in one of the important mapped areas. The removal of 37 feed trees over 57,000km^2 will have minimal impact on the area of occupancy for Swift Parrot.
c) Will the action fragment an existing population into two or more populations?

An action is likely to have a significant impact on an Endangered or Critically Endangered species if there is a real chance or possibility that it will:

The Swift Parrot occurs as a migratory population that moves throughout the landscape foraging for winter flowering Eucalypts in NSW for autumn winter foraging (Saunders & Tzaros, 2011). Given the high dispersal ability of Swift Parrot, the relatively small area of tree clearing (3.66 ha of woodland habitat). The proposal is not considered an action that would fragment any existing populations of these species into two or more populations.

d) Will the action adversely affect habitat critical to the survival of a species?

The proposal area falls within known foraging range of the Swift Parrot. The MNES Significant impact guidelines 1.1 EPBC Act 1999 states 'Habitat critical to the survival of a species or ecological community' refers to areas that are necessary:

• for activities such as foraging, breeding, roosting, or dispersal

• for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)

• to maintain genetic diversity and long term evolutionary development, or

• for the reintroduction of populations or recovery of the species or ecological community.'

The development site is not considered critical habitat for the Swift Parrot. Research of this species continues to elicit information that further defines the ecological characteristics and spatial distribution of habitat critical to the survival of the Swift Parrot (Saunders & Tzaros, 2011).

According to the National Recovery Plan for the Swift Parrot (2011) habitat critical to the survival of the Swift Parrot includes areas of priority habitat for which the Swift Parrot has a level of site fidelity or possess phenological characteristics likely to be of importance to the Swift Parrot or are otherwise identified by the recovery.

Swift Parrot prefers winter flowering trees and White Box tends to flower between May and September. Thus, the species may be feeding on the species when spending winters in Australia. White Box, Yellow Box and Blakely's Red Gum woodland are considered favoured feed trees for the swift parrot. However, there is only one record of the species in the area from 2016 and <0.01% of foraging will be impacted, therefore the proposed works are unlikely to adversely affect habitat critical to the survival of this species.

e) Will the action disrupt the breeding cycle of a population?

The Swift Parrot breeds along the east and south-east coast of Tasmania. The breeding cycle of the swift parrot requires nesting habitat, foraging habitat for breeding, post breeding, mainland foraging and roosting (Saunders & Tzaros, 2011). Removal of 3.66 ha and retainment of 24.81 ha of potential foraging woodland vegetation within the proposal area would not disrupt the breeding cycle of this highly mobile species.

f) Will the action modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?

The proposed works would lead to a decrease in availability of potential foraging habitat in the form of White Box, however the extent to be removed is 3.66ha and the amount to be retained within the development site is 24.81a. State vegetation mapping indicates there is approximately 691ha of potential foraging habitat for the Swift Parrot within 1500m radius of the site (the study area). The works would result in the clearance of approximately 0.01% of potential foraging habitat in the study area.

The proposal area would not be utilised for breeding or nesting habitat for the species. Given this, the low percentage of vegetation removal the action would not decrease the availability or quality of habitat to an

An action is likely to have a significant impact on an Endangered or Critically Endangered species if there is a real chance or possibility that it will:

extent that would cause the species to decline.

g) Will the action result in invasive species that are harmful to a Critically Endangered or Endangered species becoming established in the Critically Endangered or Endangered species' habitat?

Swift Parrots can experience competition for food from honeyeaters within altered habitats such as the introduced European Honeybee (*Apis mellifera*). Swift Parrots are likely to be driven out of foraging sites with an abundance of Noisy Miners and Rainbow Lorikeets (aggressive nectar feeders) (Saunders & Tzaros, 2011), however this is considered rather localised and unlikely to be considered harmful to the foraging habitat if the swift parrot.

Additionally, a number of invasive flora species, including Variegated Thistle, have been recorded in the proposal area. The priority weed African Boxthorn (*Lycium ferocissimum*) was also recorded. The proposal has the potential to contribute to the spread of invasive species, mainly through the clearing of vegetation and transfer and introduction of plant material and soil on machinery. Mitigation measures have been recommended to prevent the spread of weeds on site. The proposal would therefore be unlikely to result in invasive species that are harmful to these species becoming established in their potential habitat.

h) Will the action introduce disease that may cause the species to decline?

Psittacine Beak and Feather Disease (PBFD) is considered a potentially significant threat to Swift Parrot. This disease is spread through many species of Australian parrots (Sarker et al, 2013). The proposal is considered unlikely to result in any increase to the likelihood of PBFD occurrence within the development site such that the species is likely to decline.

i) Will the action interfere substantially with the recovery of the species?

The proposal will remove possible mainland foraging habitat for the species. It will remove approximately 37 White Box gum trees which are favoured feeding trees for the species within the development. The development site is not within any important mapped areas or priority management sites for the species (DPE 2022). The proposal will not interfere with the objectives of the National Recovery Plan for the Swift Parrot listed below.

- To identify and prioritise habitats and sites used by the species across its range, on all land tenures.
- To implement management strategies to protect and improve habitats and sites on all land tenures.
- To monitor and manage the incidence of collisions, competition and Beak and Feather Disease (BFD)
- To monitor population trends and distribution throughout the range.

The proposal would not interfere with these objectives.

Conclusion

The impacts of the proposal on the assessed threatened species listed under the EPBC Act are manageable. A significant impact is considered unlikely based on the following conclusions:

- The action would not fragment the population into two or more populations.
- The area of occupancy of this species would not be reduced.
- Works would not lead to a long term decrease in the size of its population.
- The amount of habitat to be removed or disturbed by the proposal will not impact the swift parrot.

An action is likely to have a significant impact on an Endangered or Critically Endangered species if there is a real chance or possibility that it will:
• No known substantial contribution to any key threatening process would be expected.

Appendix C BAM Calculator Credit Reports

Credit reports are valid for 14 days following the report generated date. The BDAR/BCAR must be submitted within this timeframe or new reports generated.

BAM Credit Summary Report

Proposal Details

Assessment Id
00035128/BAAS19078/22/00035129

Proposal Name
Orana BESS

BAM data last updated *
01/02/2023

Assessor Name
Michelle T Patrick

Report Created
29/03/2023

BAM Data version *
57

Assessor Number
BAAS19078

BAM Case Status
Open

Date Finalised
To be finalised

Assessment Revision
1

Assessment Type
Major Projects

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Ecosystem credits

White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion												
1	266_Woodland_Low-Good	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	12.6	12.6	3.7	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	0

2	266_Grassland_Low	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	0.9	0.9	7	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	0
											Subtotal	**0**
											Total	**0**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAII	Species credits

Aprasia parapulchella / Pink-tailed Legless Lizard (Fauna)									
266_Woodland_Low-Good	12.6	12.6	3.4	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Vulnerable	False	22
266_Grassland_Low	0.9	0.9	6.9	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Vulnerable	False	3
								Subtotal	**25**
Tyto novaehollandiae / Masked Owl (Fauna)									
266_Woodland_Low-Good	12.6	12.6	1.9	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	12
266_Grassland_Low	0.9	0.9	3.3	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	1
								Subtotal	**13**

BAM Candidate Species Report

Proposal Details

Assessment Id 00035128/BAAS19078/22/00035129	Proposal Name Orana BESS	BAM data last updated * 01/02/2023
Assessor Name Michelle T Patrick	Report Created 29/03/2023	BAM Data version * 57
Assessor Number BAAS19078	Assessment Type Major Projects	BAM Case Status Open
Assessment Revision 1	Date Finalised To be finalised	

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

List of Species Requiring Survey

Name	Presence	Survey Months
Acacia ausfeldii Ausfeld's Wattle	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Ammobium craspedioides Yass Daisy	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Aprasia parapulchella Pink-tailed Legless Lizard	Yes (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Burhinus grallarius Bush Stone-curlew	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☑ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Callocephalon fimbriatum Gang-gang Cockatoo	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☑ Dec ☐ Survey month outside the specified months?
Calyptorhynchus lathami Glossy Black-Cockatoo	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Euphrasia arguta Euphrasia arguta	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☑ Dec ☐ Survey month outside the specified months?
Grevillea wilkinsonii Tumut Grevillea	No (surveyed) *Survey months are outside of the months specified in Bionet.	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☑ Survey month outside the specified months?
Haliaeetus leucogaster White-bellied Sea-Eagle	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Hieraaetus morphnoides Little Eagle	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Keyacris scurra Key's Matchstick Grasshopper	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☑ Dec ☐ Survey month outside the specified months?
Lophoictinia isura Square-tailed Kite	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Ninox connivens Barking Owl	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☑ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Petaurus norfolcensis Squirrel Glider	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Phascogale tapoatafa Brush-tailed Phascogale	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☑ Dec ☐ Survey month outside the specified months?

Phascolarctos cinereus Koala	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☑ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Polytelis swainsonii Superb Parrot	No (expert report)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Prasophyllum sp. Wybong Prasophyllum sp. Wybong	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Swainsona recta Small Purple-pea	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Swainsona sericea Silky Swainson-pea	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☑ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Synemon plana Golden Sun Moth	No (surveyed) *Survey months are outside of the months specified in Bionet.	☑ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☑ Dec ☑ Survey month outside the specified months?

Tyto novaehollandiae Masked Owl	Yes (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☑ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Threatened species Manually Added

None added

Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Brush-tailed Rock-wallaby	Petrogale penicillata	Habitat constraints
Grey-headed Flying-fox	Pteropus poliocephalus	Habitat constraints
Large Bent-winged Bat	Miniopterus orianae oceanensis	Habitat constraints
Regent Honeyeater	Anthochaera phrygia	Habitat constraints
Squirrel Glider in the Wagga Wagga Local Government Area	Petaurus norfolcensis - endangered population	Refer to BAR
Swift Parrot	Lathamus discolor	Habitat constraints

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00035128/BAAS19078/22/00035129	Orana BESS	01/02/2023
Assessor Name	Report Created	BAM Data version *
Michelle T Patrick	29/03/2023	57
Assessor Number	Assessment Type	BAM Case Status
BAAS19078	Major Projects	Open
Assessment Revision		Date Finalised
1		To be finalised

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.

Common Name	Scientific Name	Vegetation Types(s)
Barking Owl	Ninox connivens	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
Black Falcon	Falco subniger	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
Black-chinned Honeyeater (eastern subspecies)	Melithreptus gularis gularis	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
Corben's Long-eared Bat	Nyctophilus corbeni	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
Diamond Firetail	Stagonopleura guttata	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
Dusky Woodswallow	Artamus cyanopterus cyanopterus	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
Eastern False Pipistrelle	Falsistrellus tasmaniensis	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
Flame Robin	Petroica phoenicea	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion

Gang-gang Cockatoo	Callocephalon fimbriatum	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
Glossy Black-Cockatoo	Calyptorhynchus lathami	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
Grey-crowned Babbler (eastern subspecies)	Pomatostomus temporalis temporalis	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
Grey-headed Flying-fox	Pteropus poliocephalus	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
Hooded Robin (south-eastern form)	Melanodryas cucullata cucullata	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
Large Bent-winged Bat	Miniopterus orianae oceanensis	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
Little Eagle	Hieraaetus morphnoides	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
Little Lorikeet	Glossopsitta pusilla	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
Masked Owl	Tyto novaehollandiae	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
Painted Honeyeater	Grantiella picta	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
Purple-crowned Lorikeet	Glossopsitta porphyrocephala	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
Regent Honeyeater	Anthochaera phrygia	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
Scarlet Robin	Petroica boodang	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
Speckled Warbler	Chthonicola sagittata	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
Spotted Harrier	Circus assimilis	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
Spotted-tailed Quoll	Dasyurus maculatus	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
Square-tailed Kite	Lophoictinia isura	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
Superb Parrot	Polytelis swainsonii	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
Swift Parrot	Lathamus discolor	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion

Turquoise Parrot	Neophema pulchella	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
Varied Sittella	Daphoenositta chrysoptera	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
White-bellied Sea-Eagle	Haliaeetus leucogaster	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
White-throated Needletail	Hirundapus caudacutus	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion

Threatened species Manually Added

None added

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Refer to BAR for detailed justification

Common Name	Scientific Name	Justification in the BAM-C

BAM Vegetation Zones Report

Proposal Details

Assessment Id
00035128/BAAS19078/22/00035129

Assessment name
Orana BESS

BAM data last updated *
01/02/2023

Assessor Name
Michelle T Patrick

Report Created
29/03/2023

BAM Data version *
57

Assessor Number
BAAS19078

Assessment Type
Major Projects

BAM Case Status
Open

Assessment Revision
1

Date Finalised
To be finalised

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
1	266_Woodland_Low-Good	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	Woodland_Low-Good	3.66	2	

2	266_Grassland_Low	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	Grassland_Low	6.96	3	

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00035128/BAAS19078/22/00035129

Proposal Name
Orana BESS

BAM data last updated *
01/02/2023

Assessor Name
Michelle T Patrick

Assessor Number
BAAS19078

BAM Data version *
57

Proponent Names

Report Created
29/03/2023

BAM Case Status
Open

Assessment Revision
1

Assessment Type
Major Projects

Date Finalised
To be finalised

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	Critically Endangered Ecological Community	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
Species		

Nil

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
No Changes

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	10.6	0	0	0

BAM Biodiversity Credit Report (Like for like)

266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	Like-for-like credit retirement options					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654,	-	266_Woodland_Low-Good	Yes	0	Inland Slopes, Bogan-Macquarie, Bondo, Capertee Uplands, Capertee Valley, Crookwell, Hill End, Kerrabee, Lower Slopes, Murray Fans, Murrumbateman, Orange, Pilliga, Talbragar Valley and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698					
	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421,	-	266_Grassland_ Low	No	0	Inland Slopes, Bogan-Macquarie, Bondo, Capertee Uplands, Capertee Valley, Crookwell, Hill End, Kerrabee, Lower Slopes, Murray Fans, Murrumbateman, Orange, Pilliga, Talbragar Valley and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698					

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Aprasia parapulchella / Pink-tailed Legless Lizard	**266_Woodland_Low-Good, 266_Grassland_Low**	10.3	25.00
Tyto novaehollandiae / Masked Owl	**266_Woodland_Low-Good, 266_Grassland_Low**	5.2	13.00

Credit Retirement Options

Like-for-like credit retirement options

Aprasia parapulchella / Pink-tailed Legless Lizard	Spp	IBRA subregion
	Aprasia parapulchella / Pink-tailed Legless Lizard	Any in NSW
Tyto novaehollandiae / Masked Owl	Spp	IBRA subregion
	Tyto novaehollandiae / Masked Owl	Any in NSW

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id
00035128/BAAS19078/22/00035129

Proposal Name
Orana BESS

BAM data last updated *
01/02/2023

Assessor Name
Michelle T Patrick

Assessor Number
BAAS19078

BAM Data version *
57

Proponent Name(s)

Report Created
29/03/2023

BAM Case Status
Open

Assessment Revision
1

Assessment Type
Major Projects

Date Finalised
To be finalised

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	Critically Endangered Ecological Community	266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion

Species
Nil

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
No Changes

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla	10.6	0	0	0.00

266-White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region

	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698	-	266_Woodland_Low-Good	Yes	0	Inland Slopes,Bogan-Macquarie, Bondo, Capertee Uplands, Capertee Valley, Crookwell, Hill End, Kerrabee, Lower Slopes, Murray Fans, Murrumbateman, Orange, Pilliga, Talbragar Valley and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highla This includes PCT's: 74, 75, 83, 250, 266, 267, 268, 270, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 286, 298, 302, 312, 341, 342, 347, 350, 352, 356, 367, 381, 382, 395, 401, 403, 421, 433, 434, 435, 436, 437, 451, 483, 484, 488, 492, 496, 508, 509, 510, 511, 528, 538, 544, 563, 567, 571, 589, 590, 597, 599, 618, 619, 622, 633, 654, 702, 703, 704, 705, 710, 711, 796, 797, 799, 840, 847, 851, 921, 1099, 1103, 1303, 1304, 1307, 1324, 1329, 1330, 1331, 1332, 1333, 1334, 1383, 1401, 1512, 1606, 1608, 1611, 1691, 1693, 1695, 1698	-	266_Grassland_Low	No	0	Inland Slopes,Bogan-Macquarie, Bondo, Capertee Uplands, Capertee Valley, Crookwell, Hill End, Kerrabee, Lower Slopes, Murray Fans, Murrumbateman, Orange, Pilliga, Talbragar Valley and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Variations)

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Aprasia parapulchella / Pink-tailed Legless Lizard	**266_Woodland_Low-Good, 266_Grassland_Low**	10.3	25.00
Tyto novaehollandiae / Masked Owl	**266_Woodland_Low-Good, 266_Grassland_Low**	5.2	13.00

Credit Retirement Options

Like-for-like options

Aprasia parapulchella/ Pink-tailed Legless Lizard	Spp	IBRA region	
	Aprasia parapulchella/Pink-tailed Legless Lizard	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Vulnerable	Inland Slopes, Bogan-Macquarie, Bondo, Capertee Uplands, Capertee Valley, Crookwell, Hill End, Kerrabee, Lower Slopes, Murray Fans, Murrumbateman, Orange, Pilliga, Talbragar Valley and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Tyto novaehollandiae/ Masked Owl	Spp		IBRA region
	Tyto novaehollandiae/Masked Owl		Any in NSW
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Vulnerable	Inland Slopes, Bogan-Macquarie, Bondo, Capertee Uplands, Capertee Valley, Crookwell, Hill End, Kerrabee, Lower Slopes, Murray Fans, Murrumbateman, Orange, Pilliga, Talbragar Valley and Wollemi. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Appendix D Targeted Survey Field Data Sheets

Targeted species	Detected	Incidental Threatened Species	Incidental Non-threatened Species	
			Common Name	Scientific Name
Pink-tailed Legless-lizard	Yes	No	**Amphibian**	
			Green Tree Frog	*Litoria caerulea*
			Reptile	
			Bandy Bandy	*Vermicella annulata*
			Proximus Blind Snake	*Ramphotyphlops proximus*
Nocturnal Fauna surveys:	Masked Owl (*Tyto novaehollandiae*)	Grey-headed Flying-fox (*Pteropus poliocephalus*)	**Aves**	
Masked Owl			Crested Pigeon	*Ocyphaps lophotes*
Barking Owl			Galah	*Eolophus roseicapilla*
Bush-stone Curlew			Kookaburra	*Dacelo novaeguineae*
Squirrel Glider			Nankeen Kestral	*Falcon cenchroides*
Koala			Noisy miner	*Manorina melanocephala*
			Southern Boobook	*Ninox boobook*
			Superb Parrot	*Polytelis swainsonii*
			Tawny Frogmouth	*Podargus strigoides*
			Mammals	
			Brushtail Possum	*Trichosurus vulpecula*
			Grey-headed Flying Fox	*Pteropus poliocephalus*
			House Mouse	*Mus musculus*
			Fox	*Vulpes vulpes*
Diurnal HBT and SAT surveys:	No	Turquoise Parrot (*Neophema pulchella*)		
Koala				

Targeted species	Detected	Incidental Threatened Species	Incidental Non-threatened Species	
			Common Name	Scientific Name
Diurnal bird Surveys:	Superb Parrot (*Polytelis swainsonii*)	Diamond Firetail (*Stagonopleura guttata*)	**Aves**	
Superb Parrot, White-bellied Sea-eagle, Little Eagle, Square-tailed Kite,Gang-gang Cockatoo			Australian King-Parrot	*Alisterus scapularis*
			Australian Magpie	*Gymnorhina tibicen*
			Australian Raven	*Corvus coronoides*
			Australian Wood Duck	*Chenonetta jubata*
			Black-faced Cuckooshrike	*Coracina novaehollandiae*
			Black-shouldered Kite	*Elanus axillaris*
			Blue Bonnet	*Northiella sp*
			Brown Songlark	*Megalurus cruralis*
			Cicadabird	*Coracina tenuirostris*
			Cockatiel	*Nymphicus hollandicus*
			Common Starling	*Sturnus vulgaris*
			Crested Pigeon	*Ocyphaps lophotes*
			Eastern Rosella	*Platycercus eximius*
			Galah	*Eolophus roseicapilla*
			Grey Butcherbird	*Cracticus torquatus*
			Kookaburras	*Dacelo novaeguineae*
			Little Corella	*Cacatua sanguinea*
			Magpie-lark	*Grallina cyanoleuca*
			Masked Lapwing	*Vanellus miles*
			Nankeen Kestral	*Nankeen Kestral*

Targeted species	Detected	Incidental Threatened Species	Incidental Non-threatened Species	
			Common Name	Scientific Name
			Noisy miner	*Manorina melanocephala*
			Pied Butcherbird	*Cracticus nigrogularis*
			Red-rumped Parrot	*Psephotus haematonotus*
			Striated Pardalote	*Pardalotus striatus*
			Stubble Quail	*Coturnix pectoralis*
			Sulphur-crested Cockatoo	*Cacatua galerita*
			Superb Fairy-wren	*Malurus cyaneus*
			Superb Parrot	*Polytelis swainsonii*
			Wedge-tailed Eagle	*Aquila audax*
			White-plumed Honeyeater	*Lichenostomus penicillatus*
			Willie Wagtail	*Rhipidura leucophrys*
			Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*
			Mammals	
			Brown Hare	*Lepus europaeus*
			Eastern Grey Kangaroo	*Macropus giganteus*
Golden Sun Moth	No	No	**Butterflies**	
			William Kershaw's Painted Lady	*William Kershaw's Painted Lady*
			Common Grass Blue	*Zizina labradus*
			Gossamer-winged butterfly	*Lycaenidae sp*
Key's Matchstick Grasshopper	No	No	**Grasshopper**	
			Giant Green Slantface Grasshopper	*Acrida conica*
Brush-tailed Phascogale	No	No	**Aves**	
			Noisy miner	*Manorina melanocephala*
			Galah	*Eolophus roseicapilla*

Targeted species	Detected	Incidental Threatened Species	Incidental Non-threatened Species	
			Common Name	Scientific Name
			Eastern Rosella	*Platycercus eximius*
			Black shouldered Kite	*Elanus axillaris*
			Australian Raven	*Corvus coronoides*
			Butcher Bird	*Cracticus torquatus*
			Starling	*Sturnus vulgaris*
			Mammals	
			House Mouse	*Mus musculus*
			Tree Goanna	*Varius varius*
			Fox	*Vulpes vulpes*
			Eastern Grey Kangaroo	*Macropus giganteus*
Flora:	No	No	**Reptile**	
Small purple-pea, Silky swainsona pea, Yass Daisy, Tumut Grevillea, Ausfelds Wattle, Prasophyll um sp. Wybong,			Brown Snake	*Pseudonaja textilis*
Euphrasia arguta			No threatened plants recorded	

Appendix E Hollow Bearing Tree Clearance Protocol

This guideline provides instruction on how to remove Hollow Bearing Trees (HBTs) in a way that minimises the impacts on fauna inhabiting trees and includes;

- Optimum timing for tree removal to minimise impacts on hollow-dependant fauna.
- Detailed information about felling hollow bearing trees (staged felling protocol).

Pre-clearing survey

1. Prior to works commencing (no more than 14 days), a fauna spotter[2] /ecologist must undertake a site inspection to clearly mark and identify all hollow bearing trees (HBT). All trees should be marked to define what will be removed/retained.
2. Fencing to be installed to define the construction footprint including laydown and storage areas based on an approved development footprint. The field ecologist must inspect the fencing as part of the pre-clear surveys to ensure no indirect impacts to surrounding vegetation
3. Each HBT to be removed must have the following recorded - number of hollows, hollow size, photographs and fauna activity.
4. If Masked Owls is determined to be present, the masked owl protocol must be implemented.
5. To minimise impacts on birds and mammals, is recommended that clearance works occur in summer to autumn to minimise impacts on breeding season for birds and mammals.
6. Prior to clearance, all known hollows must be individually inspected for occupancy and current use. This would require a pole mounted inspection camera or support from an arborist on an Elevated Work Platform. If hollows are found to be occupied, then a plan for how to minimise impacts to the fauna would be prepared (by the fauna spotter/ecologist) specific to the species and its lifecycle and implemented prior to tree removal commencement.
7. A fauna spotter/ecologist will undertake a visual inspection of all hollows and habitat features within 24 hours of clearing to identify resident fauna species that might require relocation.
8. Contact veterinarian/wildlife carers in the area prior to clearing starting. At least one must confirm to be willing to accept wildlife if orphaned or injured fauna are encountered.
9. The fauna spotter/ecologist must assess the surrounding area for alternative hollows suitable for fauna relocation. If these are not present then nest boxes should made available, and if fauna detected, installed so that mobile hollow dependent fauna have alternative locations to relocate. Nest boxes should be installed within 100m of the tree removal site and must be suitably sized and designed to accommodate the species of concern[3].

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[2] The 'fauna spotter'/ ecologist must be trained and experienced in handling fauna, , and recognise fauna species and required habitats. If handling microbats the spotter/ ecologist must be appropriately vaccinated.

[3] Common Brushtail Possum are the most common species encountered in tree removal, therefore this sized nest box should be made available as a minimum if no suitable hollows exist within 100m. If other species are encountered, then alternative nest boxes must be sourced.

Clearing of habitat features

1. The fauna spotter/ecologist must have appropriate catching, handling and housing equipment present on site in the event of the need to detain fauna. This includes enclosures suitable for common and suspected threatened species of varying needs and sizes. Housing and transport of wildlife must be in accordance with the Code of Practice for Injured, Sick and Orphaned Protected Fauna: https://www.environment.nsw.gov.au/research-and-publications/publications-search/code-of-practice-for-injured-sick-and-orphaned-protected-faunaRemove non- habitat adjacent trees and understorey (if applicable) 24-48hours prior to the felling of the habitat trees. Ensure that entire area within drop radius of habitat tree cleared of debris.
2. Prior to clearing hollow-bearing trees, use an excavator (preferable) or loader to hit the trunk as high up the tree as possible several times. Wait at least 30 seconds. Repeat this process several times. The use of machinery noise can also encourage any resident fauna to vacate the tree. These disturbance actions are best performed at the end of the day to encourage nocturnal species to relocate overnight. The tree is to be left overnight (at a minimum) before being removed. Any HBT that has been left for longer than 48 hours since being shaken/tapped, is to be re-shaken/tapped at least the day prior to removal.
3. When removing hollow-bearing trees, a fauna spotter/ecologist should be present at each tree to be removed to look for signs of animal movement in the tree to be cleared. The fauna spotter should be able to communicate directly with plant operators, ideally utilising a UHF radio. If an excavator or large machinery (as opposed to a chain saw) is used to clear hollow bearing trees, an inspection of each hollow must be undertaken by the fauna spotter/ecologist prior to commencement of clearing even if tapping has occurred the night before.
4. The excavator or equivalent machinery operator will slowly lower HBT trees. HBTs must not be pushed and left to fall under their own weight as this can cause direct injury or death to resident fauna.
5. If taking the tree down in stages, remove non-hollow-bearing limbs first. Then remove hollow-bearing limbs
6. Once the hollow-bearing limbs or hollow-bearing tree are on the ground, the fauna spotter/ecologist must check each hollow for signs of wildlife before the next limb/tree is removed. Remove any fauna into a handling bag or suitable secure housing. The fauna spotter will release any adult uninjured fauna into the designated release area (a distance of ~50m outside the clearing footprint at the appropriate time of day for the species.
7. Where practical, relocate fauna in their hollow by relocating entire hollow sections to areas of retained vegetation.
8. If dependent young or injured fauna are discovered following or during tree felling then fauna must be delivered to a licensed wildlife carer or veterinarian (previously notified of the works).
9. Records of any animals removed or injured must be retained.
10. Once felling, if uninjured fauna is detected within the felled tree and the hollow is in good condition, the fallen tree will be marked and left in situ over night to allow the fauna to self-relocate. The following day fallen trees would be left in place or moved to a nearby area to retain fauna habitat once the fauna has relocated.

Clearing timing

1. During summer/hot days (greater than 30°C), HBT are left in situ until the end of the day, so any captured animals are not subjected to heat stress before release. Wildlife is not to be held in a vehicle on hot days, unless the engine and air conditioning is on.

Handling wildlife

1. Direct contact with any wildlife should be avoided wherever possible. Wildlife should be encouraged to leave hollows through controlled disturbance as detailed above.
2. Any uninjured wildlife that does not include dependent young (unless in the company of its healthy parent) must be encouraged to leave the development site.
3. If wildlife is injured, WIRES or similarly qualified and licensed Wildlife care organisation should be contacted to collect and treat any injured or orphaned individuals. This organisation would be notified of the tree removal works, prior to works commencing.
4. No handling of microbats unless trained and vaccinated for Australian Bat Lyssavirus with current titre levels.

Clearing during June to January

1. Should clearing of hollow-bearing trees be required during the breeding or hibernation periods of threatened species, consultation is to be undertaken with local wildlife carers and/or specialist carers for those faunal groups (e.g. microbats, parrots). Confirmation is to be sought from these groups that they would accept rescued fauna.
2. Should inspections identify threatened parrots attending hollows, a detailed assessment is to be undertaken of their activity within the hollow. If investigating only, clearing may proceed with the above measures employed. Where parrots are actively building nests (i.e. bringing material to hollows), it is recommended that clearing be postponed until fledging. Where parrots are attending eggs, it is recommended that clearing be postponed until fledging. Where parrots are attending young, it is recommended that clearing be postponed until fledging.
3. Hibernating microbats are likely to occur throughout the winter months, and bats in torpor may occur year-round. Where it is considered highly likely that microbats would be in hibernation, it is recommended that supervised clearing occur, and that recovered bats are relocated to a dedicated bat carer to ensure they are sufficiently fed throughout the remainder of winter, prior to release back to the site in spring. The removal of bats from hibernation puts excessive stress on their fat reserves, which may be depleted prior to them being able to forage effectively in spring, thus intervention is recommended.

Appendix F Staff qualifications and experience

Name	Title	Qualifications Experience	Role in BAR
Michelle Patrick	Technical Lead	Masters of Environment Degree of Technology (Natural Resource Management) Ecology experience - 15 years	Technical Lead Accredited BAM assessor and Author Field Ecologist
Clare Vincent	Ecologist	Graduate Diploma in Environmental Management Bachelor of Science (Environmental Management and Ecology) Ecology experience – 3 years	BAM Contributor Lead field Ecologist
Lisa Hamilton	Reginal Manager - Biodiversity	Bachelor of Environmental Science (Management) Ecology experience – 6 years	Accredited BAM assessor Field ecologist
Zack Renner	Ecologist	Bachelor of Science (Conservation Biology and Zoology) Ecology experience – 2 years	Field ecologist
Aleksei Atkin	Field Ecologist	Master of Wildlife Management Bachelor of Natural Science (Nature Conservation) Ecology experience – 12 years	Field ecologist
Dylan Roberston	Graduate Ecologist	Bachelor of Animal	Field ecologist

Name	Title	Qualifications Experience	Role in BAR
		Science, Honours Ecology experience – 1 year	
Michael Cleland	Graduate Ecologist	Bachelor of Environmental Science and Management, Honours Ecology experience – 4 years	Field ecologist

Appendix G Consultation with BCD and Species Experts

Personnel/Agency	Targeted Species	Date of Consultation/Meeting	Outcome
BCD Meeting	Keys Matchstick Grasshopper Golden Sun Moth Brush-tailed Phascogale Large Bent Winged Bat Superb Parrot Brush-tailed Rock-wallaby	Meeting (11/10/2022) to discuss survey methods Keys Matchstick Grasshopper, Golden Sun Moth and Brush-tailed Phascogale Email confirming Brush-tailed Phascogale survey method= 25 October 2022 Email BCD expert feedback for Superb Parrot breeding 27th of October 2022 Email feedback for excluding Large Bent Winged Bat 27th of October 2022	Confirmation further surveys were required: • Brush-tailed Phascogale • Keys Matchstick Grasshopper • Golden Sun Moth Confirmation the following species can be excluded: • Large Bent Winged Bat • Brush-tailed Rock-wallaby Confirm survey methods: • Brush-tailed Phascogale • Keys Matchstick Grasshopper • Golden Sun Moth BCD expert: • Superb Parrot not likely breeding in area. No species credits required.
Professor Michael Kearney	Keys Matchstick Grasshopper	13 and 20 December 2022	Species **confirmed** to be absent on site
Dr Damian Michael	Pink-tailed Legless-lizard	5 October 2022	Species **confirmed** to be present on site