Appendix E

Revised Biodiversity Development Assessment Report (BDAR)

EMM
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Birriwa Solar and Battery Project Modification

Biodiversity Development Assessment Report

Prepared for ACEN Australia Pty Ltd

December 2025

Birriwa Solar and Battery Project Modification

Biodiversity Development Assessment Report

ACEN Australia Pty Ltd

E240117 RP#2

December 2025

Version	Date	Prepared by	Reviewed by	Comments
V1	31 March 2025	Luke O'Brien Louise Neville	Pip Fagan Rachel Dodd Nicole Armit	Draft for ACEN review
V2	30 April 2025	Luke O'Brien Louise Neville	Rachel Dodd Joshua Smart	Draft for ACEN review
V3	5 June 2025	Luke O'Brien Madeleine Hunt	Joshua Smart Rachel Dodd Nicole Armit	Final
V4	20 August 2025	Luke O'Brien	Rachel Dodd	Final Finalised BAM-C and BDAR certification
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V6	17 December 2025	Katie Diver Louise Neville Joshua Smart	Nicole Armit Rachel Dodd	Final

Approved by

Josh Smart
Senior Ecologist
17 December 2025
Level 3 175 Scott Street
Newcastle NSW 2300
ABN: 28 141 736 558

BDAR declaration

Certification under clause 6.15 Biodiversity Conservation Act 2016 and conflict of interest

I certify that this report has been prepared based on the requirements of, and information provided under, the Biodiversity Assessment Method and clause 6.15 of the *Biodiversity Conservation Act 2016* (BC Act).

Josh Smart

Date: 17 December 2025

BAM Assessor Accreditation no: BAAS23005

This Biodiversity Development Assessment Report (BDAR) has been prepared to meet the requirements of BAM 2020.

Actual, perceived or potential conflict of interest

It is noted that EMM is engaged to undertake work for both development and conservation (Stewardship) clients. There is the potential for actual, perceived or potential conflicts of Interest. This section discloses relevant information known at the time of preparation of this report to such considerations.

- EMM staff or relatives involved in the preparation of this report do not own, and were not aware of any other EMM staff or relative holding or having interests in Stewardship sites or any of the biodiversity credits identified as being required in this report.
- There were no debts to the client or associates of the client.
- There were no known potential conflicts of interest between the client for this report or with another client of EMM.

Details and experience of author/s and contributors

In this report an assessment of the biodiversity values and impacts associated with the proposal have been undertaken in accordance with the Biodiversity Assessment Method 2020 (DPIE 2020a). The BDAR has been prepared by accredited assessor Josh Smart (BAAS23005). Several staff from EMM and EcoLogical Australia contributed to fieldwork and data collection as identified in the following table.

Contributors to the BDAR

Personnel	Position	Tasks carried out
Josh Smart	Senior Ecologist Accredited Assessor (BAAS23005)	Technical review
Louise Neville	Professional Ecologist	BDAR reporting, targeted threatened flora survey, vegetation mapping, BAM plots
Katie Diver	Associate Director, Technical Lead – Ecology Accredited Assessor (BAAS17073)	Assistance with BDAR preparation and review
Luke O'Brien	Senior Ecologist Accredited Assessor (BAAS22017)	BDAR report preparation, BAM calculations, vegetation mapping, undertake BAM plot survey, targeted threated flora survey and certification of BDAR
Philippa Fagan	Associate Ecologist Accredited Assessor (BAAS18117)	Vegetation mapping, undertake BAM plot survey, targeted threated flora survey
Louise Neville	Professional Ecologist	BDAR reporting, targeted threatened flora survey
Madeleine Hunt	Professional Ecologist	Undertake BAM plot survey, targeted threated flora survey, BDAR reporting
Luke Haeusler	Graduate Ecologist	Undertake BAM plot survey, targeted threated flora survey
Dallas Milburn	Principal consultant (Coolburn)	Owl surveys
Fidelma Gurnett Eva Harling Kimberley Warren	GIS Analyst	Undertake GIS mapping and calculations
Dr. Cheryl O'Dwyer	Principal Ecologist (ELA)	Birriwa Bus Route South biodiversity assessment and fieldwork
Lachlan Metzler	Senior Ecologist (ELA)	Birriwa Bus Route South biodiversity assessment and fieldwork
Janene Devereux	Associate Ecologist (ELA)	Birriwa Bus Route South biodiversity assessment and fieldwork
Kalya Abbey	Principal Environmental Consultant (ELA)	Birriwa Bus Route South biodiversity assessment and fieldwork

Executive Summary

ES1 Project description

ACEN Australia Pty Ltd (ACEN) has approval to develop the Birriwa Solar and Battery Project, a large scale solar photovoltaic (PV) electricity generation facility along with battery storage and associated infrastructure, including the construction of a temporary accommodation facility (the project). The solar component of the project will have an indicative capacity of around 600 megawatts (MW) and will include a centralised battery energy storage system (BESS) of up to 600 MW for a two-hour duration (1,200 MWh). The project (SSD-29508870) was determined and approved on 16 August 2024 by the NSW Independent Planning Commission, with development consent conditions.

The project site is approximately 15 kilometres (km) south-east of Dunedoo, in the Central-West Orana (CWO) region of New South Wales (NSW), in the localities of Birriwa and Merotherie (refer to Figure 1.1). It is situated within the Mid-Western Regional Local Government Area (LGA). Part of the transport access route to the project site via the Castlereagh Highway is situated within the Warrumbungle Shire LGA. The project is within the CWO Renewable Energy Zone (REZ).

ACEN is seeking approval to modify development consent SSD-29508870 to include additional lots in the project area, an alternative access route and upgrades to a section of the Birriwa Bus Route South (BBRS) Road, an increase in the capacity of the approved temporary accommodation facility and an increase in the storage capacity and duration of the BESS (the modification).

EMM undertook the fieldwork relating to the additional lots, while all fieldwork for the BBRS was undertaken by Ecological Australia Pty Ltd (ELA). ELA has provided their field and spatial data to EMM for incorporation into this BDAR, in response to Conservation Programs, Heritage and Regulation's (CPHRs) request.

A Modification Submissions Report has been prepared to support the application to modify SSD-29508870 (EMM 2025). This Biodiversity Development Assessment Report (BDAR) forms part of the Modification Submissions Report.

ES2 Landscape features

The subject land is within the NSW South Western Slopes Interim Biogeographic Regionalisation for Australia (IBRA) bioregion and the Inland Slopes IBRA subregion. The Talbragar – Upper Macquarie Terrace Sands and Gravels NSW (Mitchell) Landscape makes up much of the subject land and was therefore the landscape used in this assessment. A large area of Cope Hill Granite (Mitchell) Landscape is mapped within the eastern and southern extent of the broader 1,500 metre (m) assessment area for the additional lots, which contains the linear assessment area relating to the BBRS.

Smaller occurrences of additional NSW (Mitchell) Landscapes also within the assessment area include:

- Liverpool Range Valleys and Footslopes
- Goonoo Slopes.

Native vegetation within the assessment area is highly fragmented, occurring in isolated patches surrounded by a matrix of agricultural land. Scattered tree corridors occur along the western boundary and the degraded creek lines of the subject land.

Areas of geological significance in the surrounding landscape include karsts, caves, crevices, cliffs, rocks and other geological features of significance as outlined in section 3.1.3 of the BAM (DPIE 2020). A ridgeline occurs within the assessment area which is likely to have areas of geological significance such as crevices and geological habitat. This ridge line is associated with the higher slopes to the south of the subject land but will not be directly impacted by the modification.

The percentage of native vegetation within the 1,500 m assessment area was estimated at approximately 12%, based on the NSW State Vegetation Type Map (SVTM), and aerial imagery. Due the sheer historical land clearing within the landscape and the inability to inspect all non-woody areas to determine if native species form the majority, the patch size was conservatively assumed to be 101 hectares (ha) for all vegetation zone mapped within the additional lots as a more substantial inclusion approach to threatened species assessment.

For the BBRS, a 500 m assessment area was established due to the linear development type, with an estimated 11% based on the SVTM, along with aerial imagery. EMM has conducted the same conservative approach applied to the BAM-C case to ensure a consistent approach and to include any cryptic threatened species.

ES3 Native vegetation

Vegetation within the subject land is consistent with regional vegetation mapping with areas dominated by exotic vegetation and pasture, and low-quality native grassland. All vegetation within the subject land has been impacted by past land use, particularly from ongoing grazing, with the grasslands supporting limited native species cover and diversity. Remnant vegetation is restricted to small patches, isolated paddock trees and scattered vegetated corridors consisting of Blakely's Red Gum (*Eucalyptus blakelyi*) and Rough-barked Apple (*Angophora floribunda*).

Two native plant community types (PCT) occur within the subject land, comprising the additional lots and BBRS:

- PCT 277 – Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion
- PCT 281 – Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion *derived native grassland.*

Each PCT within the subject land is present in both a derived native grassland (DNG) form and woodland form.

Both PCTs within the subject land meet the criteria for inclusion as the following *NSW Biodiversity Conservation Act 2016* (BC Act) listed Threatened Ecological Community (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 Bioregions (Critically Endangered).

In addition, White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (also known as Box Gum Woodland) is a candidate entity for Serious and Irreversible Impacts (SAII).

ES4 Threatened species

Habitat assessments within the subject land concluded that targeted surveys were required for nine flora species and sixteen fauna species. No candidate flora species were recorded during targeted surveys. Two candidate fauna species, Southern Myotis (*Myotis macropus*) and Masked Owl (*Tyto novaehollandiae*), were recorded within the subject land. A further two bat species, namely Eastern Cave Bat (*Vespadelus troughtoni*) and Large-eared Pied Bat (*Chalinolobus dwyeri*) were potentially recorded on a bat detector and have been conservatively assumed as present.

ES5 Aquatic and riparian biodiversity

The waterways within the subject land and assessment area largely lack riparian vegetation which may support aquatic and terrestrial species. These waterways have been highly altered and degraded, with numerous online dams primarily providing water for livestock. These dams lack riparian vegetation and have high turbidity and sediment load due to stock access. Where waterways are connected within the subject land, a highly eroded gully occurs due to the apparent sandy substrate associated with the landscape. These gullies are very shallow and are disconnected by man-made weirs and roads and are typically dry during low rainfall periods.

White Creek is mapped as Key Fish Habitat (KFH) and is also mapped within the freshwater threatened species distribution for the Southern Purple-Spotted Gudgeon (*Mogurnda adspersa*) (DPI 2021).

No nationally important or RAMSAR wetlands have been mapped within the subject land or are located within the locality.

ES6 Impact avoidance, minimisation and mitigation

The modification will result in direct and indirect impacts. Measures to avoid and minimise impacts to vegetation were considered during the project refinement process, resulting in impact avoidance and minimisation on biodiversity values.

In addition, a key design principle within the project refinement process has been to maximise the placement of project infrastructure in cleared areas of lower biodiversity value and, wherever possible, limit impacts to native vegetation of low quality only. Areas known to be of moderate or high condition native vegetation have been avoided as much as possible, including native vegetation along existing road verges.

A larger study area was assessed for the BBRS to inform placement of the disturbance footprint such that impacts on threatened ecological communities and hollow-dependent fauna were avoided and minimised. Consultation with Mid Western Regional Council will continue to look for opportunities for further avoidance and minimisation on these biodiversity values through detailed design.

Residual impacts to biodiversity values will be mitigated through a detailed mitigation strategy and uncertain/prescribed impacts through an adaptive management strategy. These strategies will be detailed in the Biodiversity Management Plan to be prepared prior to construction for the modification.

ES7 Impact assessment

After avoidance and minimisation, the modified project will have the residual impacts listed in Table ES1.

Table ES1 Summary of impacts – modified BDAR

Entity	Additional lots (ha)	BBRS (ha)	Subject land (ha)
PCT 277 DNG	-	0.72	0.72
PCT 277 woodland	-	0.57	0.57
PCT 281 DNG	68.96	0.18	69.14
PCT 281 woodland	0.35	1.38	1.73
Eastern Cave Bat	43.96	-	43.96
Large-eared Pied Bat	43.96	-	43.96
Masked Owl	0.11	1.03	1.14
Southern Myotis	53.17	1.85	55.02

ES8 Assessment of impacts under other relevant biodiversity legislation

ES8.1 Environment Protection and Biodiversity Conservation Act 1999

PCTs 277 and 281 are associated with White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community, listed as a critically endangered ecological community under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The occurrences of PCT 277 and PCT 281 within the subject land do not conform to the EPBC listing of the TEC (Section 7).

No EPBC Act listed flora or fauna species were recorded within the subject land. Seven EPBC Act listed fauna species were assessed as having the potential to occur within the subject land; namely:

- Regent Honeyeater (*Anthochaera phrygia*)
- Fork-tailed Swift (*Apus pacificus*)
- Large-eared Pied Bat (*Chalinolobus dwyeri*)
- Brown Treecreeper (*Climacteris picumnus*)
- White-throated Needletail (*Hirundapus caudacutus*)
- Corben's Long-eared Bat (*Nyctophilus corbeni*)
- Diamond Firetail (*Stagnopleura guttata*).

Assessments in accordance with the *Matters of National Environmental Significance – Significant Impact Guidelines 1.1* (DoE 2013) concluded that the modification is unlikely to result in a significant impact on the above listed Matters of National Environmental Significance (MNES).

ES9 Biodiversity impacts and offsets

To compensate for impacts on native vegetation and species habitat, the biodiversity credits listed in Table ES2 are required.

Table ES2 Biodiversity credits required

Entity	Impacts (ha)			Credits required to offset impacts		
	Additional lots	BBRS	Subject land	Additional lots	BBRS	Subject land
PCT 277 DNG	0	0.72	0.72	0	16	16
PCT 277 woodland	0	0.57	0.57	0	15	15
PCT 281 DNG	68.96	0.18	69.14	778	9	787
PCT 281 woodland	0.35	1.38	1.73	9	48	57
Eastern Cave Bat	43.16	0	43.16	585	0	585
Large-eared Pied Bat	43.16	0	43.16	585	0	585
Masked Owl	0.11	1.03	1.14	2	28	30
Southern Myotis	53.17	1.85	55.02	480	43	523

Exotic planted trees and exotic pasture within the subject land does not require offsetting as the vegetation integrity (VI) score of this zone falls below the offset threshold under the BAM (DPIE 2020). Additional areas which do not require offsetting include existing cleared access tracks and watercourses, both of which occur within the subject land.

TABLE OF CONTENTS

Appendices

Tables

Figures

Photographs

1 Introduction

1.1 Background

ACEN Australia Pty Ltd (ACEN) has approval to develop the Birriwa Solar and Battery Project, a large scale solar photovoltaic (PV) electricity generation facility along with battery storage and associated infrastructure, including the construction of a temporary accommodation facility (the project). The solar component of the project will have an indicative capacity of around 600 megawatts (MW) and will include a centralised battery energy storage system (BESS) of up to 600 MW for a two-hour duration (1,200 MWh). The project (SSD-29508870) was determined and approved on 16 August 2024 by the NSW Independent Planning Commission, with development consent conditions.

The project site is approximately 15 kilometres (km) south-east of Dunedoo, in the Central-West Orana (CWO) region of New South Wales (NSW), in the localities of Birriwa and Merotherie (refer to Figure 1.1). It is situated within the Mid-Western Regional Local Government Area (LGA). Part of the transport access route to the project site via the Castlereagh Highway is situated within the Warrumbungle Shire LGA. The project is within the CWO Renewable Energy Zone (REZ).

ACEN is seeking approval to modify development consent SSD-29508870 to include additional lots, an alternative access route and upgrade to part of the Birriwa Bus Route South (BBRS) Road, an increase in capacity of the approved temporary accommodation facility, and an increase in the storage capacity and duration of the BESS (the modification).

A Modification Report (EMM 2025) and a Modification Submissions Report has been prepared to support the application to modify SSD-29508870. This revised Biodiversity Development Assessment Report (BDAR) forms part of the application.

1.2 Approved project overview

The approved project comprises the following key components and is shown on Figure 1.2:

- installation of approximately 1 million solar PV panels and associated mounting infrastructure
- a BESS with a capacity of up to 600 MW and a storage duration of up to 2 hours (1,200 MWh)
- an on-site substation with a connection voltage of up to 500 kilovolts (kV)
- electrical collection and conversion systems, including inverter and transformer units, switchyard, control room and staff car park
- underground and aboveground cables
- an operational infrastructure area, including demountable and permanent offices, amenities, and equipment sheds
- internal access roads
- a temporary construction compound (during construction and decommissioning phases)
- an access route upgrade from Castlereagh Highway to the project site via Barneys Reef Road and BBRS
- a temporary accommodation facility to provide accommodation for up to 500 construction staff during the construction phase of the project

- an emergency access track providing alternative access to the accommodation facility, suitable for emergency vehicles.

1.3 Proposed modifications

ACEN is seeking to modify SSD-29508870, pursuant to section 4.55(2) of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) to:

- Increase the project area and development footprint to include three additional lots (Lot 11/DP 750755, Lot 40/DP 750755, Lot 60/DP 750755) and the remaining part of Lot 34/DP 750755, allowing for additional land to be used for solar generation, BESS, and associated ancillary infrastructure, as needed. Modifying the project area and development footprint across additional neighbouring lots will enable flexibility in design and construction, optimisation of the solar array and BESS layout, and will allow sufficient space for maintenance.

- Increase the storage capacity and duration of the BESS from up to 600 MW for a two-hour duration up to 900 MW for a four-hour duration. The additional capacity will allow the project to increase its energy storage potential, providing additional firming support and greater network system strength.

- Increase the project area and development footprint to allow for an upgrade to part of the existing BBRS Road from the Golden Highway via Merotherie Road, for use as an alternative access route. It also includes a public road crossing along BBRS to allow construction and operation traffic to access different areas of the project with limited impacts on BBRS. This upgrade will enable access to the project for the purpose of constructing and operating the approved temporary accommodation facility, as well as the BESS. Oversize over-mass vehicles will continue to access the project area, via the approved primary access point (i.e. Castlereagh Highway-Barneys Reef Road-Birriwa Bus Route South).

- Increase the approved project's accommodation facility capacity from 500 workers to 650 workers, within the approved accommodation footprint (up to an additional 150 workers will reside at the accommodation facility in peak construction periods).

- Amend the schedule of lands to include three additional neighbouring lots.

- Increase the total number of daily vehicle movements to and from the site during pre-construction and construction, from 120 to 156 daily heavy vehicle trips, split between the approved access via Barneys Reef Road and the proposed alternative access via Merotherie Road. Correction of wording errors in the consent conditions from "vehicle movements" to "vehicle trips".

1.4 Site description

The project is on Wiradjuri Country, in the localities of Birriwa and Merotherie, approximately 15 km south-east of the township of Dunedoo, in the Central West of New South Wales (NSW) (Figure 1.1).

The approved project area will be extended to accommodate the modification area (Figure 1.1), which will encompass an area of approximately 257 ha, comprised of three freehold land parcels (Figure 1.2) and one partial freehold land parcel, adjacent to the approved project area (Figure 1.2). A portion of the road corridor of BBRS is also contained within the modification area and is managed by Mid-Western Regional Council. The lots within the modification area are zoned RU1 Primary Production under the *Mid-Western Regional Local Environmental Plan 2012* (Mid-Western LEP). The additional lots/DPs and their land ownership status are provided in Table 1.1.

Table 1.1 Lots/DPs and land ownership within the subject land

Lot/DP	Land owner
11/DP750755	Private
40/DP750755	Private
60/DP750755	Private
34/DP750755[1]	Private (existing landowner to the approved project)
Birriwa Bus Route South (via Merotherie Road)	Managed by Mid-Western Regional Council

Notes: [1]Partial lot

Land surrounding the modification area is characterised by flat to gently undulating cleared land with scattered rural residences and agricultural buildings and infrastructure (e.g. silos and livestock yards). Areas of native vegetation occur within and surrounding the study area in the form of scattered paddock trees, vegetation along local roads, creek lines and windbreaks. The properties within the study area are currently primarily used for sheep and cattle grazing as well as low intensity dry land cropping.

During the preparation of this BDAR, the subject land has been refined based on environmental constraints identification (namely areas of biodiversity value) and consideration of the project infrastructure layout with the objective of maintaining an efficient project that avoids and minimises environmental impacts. The modified layout was determined as suitable following seasonal targeted biodiversity surveys and the completion of floristic plots.

1.5 Report purpose and assessment requirements

This BDAR provides an assessment of the potential biodiversity impacts associated with the proposed modification, including assessment by an accredited assessor in accordance with the Biodiversity Assessment Method (BAM) (DPE 2020).

This BDAR has been prepared to accompany the Birriwa Solar and Battery Project - Modification Submissions Report (hereafter referred to as the Modification Submissions Report) with the specific objectives to:

- describe biodiversity values of the subject land
- assess the likelihood that threatened species and communities (threatened biodiversity) listed under relevant the *NSW Biodiversity Conservation Act 2016* (BC Act), *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the *NSW Fisheries Management Act 1994* (FM Act) could occur in the subject land
- document the strategies implemented to avoid and/or minimise impacts of the project on threatened biodiversity
- assess residual threatened biodiversity impacts, after avoidance and minimisation strategies have been implemented
- provide environmental safeguards to mitigate threatened biodiversity impacts during construction and operation.

EMM Consulting Pty Limited (EMM) has conducted the necessary biodiversity assessments required under the Biodiversity Offset Scheme (BOS) to assess impacts of the modification under the BC Act, FM Act and the EPBC Act.

1.5.1 Assessment approach

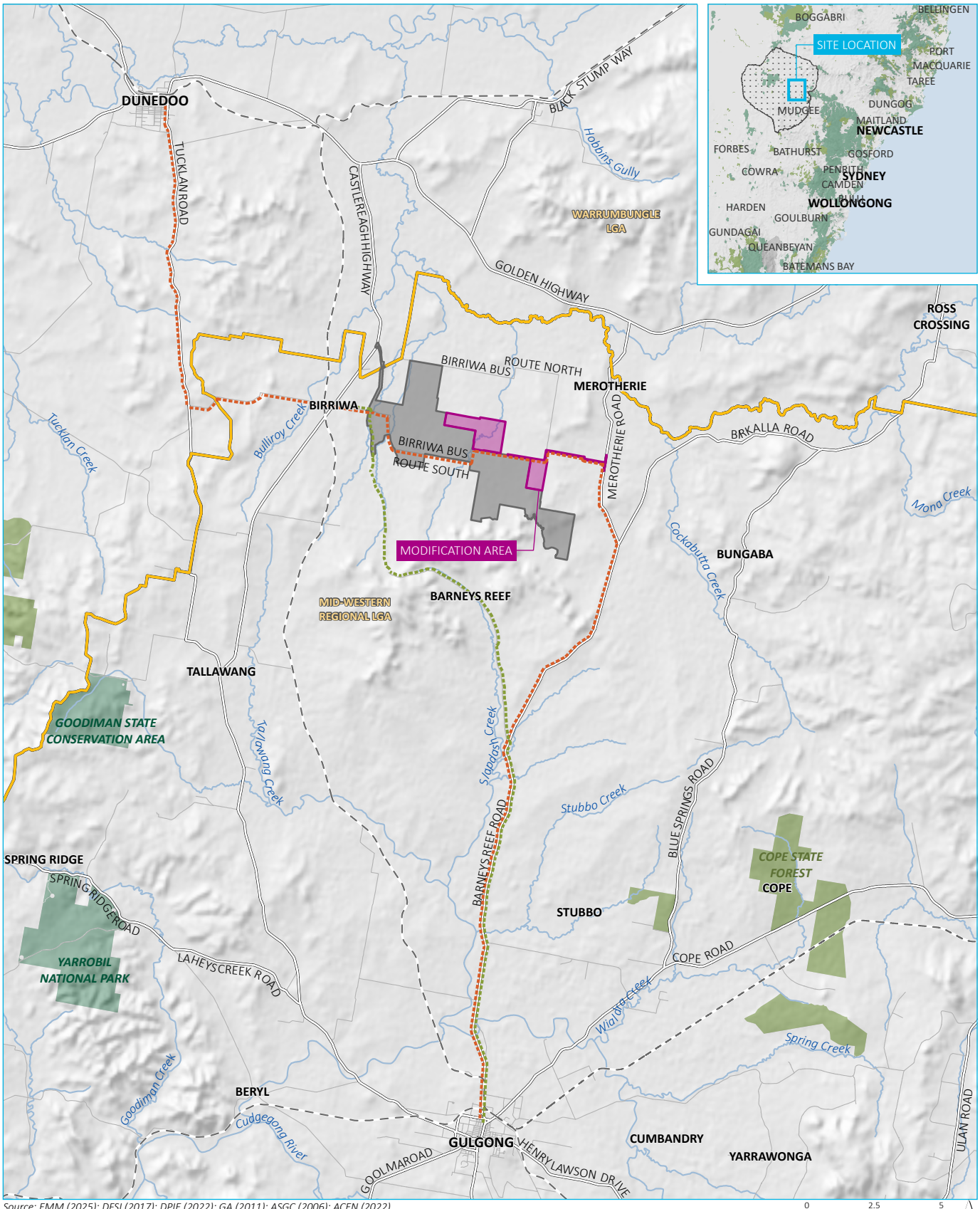
Assessment for the BBRS (Figure 1.1) was originally undertaken by Eco Logical Australia Pty Ltd (ELA). ELA conducted all vegetation mapping and flora and fauna surveys for BBRS, which was documented in a separate BDAR with the modification application.

During consultation with Conservation Programs, Heritage and Regulation Group (CPHR) of the NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW), a consolidated BDAR assessing the impacts of the additional lots and BBRS was requested. Accordingly, EMM has incorporated field methods, field results and spatial data from the BBRS BDAR for the modification application (ELA 2025) into this consolidated BDAR.

As construction of the two different components will be staged (with BBRS representing the first stage), two separate child cases have been created under the parent case in the Biodiversity Assessment Method Calculator (BAMC), outlined in Table 1.2.

Table 1.2 BAMC cases

Construction stage	Assessment type	Case number
Stage 1 - BBRS	Linear	00046709/BAAS22017/25/00057713
Stage 2 – Additional lots	Site-based	00046709/BAAS18117/24/00046710



Source: EMM (2025); DFSI (2017); DPIE (2022); GA (2011); ASGC (2006); ACEN (2022)

0 2.5 5 km
GDA 1994 MGA Zone 55

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KEY

- Modification area
- Approved project area

Existing environment

- Rail line
- Major road
- Minor road
- Named watercourse
- Local government area
- Central West Orana Renewable Energy Zone (refer to inset)
- NPWS reserve
- State forest

Central West Cycle (CWC) Trail

- CWC main route- Gulgong to Dunedoo
- CWC alternate route- Slap Dash Creek side trail

Regional context

Birriwa Solar and Battery Project- Modification
Biodiversity Development Assessment Report
Figure 1.1

EMM creating opportunities

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Source: EMM (2025); DCSSS (2023, 2024); GA (2011); ACEN (2022)

The modification

Birriwa Solar and Battery Project
Biodiversity Development Assessment Report
Figure 1.2

EMM
creating opportunities

1.6 Key terminology

The following key terms will be used throughout the modification report:

- **The approved project**: The project as approved by development consent SSD-29508870, comprising the solar and battery project as well as public road upgrades, as assessed in the *Birriwa Solar and Battery Project Environmental Impact Statement* (EIS) (EMM 2022) and the accommodation facility assessed in the *Amendment Report* (EMM 2023).

- **The study area (referred to within the Modification Report as modification area)**: The three additional lots to be added to the schedule of lands (Lot 11/DP 750755, Lot 40/DP 750755, Lot 60/DP 750755) and the remaining part of Lot 34/DP 750755, comprising additional areas for infrastructure associated with the solar generation and general operation of the project (approximately 257 ha), and the area of potential impact associated with the upgrade of BBRS Road as an alternative access route to the project area from the Golden Highway via Merotherie Road. Hereafter referred to as the study area.

- **The subject land (referred to within the Modification Report as modification development footprint/impact area):** Area subject to all proposed direct impacts in accordance with the 'subject land' described in the BAM (DPIE 2020). This equates to the 'modification development footprint' described in the Modification Report and includes the maximum extent of ground disturbing work (impact footprint). This area also includes temporary laydown areas and ancillary structures, including the provision of bushfire Asset Protection Zones (APZs), where required. Biodiversity offset liabilities will be finalised before commencement. As the portion of the subject land relating to the proposed upgrades to the BBRS will be constructed in an earlier project stage to the additional lots, separate child cases have been created in the BAMC, with credits calculated relevant to each stage. Herein, the term BBRS refers to Stage 1 of the project (Figure 1.2). The remainder of the subject land that is not included within the BBRS, will herein be referred to as the 'additional lots', and represents Stage 2.

Project elements referred to in this BDAR are described in Table 1.3.

Table 1.3 Other project elements referred to in this BDAR

Project elements	Definition
1,500 m assessment area	1,500 m buffer of the subject land (as per the BAM), used to calculate native vegetation extent relevant to the additional lots.
500 m assessment area	500 m buffer of the BBRS, used to calculate native vegetation extent relevant to the BBRS.
Locality	Area within a 20 km radius of the subject land.
Indirect impact area	Area subject to anticipated indirect impacts, which was delineated as a 20 m buffer from the subject land.
Impact area	Combined direct impact and indirect impact areas.

1.7 Consideration of BOS triggers

The overarching approved Birriwa Solar and Battery Project was declared as a State Significant Development (SSD) under Part 4 Division 4.7 of the EP&A Act. Assessment in accordance with the Biodiversity Offset Scheme (BOS) and Biodiversity Assessment Method is mandatory. Accordingly, as a modification to this SSD project, the BOS applies and this BDAR has been prepared.

1.8 Assessment requirements

ACEN submitted a request for Secretary's environmental assessment requirements (SEARs) to the NSW Department of Planning, Housing and Infrastructure (DPHI) for the approved project with supporting documentation describing the project, stakeholder engagement, key matters to be addressed in the EIS and the proposed assessment methods. The SEARs were issued on 5 November 2021. The relevant requirements of the SEARs were also applied to the study area (this BDAR).

Table 1.4 lists the biodiversity assessment requirements relevant to the study area and describes where these are addressed in the BDAR.

Table 1.4 Secretary's Environmental Assessment Requirements

Requirement	Section addressed
Biodiversity An assessment of the biodiversity values and the likely biodiversity impacts of the project in accordance with section 7.9 of the *Biodiversity Conservation Act 2016* (NSW), the Biodiversity Assessment Method (BAM) and documented in a Biodiversity Development Assessment Report (BDAR), unless BCS and DPIE determine the proposed development is not likely to have any significant impacts on biodiversity values.	All sections of this BDAR
The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the BAM.	Chapter 6
An assessment of the likely impacts on listed aquatic threatened species, populations or ecological communities, scheduled under the *Fisheries Management Act 1994*, and a description of the measures to minimise and rehabilitate impacts.	Sections 3.1.2 and 7.4
If an offset is required, details of the measures proposed to address the offset obligation.	Section 6.6

1.9 Information sources

1.9.1 Publications and databases

To provide context for the modification, information about flora and fauna species, populations, communities and habitats from the locality (generally within 20 km) was obtained from the following databases:

- BioNet Atlas of NSW Wildlife for previous threatened species records (BCS 2025b)
- Commonwealth Department of Agriculture, Water and the Environment (DAWE) (now the Department of Climate Change, Energy, the Environment and Water, DCCEEW) Protected Matters Search Tool (PMST) (DCCEEW 2025) for Matters of National Environmental Significance (MNES) likely to occur within the subject lands
- the NSW Plant Community Types (PCTs), as held within the BioNet Vegetation Classification database.

1.9.2 Spatial data

Spatial data encompassing the subject land, was obtained from ACEN. Base map data was obtained from Department of Finance, Services and Innovation (DFSI) NSW databases, with cadastral data obtained from DFSI digital cadastral database. Mapping for stream orders was obtained from NSW Department of Primary Industries (DPI).

The following spatial datasets were utilised during the development of this report:

- *State Vegetation Type Map: Central West/Lachlan Region version 1.4. VIS_ID 4468* (DPIE 2015)
- *NSW State Vegetation Type Map* (NSW DCCEEW 2025b)
- *Mitchell Landscapes Version V3.1* (OEH 2017)
- *Interim Biogeographic Regionalisation of Australia (IBRA) Version 7* (DoEE 2018)
- Strahler Stream Order (DPI 2015)
- Freshwater threatened species distribution maps (DPI 2021)
- Key fish habitat map – Murray Darling Basin North (DPI 2025b)
- Fisheries NSW Spatial Data Portal (DPI 2025c)
- Fish stocking (DPI 2025a)
- Local Government Area (DFSI 2017)
- Road Segment (DFSI 2017)
- NPWS Reserve (DFSI 2017)
- State Forest (DFSI 2017)
- BAM – Important Areas viewer maps (BCS 2025b).

Mapping undertaken during the site assessment was conducted using a hand-held Global Positioning System (GPS) unit, mobile tablet computers running Collector for ArcGIS™ and Survey123 for ArcGIS™ and aerial photo interpretation. Accuracy is subject to accuracy of GPS devices, generally ± 5 m. Mapping has been produced using a Geographic Information System (GIS; ArcGIS 10.5).

1.9.3 Other relevant reports

This BDAR has been prepared with reference to other technical reports that were prepared as part of the project. The other relevant reports referenced in this BDAR are listed below.

- EMM 2025, *Birriwa Solar and Battery Project Modification* report prepared for ACEN Australia Pty Ltd
- EMM 2023, *Birriwa Solar and Battery Project Environmental Impact Statement,* prepared for ACEN Australia Pty Ltd.
- EMM 2023, *Birriwa Solar and Battery Project Biodiversity Development Assessment Report,* prepared for ACEN Australia Pty Ltd.
- ELA 2025, *Birriwa Bus Route South Biodiversity Development Assessment Report* prepared for ACEN by ELA.
- ELA 2024, *Birriwa Bus Route South - Biodiversity Assessment Report* prepared for ACEN by ELA.

2 Legislative context

This chapter provides a brief outline of the key biodiversity legislation and government policy considered in this assessment.

2.1 Commonwealth

2.1.1 Environmental Protection and Biodiversity Conservation Act 1999

The EPBC Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities, heritage places and water resources which are defined as MNES under the EPBC Act. These are:

- world heritage properties
- places listed on the National Heritage Register
- Ramsar wetlands of international significance
- threatened flora and fauna species and ecological communities
- migratory species
- Commonwealth marine areas
- the Great Barrier Reef Marine Park
- nuclear actions (including uranium mining)
- water resources, in relation to coal seam gas or large coal mining development.

Under the EPBC Act, an action that may have a significant impact on a MNES is deemed to be a 'controlled action' and can only proceed with the approval of the Commonwealth Minister for the Environment. An action that may potentially have a significant impact on a MNES is to be referred to DCCEEW for determination as to whether or not it is a controlled action. If deemed a controlled action, the project is assessed under the EPBC Act and a decision made as to whether or not to grant approval.

The project was referred to the Commonwealth Minister for the Environment and determined to not be a controlled action on 6 September 2024 (EPBC 2024/09912).

It was determined the study area would not be referred to the DCCEEW as it was considered the impacts to MNES would be negligible. Further assessment of the study area against the EPBC Act is provided in Section 7.1. As described in Section 7.1, the assessment concluded that the project is unlikely to result in a significant impact on MNES.

2.2 State

2.2.1 Environmental Planning and Assessment Act 1979

The EP&A Act was enacted to encourage the consideration and management of impacts of proposed development or land-use changes on the environment and the community. The EP&A Act is administered by the DPHI.

The EP&A Act provides the overarching structure for planning in NSW; however, is supported by other statutory environmental planning instruments (EPIs) including State Environmental Planning Policies (SEPPs). EPIs relevant to the natural environment are outlined below.

i State Environmental Planning Policy (Biodiversity and Conservation) 2021

State Environmental Planning Policy (Biodiversity and Conservation) 2021 (hereafter referred to as the Biodiversity and Conservation SEPP) aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for Koalas to ensure a permanent free-living population over their present range and reverse the current trend of Koala population decline. The Biodiversity and Conservation SEPP adopts two Chapters of relevance to Koala management, with Chapter 3 - *Koala habitat protection 2020*, and Chapter 4 - *Koala habitat protection 2021*.

In nine metropolitan Sydney LGAs (Blue Mountains, Campbelltown, Hawkesbury, Ku-Ring-Gai, Liverpool, Northern Beaches, Hornsby, Wollondilly) and the Central Coast LGA Chapter 4 of the Biodiversity and Conservation SEPP applies to all land use zones. Outside of these areas Chapter 3 continues to apply to all land zoned RU1, RU2, and RU3.

As an SSD project, the modification does not require approval from council, and thus consideration of the provisions of the former Koala SEPP 2020 and Koala SEPP 2021 are not triggered. Nonetheless, consideration has been given to the potential occurrence and impacts upon the Koala (*Phascolarctos cinereus*) within this BDAR, as required by the BC Act and EPBC Act.

2.3 Biodiversity Conservation Act 2016

The BC Act is the legislation responsible for the conservation of biodiversity in NSW through the protection of threatened flora and fauna species, populations and ecological communities. The BC Act, together with the Biodiversity Conservation Regulation 2017 (BC Regulation), established the BOS.

The BOS includes establishment of the Biodiversity Assessment Method (the BAM, DPIE 2020) for use by accredited persons in biodiversity assessment under the scheme. The purpose of the BAM is to assess the impact of actions on threatened species and threatened ecological communities, and their habitats and determine offset requirements. For major projects, use of the BAM is mandatory, unless a BDAR waiver is granted.

The BAM sets out the requirements for a repeatable and transparent assessment of terrestrial biodiversity values on land in order to:

- identify the biodiversity values on land subject to proposed development area
- determine the impacts of a proposed development, following all measures to avoid, minimise and mitigate impacts
- quantify and describe the biodiversity credits required to offset the residual impacts of proposed development on biodiversity values.

This biodiversity assessment has been undertaken in accordance with the requirements of the BAM.

2.4 Fisheries Management Act 1994

The FM Act contains provisions for the conservation of fish stocks, key fish habitat, biodiversity, threatened species, populations and ecological communities. It regulates the conservation of fish, vegetation and some aquatic macroinvertebrates and the development and sharing of the fishery resources of NSW for present and future generations. The FM Act lists threatened species, populations and ecological communities, key threatening processes (KTPs) and declared critical habitat. Assessment guidelines to determine whether a significant impact is expected are detailed in sections 220ZZ and 220ZZA of the FM Act.

Another objective of the FM Act is to conserve key fish habitat (KFH). These are defined as aquatic habitats that are important to the sustainability of recreational and commercial fishing industries, the maintenance of fish populations generally and the survival and recovery of threatened aquatic species. KFH is defined in sections 3.2.1 and 3.2.2 of the *Policy and Guidelines for Fish Conservation and Management* (DPI 2013).

White Creek, located within the subject land, is mapped as KFH and is also mapped within the freshwater threatened species distribution for the Southern Purple Spotted Gudgeon (*Mogurnda adspersa*) (DPI 2021).

A likelihood of occurrence assessment for species listed under the FM Act was conducted based on database searches. The assessment concluded that no aquatic threatened ecological communities, endangered populations or species have a moderate to high likelihood of occurring within the subject land, therefore assessment under sections 220ZZ and 220ZZA of the FM Act is not required.

2.5 Biosecurity Act 2015

The NSW *Biosecurity Act 2015* (Biosecurity Act) has superseded the *Noxious Weeds Act 1993*, which has now been repealed.

The primary objective of the Biosecurity Act is to provide a framework for the prevention, elimination and minimisation of biosecurity risks posed by biosecurity matter, dealing with biosecurity matter, carriers and potential carriers, and other activities that involve biosecurity matter, carriers or potential carriers.

The Biosecurity Act stipulates management arrangements for weed biosecurity risks in NSW, with the aim to prevent, eliminate and minimise risks. Management arrangements include:

- any land managers and users of land have a responsibility for managing weed biosecurity risks that they know about or could reasonably be expected to know about
- applies to all land within NSW and all waters within the limits of the State
- local strategic weed management plans will provide guidance on the outcomes expected to discharge duty for the weeds in that plan.

NSW WeedWise (DPI 2024) identifies relevant weed species by region. The relevant region for the project is the Central Tablelands. 109 priority weed species are listed for the Central Tablelands region (DPI 2024).

The *Central Tablelands Regional Strategic Weed Management Plan 2023–2027* (LLS 2022) supports regional implementation of the Biosecurity Act by articulating community expectations in relation to effective weed management and facilitating a coordinated approach to weed management in the region. The plan identifies weed management in the region, weed risk assessment and prioritisation, actions, details regarding how to apply the actions, and measures proposed to increase the chance of success and for continuous improvement. Appendix 1 of the plan provides a list of state and regional priority weeds for the Central West LLS region. Should any of these species be recorded on the subject land the management actions provided in the plan will need to be implemented.

The provisions of the Biosecurity Act are discussed further in Section 7.3.

2.6 Water Management Act 2000

Division 6 of the NSW *Water Management Act 2000* (WM Act) requires consideration of controlled activities on waterfront land (i.e. activities within 40 m of top of bank) and aquifer interference activities. The NSW Aquifer Interference Policy (DPI 2012) also requires an assessment of potential impacts on groundwater users, including groundwater dependent ecosystems.

The project will be constructed within 40 metres (m) of waterfront land; however, a water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91 of the WM Act will not be required pursuant to section 4.41 of the EP&A Act. Section 91 of the WM Act states that a controlled activity approval confers a right on its holder to carry out a specified controlled activity at a specified location in, on or under waterfront land. Under section 4.41 of the EP&A Act, SSD does not require a controlled activity approval. Water management is further discussed in Section 6.6 of the Birriwa Solar and Battery Project Modification (EMM 2025).

Groundwater will not be intercepted for the modification and therefore it does not represent an aquifer interference activity.

Part A

Biodiversity assessment

EMM
creating opportunities

3 Landscape features

3.1 Landscape features

The landscape features described in the following sections are shown on Figure 3.1 and Figure 3.2. This assessment incorporates landscape features relevant to both the BBRS and the additional lots.

3.1.1 Bioregions and landscapes

The subject land is within the NSW South Western Slopes Interim Biogeographic Regionalisation for Australia (IBRA) bioregion and the Inland Slopes IBRA subregion. The Talbragar – Upper Macquarie Terrace Sands and Gravels NSW (Mitchell) Landscape dominates the assessment area with Cope Hill Granite mapped in the southern and eastern portions. Smaller occurrences of additional NSW (Mitchell) Landscapes within the assessment area include:

- Liverpool Range Valleys and Footslopes
- Goonoo Slopes.

As most of the subject land and assessment area is in the Talbragar – Upper Macquarie Terrace Sands and Gravels NSW (Mitchell) Landscape, this was the landscape used in this assessment.

3.1.2 Rivers, streams, estuaries and wetlands

The subject land is located within the Macquarie-Bogan catchment. The Macquarie-Bogan catchment covers 74,800 square kilometres of central-west NSW (DPIE n.d). The catchment originates from the Great Dividing Range to the east and flows north-westerly until it joins the Barwon River.

Two named creeks, White Creek and Huxleys Creek, occur within the study area. White Creek and its tributaries include two third order streams, which intersect the subject land and multiple unnamed first and second order streams. Huxleys Creek is located north of the subject land but has two smaller unnamed tributaries, which intersect the western extent of the subject land. (Figure 3.1; Figure 3.2). These creeks flow in a northerly direction into Talbragar River, approximately 2.5 km from the subject land.

In total, the subject land and assessment area contains:

- four first-order water courses
- five second-order water courses
- two third-order water courses.

Three of the four first order water courses and one third order water course intersect the BBRS. Third and fourth order water courses have been excluded from the additional lots, while two first and second order water courses and one third order water course are intersected.

The waterways within the subject land and assessment area largely lack wooded riparian vegetation, which may support aquatic and terrestrial species. These creeks have a sandy substrate, which is highly erodible and has resulted in the creeks occurring as eroded gullies with limited to no bank vegetation. Additionally, the construction of man-made culverts and roads has significantly altered the flow-regimes of these creeks, with many being completely dry and unable to support any aquatic vegetation or subsequent fauna species (Photograph 3.1).

Some aquatic habitat is present within the assessment area as slow-flowing creeks, though these generally lack rocky habitat or substrates able to refuge for aquatic species. However, intermittent pools within the actual subject land generally lack aquatic vegetation, limiting diversity of macrophytes and aquatic species habitat (Photograph 3.2).

The subject land also has several online dams primarily providing water for livestock. These dams lack riparian vegetation and have high turbidity and sediment load due to stock access.

Within the broader assessment area, White Creek is mapped as KFH (DPI 2025). This creek, in addition to Huxleys Creek, is also mapped within the freshwater threatened species distribution for the Southern Purple Spotted Gudgeon (*Mogurnda adspersa*) (DPI 2021). Talbragar River to the north-east is also mapped within the freshwater threatened species distribution of the Eel-tailed Catfish (*Tandanus tandanus*).

No nationally important or RAMSAR wetlands have been mapped within the subject land or are located within the 20 km locality.

Photograph 3.1 White Creek within the study area

Photograph 3.2 Highly degraded ephemeral aquatic habitat associated with White Creek in the study area

3.1.3 Connectivity

The locality is considered highly fragmented with native vegetation often occurring in isolated patches surrounded by a matrix of agricultural land. Minimal connectivity occurs within the subject land with most of the vegetation being comprised of pasture or derived native grassland.

Several waterways occur within the subject land (see above). These waterways lack wooded riparian vegetation, which is likely to provide connectivity to terrestrial species within the landscape.

3.1.4 Areas of geological significance

Areas of geological significance include karsts, caves, crevices, cliffs, rocks and other geological features of significance as outlined in section 3.1.3 of the BAM (DPIE 2020). A ridgeline occurs within the far southern extent of the assessment area, which is likely to have areas of geological significance such as crevices and geological habitat. This ridge line is located within the Barney's Reef rock formation that is associated with the higher slopes to the south of the subject land and will not be directly impacted by the proposal.

3.1.5 Areas of outstanding biodiversity value

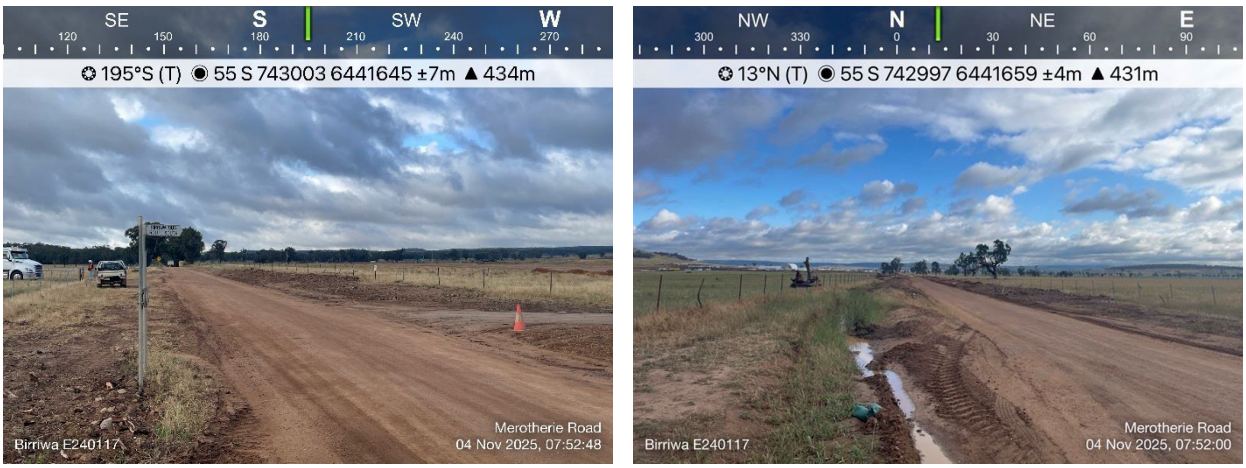
There are no areas of outstanding biodiversity value, as declared by the NSW Minister for Energy and Environment, within the subject land or assessment area.

3.2 Assessment of site context

Native vegetation cover within the assessment areas (as defined in Section 1.6) have been assessed in accordance with section 3.2 of the BAM (DPIE 2020) and is outlined within the following section.

3.2.1 Native vegetation extent

Vegetation mapping across the subject land and locality (NSW DCCEEW 2025b) identifies several vegetation communities. To calculate native vegetation cover, these vegetation communities were classified as native or non-native (Table 3.1). The native vegetation extent was then assessed against aerial imagery to adjust for inconsistencies between the state vegetation mapping and aerial imagery, such as native vegetation recently cleared at the intersection of the proposed BBRS with Merotherie Road (Photograph 3.3).



Photograph 3.3 Cleared vegetation at Merotherie Road intersection facing south (left image) and north (right image)

Areas such as cropped farmland were excluded, whilst treed waterways and planted vegetation screens were included. The area of native vegetation within the assessment areas and the percent native vegetation was then calculated (Table 3.2 and Table 3.3), consistent with the requirements of the BAM (DPIE 2020). The extent of native vegetation cover based on this data source is shown in Figure 3.1.

Table 3.1 Native vegetation assessment

PCT (NSW DCCEEW 2025b)	Classification
76 – Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	Native
81 – Western Grey Box – cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion	Native
201 – Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes and Bioregion	Native
277 – Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Native
281 – Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	Native
358 – Mugga Ironbark – Red Box – White Box – Black Cypress Pine tall woodland on rises and hills in the northern NSW South Western Slopes Bioregion	Native
437 – Yellow Box grassy woodland on lower hillslopes and valley flats in the southern NSW Brigalow Belt South Bioregion	Native

PCT (NSW DCCEEW 2025b)	Classification
461 – Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion	Native
476 – Narrow-leaved Wattle low open forest/very tall shrubland on ridges in northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion	Native
477 – Inland Scribbly Gum – Red Stringybark – Black Cypress Pine – Red Ironbark open forest on sandstone hills in the southern Brigalow Belt South Bioregion and northern NSW South Western Slopes Bioregion	Native
478 – Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion	Native
479 – Narrow-leaved Ironbark – Black Cypress Pine – stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow	Native
599 – Blakely's Red Gum – Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion	Native
1610 – White Box – Black Cypress Pine shrubby woodland of the Western Slopes	Native
1860 – Growee Ranges Grey Gum – Scribbly Gum Forest	Native
Not classified	Not native

The above vegetation dataset was then combined with the field-verified vegetation within the subject land to create the native vegetation extent layer for both assessment areas.

Vegetation proximal to the subject land is highly fragmented, with native vegetation often occurring in isolated patches surrounded by a matrix of agricultural land (Figure 3.2). This is also consistent with the remaining vegetation within and adjoining the site. A large extent of native woodland occurs south of the assessment area associated with the higher slopes and ranges (Figure 3.2). Native vegetation cover for the assessment area is provided in Table 3.2.

As the additional lots and BBRS were assessed in separate BAM child cases, the native vegetation cover and patch size were calculated separately. To calculate the native vegetation cover and patch size for the additional lots, EMM applied the following buffer area consistent with the requirements of the BAM (DPIE 2020):

- a 1,500 m buffer was placed around the entire subject land (including BBRS). The area of native vegetation within the buffer and the percent native vegetation was then calculated (Table 3.2).

Table 3.2 Percentage native vegetation cover (1,500 m assessment area)

IBRA subregion	Native vegetation in 1,500 m assessment area (ha)	Assessment area (ha)	Approximate percentage of native vegetation in 1,500 m assessment area (%)	Cover class (%)
Inland Slopes	222.60	3486.57	6	0-10%

To calculate the native vegetation cover and patch size for BBRS, the following buffer area was applied, consistent with the requirements for linear assessments under the BAM (ELA 2025, DPIE 2020):

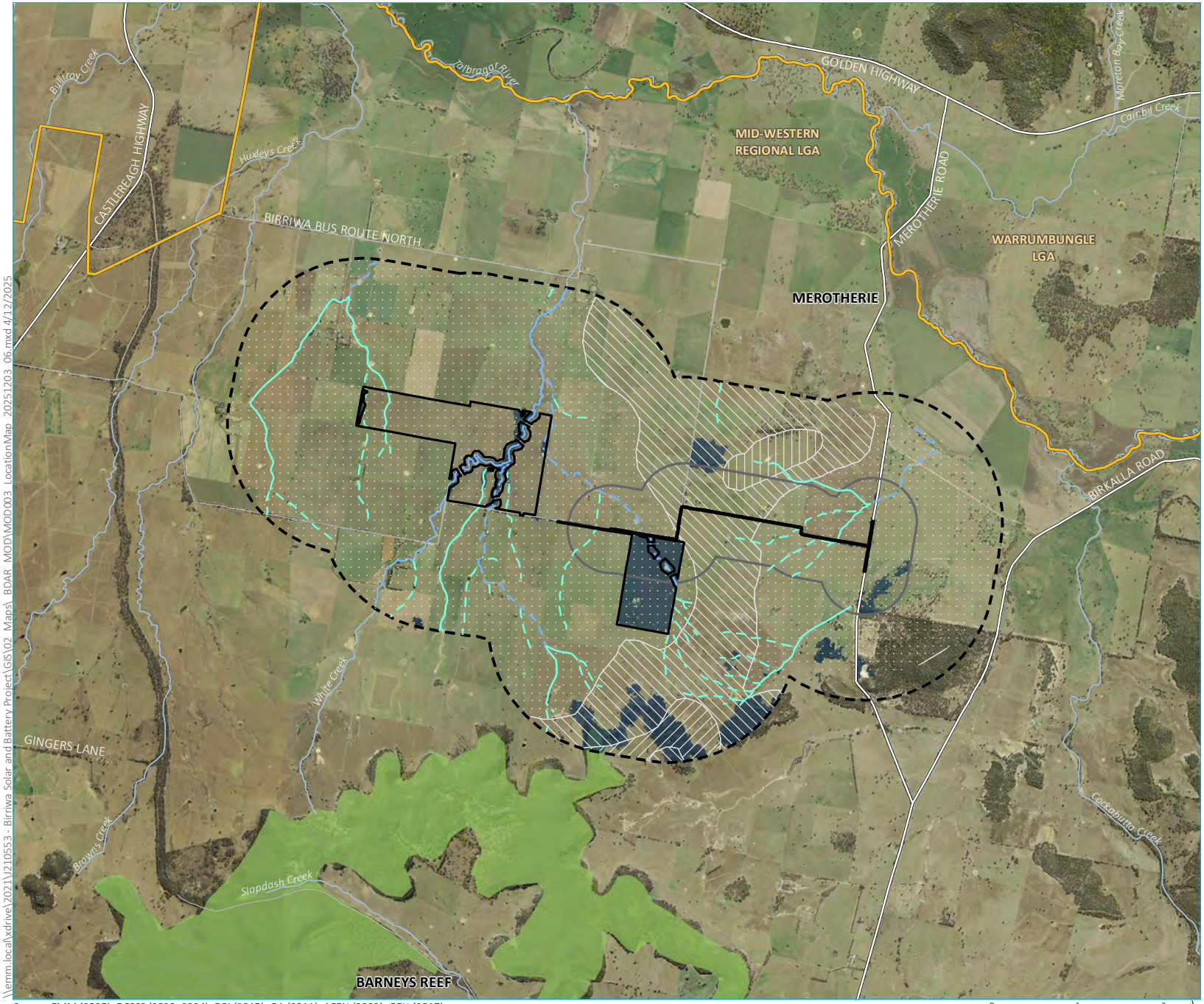
- a 500 m buffer was placed around the BBRS. The area of native vegetation within the buffer and the percent native vegetation was then calculated.

Table 3.3 Percentage native vegetation cover (500 m assessment area; ELA 2025)

IBRA subregion	Native vegetation in 500 m assessment area (ha)	Assessment area (ha)	Approximate percentage of native vegetation in 500 m assessment area (%)	Cover class (%)
Inland Slopes	51.7	465.8	11.1	>10-30%

3.2.2 Patch size

Patch size was assumed to be 101 ha for every vegetation zone mapped within the additional lots and BBRS as a conservative approach to threatened species assessment. This enabled the BAMC to filter in the maximum number of candidate species for consideration, and species to only be discounted based on geographic constraints, absence of microhabitats or absence during targeted survey.



KEY

- Subject land
- BBRS Assessment area (465 ha)
- Assessment area (3,486 ha)

Existing environment

- Major road
- Minor road
- Named watercourse
- Local government area boundary
- Barney's Reef cave habitat
- Native vegetation cover

Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 4th order

Mitchell landscape (v3.1)

- Cope Hills Granite
- Goonoo Slopes
- Liverpool Range Valleys and Footslopes
- Talbragar - Upper Macquarie Terrace Sands and Gravels

Note: entire view extent is within the:
- NSW South Western Slopes IBRA7 region
- Inland Slopes IBRA7 subregion

Source: EMM (2025); DCSSS (2023, 2024); DPI (2015); GA (2011); ACEN (2022); OEH (2017)

0 1 2 km

GDA 1994 MGA Zone 55

N

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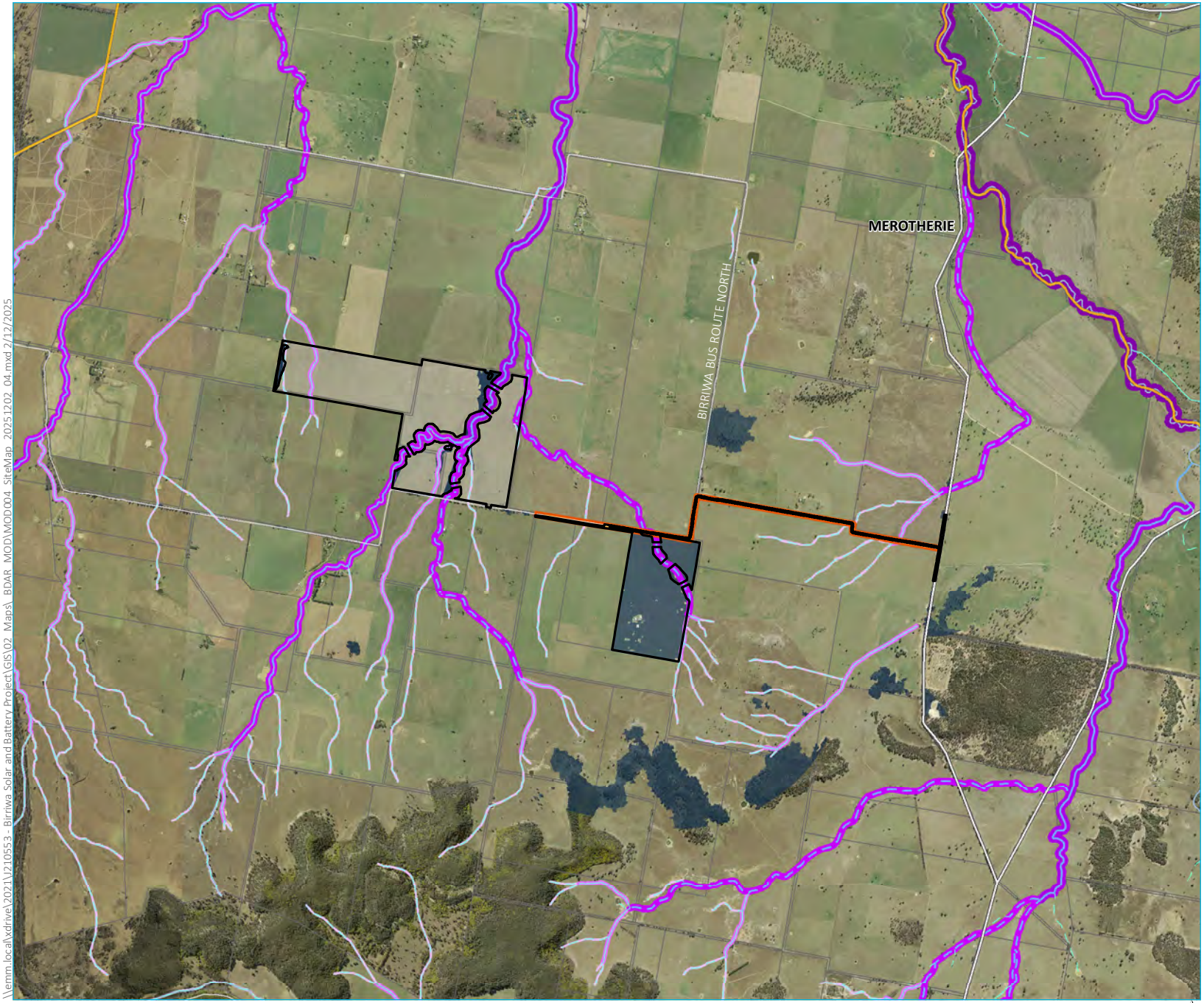
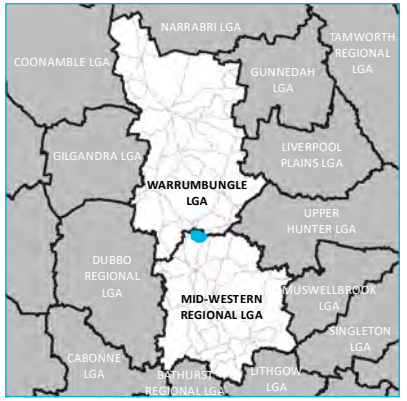
Location map

Birriwa Solar and Battery Project
Biodiversity Development Assessment Report
Figure 3.1

EMM creating opportunities





KEY

- Birriwa Bus Route South (Assessed by ELA)
- Subject land

Existing environment

- Major road
- Minor road
- Cadastral boundary
- Native vegetation cover
- Local government area

Strahler stream order

- 1st order
- 2nd order
- 3rd order
- 4th order

Riparian buffer

- 10 m
- 20 m
- 30 m
- 40 m
- 50 m

Site map

Source: EMM (2025); DCSSS (2023, 2024); DPI (2015); GA (2011); ACEN (2022)

0 1 2 km

GDA 1994 MGA Zone 55

N

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Birriwa Solar and Battery Project
Biodiversity Development Assessment Report
Figure 3.2

EMM creating opportunities

4 Native vegetation

The assessment of native vegetation within the subject land was determined using section 4 of the BAM (DPIE 2020), as summarised within this chapter.

4.1 Background review

Review of the NSW State Vegetation Type Mapping (SVTM) (NSW DCCEEW 2025b) indicates that most of the 1,500 m assessment area is listed as non-native and considered cleared. This is supported by recent and historical aerial imagery with widespread evidence of agriculture including plough lines, farm dams and cropping. Only patches of native vegetation are mapped, and these consisted of a small number of native plant community types (PCTs) (Table 4.1).

Table 4.1 Plant community types and threatened ecological communities historically mapped within the 1,500 m assessment area (NSW DCCEEW 2025b)

PCT ID	PCT name	BC Act	EPBC Act
277	Blakely's Red Gum-Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Box Gum Woodland and derived native grassland[1]	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland[2]
281	Rough-barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	Box Gum Woodland and derived native grassland[1]	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland[2]
461	Tumbledown Gum woodland on hills in the northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion	-	-
476	Narrow-leaved Wattle low open forest/very tall shrubland on ridges in northern NSW South Western Slopes Bioregion and southern Brigalow Belt South Bioregion	-	-
478	Red Ironbark – Black Cypress Pine – stringybark +/- Narrow-leaved Wattle shrubby open forest on sandstone in the Gulgong – Mendooran region, southern Brigalow Belt South Bioregion	-	-
1610	White Box – Black Cypress Pine shrubby woodland of the Western Slopes	-	-

Notes:

1. 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 (BC Act – Critically Endangered Ecological Community).
2. White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (EPBC Act – Critically Endangered Ecological Community).

As shown in Table 4.1, two of the mapped PCTs are aligned to one BC Act listed threatened ecological community (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 Bioregions (Critically Endangered) (referred to as Box Gum Woodland and derived native grassland).

In addition, the Box Gum Woodland and derived native grassland is a candidate entity for Serious and Irreversible Impacts (SAII) under the BAM (DPIE 2020).

As shown in Table 4.1 the BC Act listed TEC is also listed under the EPBC Act, albeit with a different name:

- White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community (Critically Endangered).

The EPBC Act listing has a different determination, with specific condition requirements for woodland and derived native grassland (DNG) to meet the EPBC Act listing. In contrast, the BC Act listing has few condition requirements. This is discussed further in Section 4.3.5.

4.2 Methods

The following sections outline the methods employed to map vegetation, and to assess the vegetation integrity of native vegetation within the subject land in accordance with section 4.3 of the BAM (DPIE 2020).

4.2.1 Detailed vegetation mapping and habitat assessment

An assessment of the vegetation within the subject land was undertaken between October 2023 and May 2024. The assessment of the additional lots was undertaken on 9 to 13 October 2023, 23 to 25 January and 20 to 21 May 2024 by EMM which involved detailed vegetation mapping and habitat assessments. The assessment of the BBRS was conducted on 27 November 2023 by ELA. This assessment involved vegetation validation and vegetation integrity plots.

The study area was traversed in a vehicle and on foot, with vegetation mapped and aligned with NSW PCTs. For vegetation within the additional lots, PCTs were stratified into vegetation zones based on broad condition state using the definitions in Table 4.2.

Table 4.2 Definitions used in delineation of vegetation zones

Condition class	Description
High	Largely intact with all stratum present and minimal disturbance.
Medium	Some elements or stratum missing or immature, but minimal disturbance.
Regenerating	Regeneration is occurring due to previous human impacts, such as clearing or fire, but minimal to moderate disturbance to other stratum.
Poor	Tree stratum present, but understorey vegetation degraded due to weeds or other major disturbance.
Derived native grassland (DNG)	Tree stratum and shrub stratum missing. Native vegetation restricted to groundcover.
Exotic pasture	Tree stratum and mid stratum missing. Grassland areas with various levels of improvement and seeding. Native vegetation is restricted to low diversity grasslands with high native cover.

Where there was some uncertainty about correct PCT alignment, or to justify PCT alignment, floristic plots were undertaken in accordance with the BAM. Vegetation was mapped in the field using GPS-enabled tablet computers using Collector for ArcGIS™. Three plots were also undertaken in exotic pasture.

4.2.2 Vegetation integrity assessment

Following the stratification of vegetation zones within the subject land, native vegetation integrity was assessed using data obtained via a series of plots, as per the methodology outlined in sections 4.2.1, 4.3.3 and 4.3.4 of the BAM (DPIE 2020). Plot data was collected from the subject land between 23 to 25 January 2024 and 20 to 21 May 2024 by EMM and 3 to 4 April 2024 by ELA. At each plot location the following was undertaken:

- one 20 m x 20 m plot, for assessment of composition and structure
- one 20 m x 50 m plots for assessment of function, including a series of five 1 m x 1 m plots to assess average leaf litter cover.

Given the narrow width of the road reserve, ELA had to modify the following dimensions of BBRS Plots 5 to 7, to 10 m x 100 m.

The assessment of composition and structure, based on a 20 m x 20 m plot, recorded species name, stratum, growth form, cover and abundance rating for each species present within the plot. Cover (foliage cover) was estimated for all species rooted in or overhanging the plot, and recorded using decimals (if less than 1%, rounded to whole number (1 to 5%) or estimated to the nearest 5% (5 to 100%). Abundance was counted (up to 20) and estimated above 20, and recorded using the following intervals: 1, 2, 3, 4, 5, 10, 20, 50, 100, 500, 1,000, 1,500, 2,000, etc.

The assessment of function recorded the number of large trees, the presence of tree stem size class, tree regeneration, number of trees with hollows and length of fallen logs, as well as leaf litter cover within the 20 m x 50 m plot and five 1 m x 1 m subplots. The minimum number of plots and transects per vegetation zone was determined using table 3 of the BAM (DPIE 2020). A total of 16 plots were undertaken within the subject land, with eight conducted by EMM in the additional lots and 8 conducted by ELA within the BBRS. Datasheets for EMM and ELA plots are provided in Appendix A while compiled plot data is provided in Appendix B.

Surveys for flora and vegetation communities undertaken by EMM were completed under the authority of Scientific License (SL100409). Surveys undertaken by ELA were completed under the authority of Scientific License (SL100243). A list of flora species was compiled for each plot and PCT. Records of all flora species will be submitted to CPHR for incorporation into the Atlas of NSW Wildlife.

4.3 Results

4.3.1 Vegetation description

The subject land is more consistent with current state vegetation mapping (DCCEEW 2025b) than regional mapping (DPIE 2015) with areas of exotic pastureland vegetation dominating the subject land, with smaller patches of better condition native grassland occurring less frequently. All vegetation within the subject land has been impacted by past land use, particularly from ongoing grazing, with the grasslands supporting limited native species cover and diversity. Remnant vegetation is restricted to small patches of woodland predominantly along roadside corridors and isolated paddock trees consisting primarily of Rough-barked Apple (*Angophora floribunda*) and Blakely's Red Gum (*Eucalyptus blakelyi*). These remnant patches and paddock trees generally lack any native mid-stratum and contain a disturbed understorey of native and exotic groundcover species. Scattered, planted exotic tree species, were also recorded within the southern-most lot of the subject land.

4.3.2 Plant community types

The vegetation within the subject land (BBRS and additional lots) has been classified as containing two PCTs as well as exotic vegetation (Table 4.3). Details for each PCT are summarised in Table 4.3.

Table 4.3 Vegetation mapping within the subject land

Plant community type	Vegetation formation	Vegetation class	Percentage cleared	Extent of direct impact area (ha)
PCT 277 – Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Grassy Woodlands	Western Slopes Grassy Woodlands	94	1.29
PCT 281 – Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion – *Derived Native Grassland*	Grassy Woodlands	Western Slopes Grassy Woodlands	67	70.87
Exotic planted vegetation	-	-	-	0.88
Pasture/exotic grassland	-	-	-	147.52
Total	-	-	-	220.56

4.3.3 Vegetation zones

Vegetation zones within the subject land were delineated by the species assemblage and condition. Two PCTs were identified across the subject land (Figure 4.1) and each was delineated into two condition classes, consisting of DNG and woodland. Most of the subject land is dominated by open grasslands and most areas have been impacted by pastoral activities, particularly grazing but also cropping. Wooded vegetation within the subject land is restricted to the roadside corridor along the BBRS and isolated paddock trees. A list of native vegetation zones that will be impacted within the subject land is provided in Table 4.4 and Table 4.5.

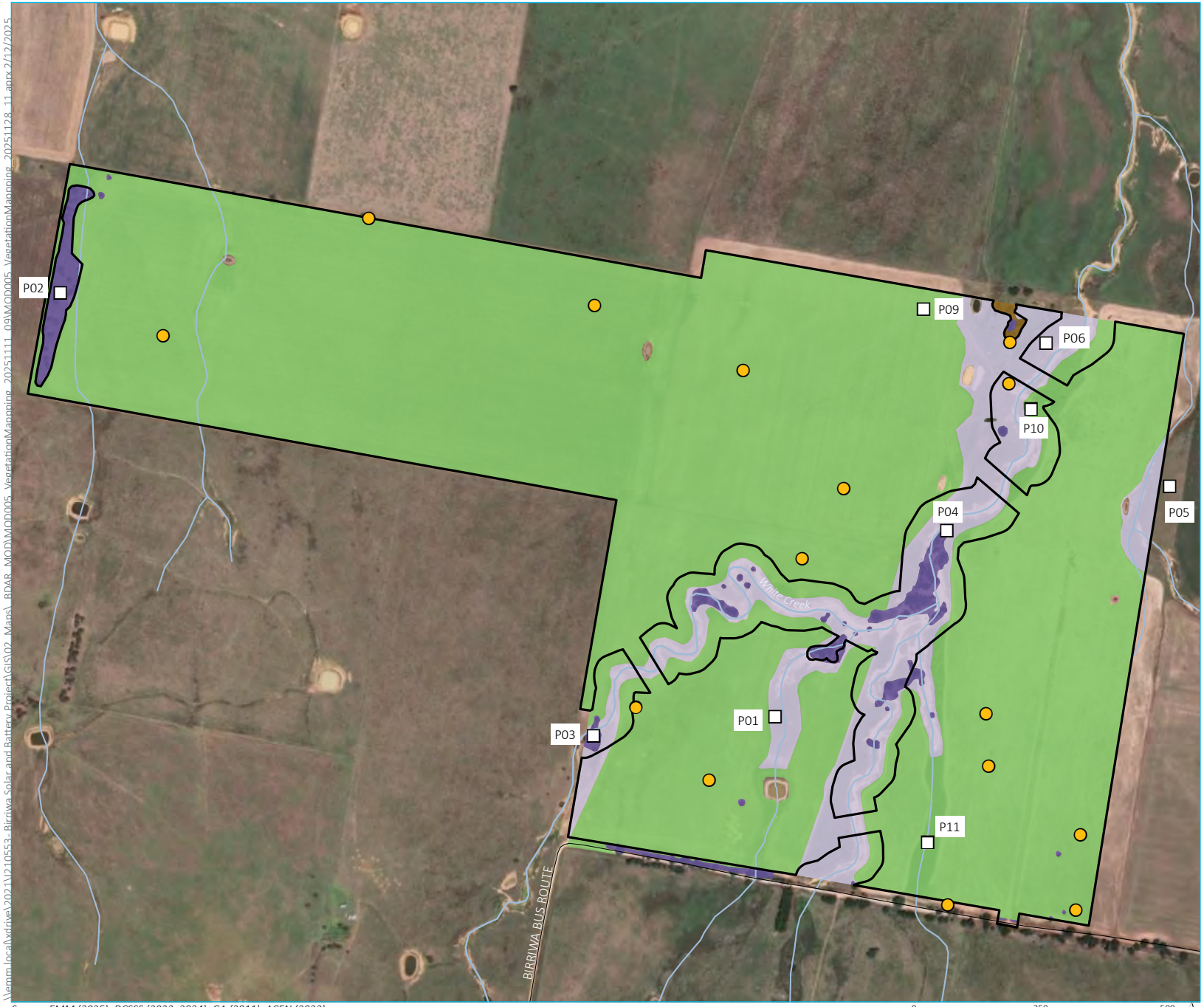
Table 4.4 Vegetation zones identified within the additional lots (EMM)

Vegetation zone	PCT ID	PCT name	Condition	Extent in direct impact area (ha)
1	281	Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	DNG	68.96
2	281	Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	Woodland	0.35
			Total	**69.31**

Table 4.5 Vegetation zones identified within the BBRS

Vegetation zone	PCT ID	PCT name	Condition	Extent in direct impact area (ha)
1	281	Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	Woodland	1.38
2	277	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Woodland	0.57
3	281	Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	DNG	0.18
4	277	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	DNG	0.72
			Total	**2.85**

The PCTs and condition zones across the entire subject land are presented in Figure 4.1. A detailed description of vegetation in the subject land is provided in Table 4.6 to Table 4.9.



KEY

- Subject land
- Birriwa Bus Route South (Assessed by ELA)
- RDP location

Plot location

- ELA
- EMM

Plant community type

- Exotic (planted vegetation)
- Pasture

PCT 277 | Blakely's Red Gum- Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

- Derived native grassland (DNG)
- Woodland

PCT 281 | Rough-Barked Apple- red gum- Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion

- Derived native grassland (DNG)
- Woodland

Existing environment

- Major road
- Minor road
- Watercourse/drainage line

Source: EMM (2025); DCSSS (2023, 2024); GA (2011); ACEN (2022)

0 250 500 m

GDA 1994 MGA Zone 55

N

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Plant community types and plot locations

Birriwa Solar and Battery Project
Biodiversity Development Assessment Report
Figure 4.1

EMM creating opportunities

KEY

- Subject land
- Birriwa Bus Route South (Assessed by ELA)
- RDP location

Plot location

- ELA
- EMM

Plant community type

- Exotic (planted vegetation)
- Pasture

PCT 277 | Blakely's Red Gum- Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

- Derived native grassland (DNG)
- Woodland

PCT 281 | Rough-Barked Apple- red gum- Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion

- Derived native grassland (DNG)
- Woodland

Existing environment

- Major road
- Minor road
- Watercourse/drainage line

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Source: EMM (2025); DCSSS (2023, 2024); GA (2011); ACEN (2022)

0 250 500 m

GDA 1994 MGA Zone 55

N

Plant community types and plot locations

Birriwa Solar and Battery Project
Biodiversity Development Assessment Report
Figure 4.1

EMM creating opportunities

KEY

- Subject land
- Birriwa Bus Route South (Assessed by ELA)
- RDP location

Plot location

- ELA
- EMM

Plant community type

- Exotic (planted vegetation)
- Pasture
- PCT 277 | Blakely's Red Gum- Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion
  - Derived native grassland (DNG)
  - Woodland
- PCT 281 | Rough-Barked Apple- red gum- Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion
  - Derived native grassland (DNG)
  - Woodland

Existing environment

- Major road
- Minor road
- Watercourse/drainage line

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Source: EMM (2025); DCSSS (2023, 2024); GA (2011); ACEN (2022)

0 250 500 m

GDA 1994 MGA Zone 55

N

Plant community types and plot locations

Birriwa Solar and Battery Project
Biodiversity Development Assessment Report
Figure 4.1

EMM creating opportunities

To identify PCTs within the additional lots, data collected during the preliminary site visit to map vegetation was assessed. Floristic data collected during plot surveys was used to confirm the vegetation mapping. One PCT was identified within the additional lots, as described in the following sections. Within this PCT, further stratification into differing vegetation zones was also required to meet the requirements of the BAM (DPIE 2020) and better define TECs. A detailed description of PCT 281 in the additional lots is provided in Table 4.6, while a description of exotic vegetation (i.e. pasture and exotic planted) is provided in Table 4.7.

For descriptions of the PCTs within the BBRS, namely PCT 281 Woodland, PCT 277 Woodland, PCT 281 DNG and PCT 277 DNG refer to Table 4.8 and Table 4.9.

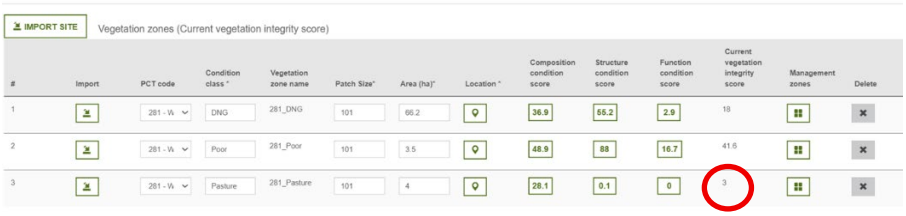
Table 4.6 PCT 281 – Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion (additional lots)

Attribute	Description
PCT ID	281 (additional lots)
PCT name	Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion
Vegetation formation	Grassy Woodlands
Vegetation class	Western Slopes Grassy Woodlands
Condition class/es	Derived Native Grassland and Woodland
Extent within subject land (all condition zones in additional lots and BBRS combined)	69.31 ha
Survey effort	Plot 1 Plot 2 Plot 3 Plot 4 Plot 5 Plot 6 Plot 7 Plot 8
Vegetation integrity score	18
Description	This PCT was identified as small patches of canopy in paddocks and large open grasslands, primarily in the central and western parts of the subject land and associated with flats and drainage lines, where clearing and subsequent land management has been less extensive. Woodland remnants occur as areas of intact canopy, with an absent shrub layer, and a more diverse groundcover composition. These areas comprise mature *Angophora floribunda* (Rough-barked Apple) and Blakely's Red Gum (*Eucalyptus blakelyi*) and were designated as poor condition. All wooded areas mapped as PCT 281-poor are to be retained. A spectrum of open grassland occurs within the study area, ranging from areas where there is a mixture of exotic and native species (albeit at a low diversity), to areas of higher native groundcover diversity and lower exotic coverage. Areas with higher native diversity and less weed presence were assigned to 'Derived Native Grassland' (DNG). Where exotic pasture species dominated (>90% coverage), and where clear cropping tillage was evident, coupled with a low VI score, these were assigned exotic/pasture. All vegetation zones of PCT 281 lack a shrub layer and show signs of disturbance in the groundcover due to current grazing practices, though generally a low exotic species cover was recorded. A number of native forbs, sedges and grasses persist, including Brown's Lovegrass (*Eragrostis brownii*), Purple Wiregrass (*Aristida ramosa*), Common Rush (*Juncus usitatus*), Rat's Tail Grass (*Sporobolus creber*), Red Grass (*Bothriochloa macra*), Slender

Attribute	Description
	Bamboo Grass (*Austrostipa verticillata*), Swamp Dock (*Rumex brownii*) and Yellow Burr Daisy (*Calotis lappulacea*). Exotic species occurring within the groundcover include St. Johns Wort (*Hypericum perforatum*), Paspalum (*Paspalum dilatatum*), African Lovegrass (*Eragrostis curvula*), Khaki Weed (*Alternanthera pungens*) Bathurst Burr (*Xanthium spinosum*) and Saffron Thistle (*Carthamus lanatus*) which are all High Threat Weeds (HTWs). Other common exotics include Flaxleaf Fleabane (*Conyza bonariensis*), Pale Pigeon Grass (*Setaria pumila*), Purpletop (*Verbena bonariensis*) and Scotch Thistle (*Onopordium acanthium*).
Diagnostic tools and justification used to assign PCT 281	Based upon the data contained in BioNet Vegetation Classification database (DPE 2024), PCT 281 is considered to be the best fit based on: • occurrence within the NSW South Western Slopes IBRA Bioregion and the Inland Slopes subregion • association with valley floors, flats and drainage lines • presence of Rough-barked Apple and Blakely's Red Gum within the subject land • presence of characteristic species described by the database within the subject land including: – Rough-barked Apple – Blakely's Red Gum – Slender Bamboo Grass – Purple Wiregrass – Yellow Burr-daisy – Kangaroo Grass (*Themeda triandra*) – Brown's Lovegrass – Common Rush – Red Grass – Rock Fern (*Cheilanthes sieberi*) – Twining glycine (*Glycine clandestina*) – *Oxalis perennans* – Fuzzweed (*Vittadinia cuneata*)
TEC Status	**BC Act status:** PCT 281 within the subject land represents 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 (Box Gum Woodland) CEEC (NSW TSSC 2020) listed under the BC Act as it: • occurs on fertile soils in the NSW South Western Slopes IBRA region, where the subject land is located • is dominated by representative canopy species Blakely's Red Gum, though the overstorey may be absent as a result of past clearing or thinning in some locations • has an understorey comprising grass and herb species which align with those listed in the floristic description. All zones for PCT 281 within the subject land meet the criteria for inclusion as the BC Act listed community. **EPBC Act status:** The Approved Conservation Advice for White Box – Yellow Box – Blakely's Red Gum grassy woodland and derived native grassland (DCCEEW 2023c) describes the listed community (under the EPBC Act) as a woodland that is dominated (or was formerly dominated) by a range of eucalyptus, most commonly including *Eucalyptus albens* (White Box), *Eucalyptus melliodora* (Yellow Box) and/or *Eucalyptus blakelyi* (Blakely's Red Gum), and in some areas the grey box species *E. microcarpa* and/or *E. moluccana* and also includes 'derived grasslands' that have resulted from the loss of the characteristic tree layer but retain an intact ground layer. To be considered part of the listed community, remnants must also: • have a predominantly native understorey (i.e. more than 50% of the perennial ground layer must comprise native species)

Attribute	Description
	• be 0.1 ha or greater in size and contain 12 or more native understorey species (excluding grasses), including one or more identified important species, or • be 2 ha or greater in size and have either natural regeneration of the overstorey species or an average of 20 or more mature trees per hectare. Using the above criteria, vegetation zones mapped as PCT 281 within the subject land do not meet the criteria for White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community (CEEC) as listed under the EPBC Act (see Table 7.2 for detailed assessment).
Estimate of percent cleared value of PCT across its distribution	67%
Patch size	101
Hollow-bearing trees	Not present
Photo: vegetation zone 1 – PCT 281_DNG, Plot 6 (directly impacted)	
Photo: PCT 281_woodland, Plot 2 (to be retained)	

Table 4.7 Exotic vegetation (additional lots)

Attribute	Description
PCT ID	Not applicable
Common name	Exotic vegetation
Vegetation class	Not applicable
Extent within subject land	148.40 ha, comprising: • Exotic pasture: 147.52 ha • Exotic planted: 0.88 ha
Survey effort	Detailed vegetation mapping was undertaken as described in Section 4.2.1. Exotic grassland/cropping and areas of exotic trees refer specifically to the areas which are clearly dominated by exotic species with low diversity or abundance of native species. Rapid vegetation assessments were undertaken to provide additional detail on the areas mapped as 'exotic vegetation' in order to differentiate areas of exotic versus derived native grassland.
Description and condition	Exotic vegetation included cropping, exotic grassland, and exotic planted trees. Exotic pastureland includes areas which are either ploughed or sown with crops. No native ground cover species are typically present, and if so, limited to very low coverage. Exotic trees include small stands near to farmsteads, such as Pepper Tree (*Schinus molle* var. *areira*). These areas were mapped as exotic, providing any other vegetation were also exotic (i.e. cropping or exotic grassland). Exotic species found in high abundance include Wimmera Ryegrass (*Lolium rigidum*), Soft Brome (*Bromus hordaceus*), *Avena sativa* (Oats), Canola (*Brassica napus*), Wall Fescue (*Vulpia muralis*), Catsear (*Hypochaeris radicata*), Purpletop (*Verbena bonariensis*), Flaxleaf Fleabane (*Conyza bonariensis*), Lamb's Tongues (*Plantago lanceolata*) and Subterranean Clover (*Trifolium subterraneum*). The pasture vegetation zone also had a number of high threat exotics prevalent including African Lovegrass (*Eragrostis curvula*), St Johns Wort (*Hypericum perforatum*), Paspalum (*Paspalum dilatatum*) and Saffron Thistle (*Carthamus lanatus*).
Justification of evidence used to identify the PCT	Three plots (Plots 9, 10 and 11) were undertaken in pasture on the additional lots on 3 and 4 November 2026 which are shown on Figure X and provided in Appendix X of the BDAR. These plots were undertaken to record the floristics, quantify the vegetation integrity score and justify its mapping as non-native vegetation. The vegetation integrity (VI) score for pasture was found to be 3 (see Plate 4.1), which is well below the threshold for offsetting.  IMPORT SITE Vegetation zones (Current vegetation integrity score) The land within this vegetation zone has experienced many forms of agricultural utilisation, including canola and barley cropping, as well as cropping/sowing of pasture-improving Ryegrass species in areas currently grazed by cattle. Due to past and ongoing disturbance, there is a high exotic species cover in areas, which have been cropped and in adjacent areas. Little to no native seedbank exists within these areas with native cover recorded as less than 5% across all pasture BAM plots. The majority of groundcover was dominated by exotic species with an average of 88.6% across all pasture plots. Nearly 10% of exotic coverage was comprised of high threat exotics within the pasture plots.
Status	Not listed

Attribute	Description
Estimate of percent cleared value of PCT	Not applicable
Photo	

Table 4.8 Vegetation description of PCT 281 Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion (BBRS)

Attribute	Description
PCT name	Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion
Vegetation formation	Grassy Woodlands
Vegetation class	Western Slopes Grassy Woodlands
Percent cleared (%)	70
Vegeation zones	Derived Native Grassland and Woodland
Extent within BBRS	1.56 ha
Threatened Ecological Community (TEC) Association	PCT 281 is associated with 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 (Box Gum Woodland) listed as Critically Endangered under the BC Act and the EPBC Act.
PCT Justification	The best fit PCT was identified using the BioNet Filter Tool within BioNet Vegetation Classification Database. The following parameters were added to the tool: • IBRA and subregion (NSW South Western Slopes and Inland Slopes)

Attribute	Description
	• Vegetation Formation - Grassy Woodland • Vegetation Class – Western Slopes Grassy Woodlands • Upper stratum - *Angophora floribunda* and *Eucalyptus blakelyi* were selected as the key tree species. The process returned 6 PCTs. Lithology and landscape positioning (alluvial sediments on footslopes), was also used to select best fit PCT. • PCT 274 was discarded due to the absence of *Eucalyptus albens* which is a significant feature of this PCT • PCT 3388 was discarded due to the absence of *Eucalyptus albens* which is a significant feature of this PCT • PCT 3397 was discarded due to the absence of *Eucalyptus melliodora* which is 'almost always' included in this PCT • PCT 3406 was discarded due to the absence of *Eucalyptus albens* which is a dominant canopy species in this PCT • PCT 3396 was discarded, whilst this PCT is a fit floristically, it primarily occurs in the Capertee and Goulburn River valleys, along the footslopes of the Liverpool Range and around Barraba and Bundarra. • PCT 281 was determined to be a better fit due to the dominance of *A. floribunda* with the presence of *E. blakelyi* occurring along lower slopes on alluvial soils. Plot data identified a variety of ground species that are typical of this PCT.
Vegetation description	The following vegetation zones were identified differentiated based on presence or absence of canopy and shrubs: • PCT 281-DNG. At the time of assessment this vegetation zone was predominantly native, characterised by a mix of native grasses including *Sporobolus creber, Eragrostis brownii* and *Eragrostis leptostachya.* Tree cover was minimal with less than 1%. There was an incursion of weeds consisting of predominately *Setaria parviflora* and *Eragrostis cilianensis* with *P. dilatatum, S. pumila, Conyza bonariensis,* but included native grasses such as *E. leptostachya, S. crebra, T. triandra* and *Chloris truncata*. • PCT 281-Woodland. This vegetation zone was identified along the roadsides The canopy layer was dominated by a diverse mix of species, including *A. floribunda, E. melliodora*, and *E. blakelyi.* The shrub layer was sparse, primarily consisting of *C. sifton* with small patches of *Atriplex semibaccata.* The ground cover layer was predominantly native, featuring a variety of grasses and herbaceous species, with only a minor incursion of weeds observed along the roadsides.
Photo: PCT 281 Woodland	

Attribute	Description
Photo: PCT 281 DNG	

Table 4.9 Vegetation description of PCT 277 Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion (BBRS)

Attribute	Description
PCT name	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion
Vegetation formation	Grassy Woodlands
Vegetation class	Western Slopes Grassy Woodlands
Percent cleared (%)	94
Extent within BBRS	1.29 ha
Threatened Ecological Community (TEC) Association	PCT 277 is associated with 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 (Box Gum Woodland) listed as Critically Endangered under the BC Act and the EPBC Act.
PCT Justification	The best fit PCT was identified using the BioNet Filter Tool within BioNet Vegetation Classification Database. The following parameters were added to the tool: • IBRA and subregion (NSW South Western Slopes and Inland Slopes) • Vegetation Formation - Grassy Woodland • Vegetation Class – Western Slopes Grassy Woodlands • Upper stratum – *Eucalyptus melliodora* was selected as the key tree species. The process returned 16 PCTs. These PCTs were further refined by adding ground cover from plot data. *Themeda triandra* (Kangaroo Grass) and *Austrostipa bigeniculata* were added to the PCT Filter Tool. This process returned two PCTs. Lithology and landscape positioning (colluvial sediments on footslopes), was also used to select best fit PCT. Other PCTs considered were: • PCT 266 was discarded due to the dominance of *Eucalyptus albens* associated with this PCT which was not recorded within the zone

Attribute	Description
	• PCT 277 was selected as the best fit due to the presence of *Eucalyptus melliodora* on colluvial soils with a predominately grassy ground layer.
Vegetation description	This PCT within the study area was scattered patches of remnant canopy of *E. blakelyi* and *E. melliodora*. The shrub layer was sparse typical of this vegetation type. The ground layer showed significant disturbance attributed to road maintenance activities such as road grading and the formation of culverts for drainage. These disturbances have heavily impacted the area, introducing weeds and exotic pastures, which dominate much of the vegetation. Notable invasive species include *Paspalum dilatatum* (Paspalum), *Avena fatua* (Wild Oats), and *Bromus diandrus* (Great Brome). Despite these impacts patches of remnants of native grasses persisted throughout this zone. *Themeda triandra* and *Austrostipa bigeniculata* were recorded in scattered patches alongside *Aristida ramosa, Sporobolus crebra* and *Calotis lappulacea.* Two vegetation zones were identified, differentiated based on the presence or absence of canopy cover: • PCT 277-Woodland. This zone featured a canopy dominated by *E. melliodora with E. blakelyi* as a co-dominate species and occasional occurrences of *Angophora floribunda*. The ground layer contained native grasses including *Themeda triandra, Aristida ramosa* and *Sporobolus creber*. Agricultural weeds were abundant including *Lolium perenne* (Rye Grass), *Chloris gayana* (Rhodes Grass) and *Bromus diandrus*. • PCT 277-DNG. This zone lacked a canopy layer but shared the same ground layer composition as the Woodland zone. Native grasses were still evident interspersed with invasive weeds.
Photo: PCT 277 Woodland	

Attribute	Description
Photo: PCT 277 DNG	

4.3.4 Vegetation integrity scores

Two PCTs occur in the subject land, each consisting of a DNG and woodland vegetation zone. These zones were entered into the respective BAMC child cases to determine the vegetation integrity score. As the subject land has been assessed in two parts, two BAMC cases will be lodged for the project. This also allows the proponent to stage the offset credit requirement of the project, an opportunity that is provided to state significant proposals in accordance with the BOS (refer to Section 6.6iii). Given this, the vegetation integrity scores for the vegetation zones within the additional lots and the BBRS have been calculated independently.

A summary of the vegetation integrity score for the vegetation zones to be impacted within the additional lots and the BBRS is provided in Table 4.10 and Table 4.11 respectively.

Table 4.10 Summary of vegetation zones within the additional lots (EMM)

Vegetation zone	PCT ID	PCT name	Condition	Ancillary	Extent in subject land (ha)	Vegetation integrity score
1	281	Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	DNG	DNG	68.96	18
2	218	Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	Woodland	Woodland	0.35	41.6
Total					**69.31**	

Table 4.11 Summary of vegetation zones within BBRS

Vegetation zone	PCT ID	PCT name	Condition	Ancillary	Extent in subject land (ha)	Vegetation integrity score
1	281	Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	Woodland	Woodland	1.38	55.6
2	277	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Woodland	Woodland	0.57	41.1
3	281	Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	DNG	DNG	0.18	59.1
4	277	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	DNG	DNG	0.72	35.8
Total					**2.85**	

4.3.5 Threatened ecological communities

i NSW Biodiversity Conservation Act

Based on the assessment of vegetation with the subject land, one critically endangered ecological community (CEEC) listed under the BC Act has been recorded, occurring in a derived native grassland and a woodland form. This CEEC is the 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 (herein referred to as White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland).

A summary of this CEEC within the subject land is provided in Table 4.12.

Table 4.12 Threatened ecological communities recorded in the subject land

TEC	EPBC Act	BC Act	Associated PCTs and vegetation zones	Additional lots - direct impact (ha)	BBRS - direct impact (ha)	Total area (ha)
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Does not meet criteria for listing	CEEC	PCT 277: DNG	0.0	0.72	0.72
			PCT 277: Woodland	0.0	0.57	0.57
			PCT 281: DNG	68.96	0.18	69.14
			PCT 281: Woodland	0.35	1.38	1.73
Total area (ha)	-	-	-	**69.31**	**2.85**	**72.16**

ii Commonwealth Environment Protection and Biodiversity Conservation Act

Based on the assessment of vegetation within the subject land, no threatened ecological communities listed under the EPBC Act have been recorded within the subject land. Detailed assessment of potential EPBC Act listed communities occurring within the subject land can be found in Section 7.

5 Threatened species

5.1 Threatened species habitat description

The subject land occurs as a highly fragmented agricultural landscape. The land is primarily utilised for livestock and agricultural pasture, which has resulted in the majority of remnant vegetation being reduced to exotic cropping land. Where native vegetation persists, it is generally found within riparian areas and consists of derived native grasslands, with occasional patches of native canopy cover predominantly along roadside corridors or scattered individual paddock trees. The grasslands have limited native diversity, and lack habitat features such as hollow logs and rocky areas.

Areas of quality remnant vegetation of moderate-high condition remain along BBRS in the roadside corridor where there is a moderate level of litter cover and fallen timber. It comprises mature trees with suitable small to large hollows for arboreal mammals and large bird species such as cockatoo and owl species. No large raptor nests were observed within the subject land during the habitat assessment. The vegetated corridor also has the potential to provide foraging habitat for many species including birds and arboreal mammals.

Waterways within the subject land are highly degraded due to historical and current agricultural practices and are limited to a series of isolated online dams. These dams lack riparian vegetation and have high turbidity and sediment load due to stock access. Where waterways are connected within the subject land, a highly eroded gully occurs due to the apparent sandy substrate associated with the landscape. These gullies are very shallow and are disconnected by man-made weirs and roads. These waterways are unlikely to provide habitat for threatened fish species.

5.2 Ecosystem credit species

Ecosystem credit species are threatened species that can be reliably predicted to use an area of land based on habitat surrogates. For the purposes of the BAM (DPIE 2020), ecosystem credit species are deemed to be offset through the habitat surrogates (PCTs) in which they occur.

A list of ecosystem credit species predicted to occur within the subject land, based on the PCTs present and generated by the calculator associated within the BAM (DPIE 2020) is provided in Table 5.1. The potential for these species to occur within the subject land was assessed in accordance with section 5.2.2 of the BAM (DPIE 2020).

As an additional PCT was identified within BBRS and this portion of the subject land was assessed independently, some species have been predicted to occur within BBRS and not the additional lots. These species have been identified within Table 5.1. None of these species were excluded from the assessment.

Table 5.1 Assessment of ecosystem credit species within the subject land

Scientific name	Common name	Associated PCTs	Project component
Anthochaera phrygia	Regent Honeyeater	281, 277	BBRS and additional lots
Aphelocephala leucopsis	Southern Whiteface	277	BBRS only
Artamus cyanopterus	Dusky Woodswallow	281, 277	BBRS and additional lots
Callocephalon fimbriatum	Gang-gang Cockatoo	281, 277	BBRS and additional lots
Chalinolobus picatus	Little Pied Bat	281	BBRS and additional lots
Chthonicola sagittata	Speckled Warbler	281, 277	BBRS and additional lots
Circus assimilis	Spotted Harrier	281, 277	BBRS and additional lots

Scientific name	Common name	Associated PCTs	Project component
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	281, 277	BBRS and additional lots
Daphoenositta chrysoptera	Varied Sittella	281, 277	BBRS and additional lots
Dasyurus maculatus	Spotted-tailed Quoll	281, 277	BBRS and additional lots
Falco subniger	Black Falcon	281, 277	BBRS and additional lots
Falsistrellus tasmaniensis	Eastern False Pipistrelle	277	BBRS only
Glossopsitta pusilla	Little Lorikeet	281, 277	BBRS and additional lots
Grantiella picta	Painted Honeyeater	281, 277	BBRS and additional lots
Haliaeetus leucogaster	White-bellied Sea-Eagle	281, 277	BBRS and additional lots
Hieraaetus morphnoides	Little Eagle	281, 277	BBRS and additional lots
Hirundapus caudacutus	White-throated Needletail	281, 277	BBRS and additional lots
Lathamus discolor	Swift Parrot	281, 277	BBRS and additional lots
Lophoictinia isura	Square-tailed Kite	281, 277	BBRS and additional lots
Melanodryas cucullata cucullata	South-eastern Hooded Robin	281, 277	BBRS and additional lots
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	281, 277	BBRS and additional lots
Miniopterus orianae oceanensis	Large Bent-winged Bat	281, 277	BBRS and additional lots
Neophema pulchella	Turquoise Parrot	281, 277	BBRS and additional lots
Petaurus australis	Yellow-bellied Glider	277	BBRS only
Petroica boodang	Scarlet Robin	281, 277	BBRS and additional lots
Petroica phoenicea	Flame Robin	281, 277	BBRS and additional lots
Polytelis swainsonii	Superb Parrot	281, 277	BBRS and additional lots
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	281, 277	BBRS and additional lots
Pteropus poliocephalus	Grey-headed Flying-fox	281, 277	BBRS and additional lots
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	281, 277	BBRS and additional lots
Stagonopleura guttata	Diamond Firetail	281, 277	BBRS and additional lots
Varanus rosenbergi	Rosenberg's Goanna	281	BBRS and additional lots

5.3 Species credit species

5.3.1 Candidate species assessment

In accordance with Step 3 (section 5.2.3 of BAM (DPIE 2020)), a field assessment of habitat constraints and microhabitats was undertaken in the field during all surveys to determine the suitability of habitat within the subject land for:

- predicted species (ecosystem credit species associated with recorded PCTs, predicted by the BAMC)
- candidate species (species credit species associated with specific geographic and landscape feature constraints)
- species predicted to occur by the EPBC Act Protected Matters Search Tool.

Candidate species predicted by the BAMC are shown in Table 5.2. An assessment of the geographic and landscape constraints has been provided for each species, with a justification provided where species have been excluded, in accordance with Steps 1 to 3 (sections 5.2.1 to 5.2.3) of the BAM.

As an additional PCT was identified within BBRS and this portion of the subject land was assessed independently, some species have been predicted to occur within BBRS and not the additional lots. These species have been identified within Table 5.1.

Table 5.2 Candidate threatened species assessment

Step 1 – Identify threatened species for assessment		Step 2 – Assessment of habitat constraints and vagrant species			Step 3 – Identify candidate species for further assessment	
Scientific name	**Common name**	**Candidate species (yes/no) and rationale**	**Constraint present in subject land?**	**Vagrant species?**	**BBRS** **Candidate species (yes/no) and rationale**	**Additional lots** **Candidate species (yes/no) and rationale**
Flora						
Acacia ausfeldii	Ausfeld's Wattle	-	-	N/A	Yes. Can be found in woodlands with a *Cassinia spp.* dominated understorey.	Yes. Potential habitat occurs within the subject land. Associated species include *Eucalyptus albens, E. blakelyi* and *Callitris spp.*, with an understorey dominated by *Cassinia spp.* and grass.
Ammobium craspedioides[1]	Yass Daisy	South of Cowra.	-	N/A	No. The subject land is not located South of Cowra.	No. The subject land is not located South of Cowra.
Cullen parvum[1]	Small scurf-pea	-	-	N/A	Yes. Associated with Box Gum Woodland.	Yes. Associated with Box Gum Woodland.
Dichanthium setosum	Bluegrass	-	-	N/A	Yes. Potential habitat present. Associated with heavy black soils and red-brown loams with clay subsoil. Often found in disturbed areas.	Yes. Potential habitat exists within the subject land as this species is found in moderately disturbed areas such as cleared woodland, grassy roadside remnants and highly disturbed pasture.
Euphrasia arguta	-	-	-	N/A	Yes. Potential habitat present.	Yes. Potential habitat present. The species has been reported from eucalypt forest with a mix of grass and shrub understorey, often found in open disturbed areas and along roadsides indicating they respond to disturbance. Only areas of better-quality woodland were searched for this species, as it is considered unlikely to occur in the DNG.

Step 1 – Identify threatened species for assessment		Step 2 – Assessment of habitat constraints and vagrant species			Step 3 – Identify candidate species for further assessment	
Scientific name	**Common name**	**Candidate species (yes/no) and rationale**	**Constraint present in subject land?**	**Vagrant species?**	**BBRS** **Candidate species (yes/no) and rationale**	**Additional lots** **Candidate species (yes/no) and rationale**
Pomaderris cotoneaster	Cotoneaster Pomaderris	In northern portion of Inland Slopes subregion the species may occur east of the Castlereagh Highway. In southern portion of Inland Slopes subregion the species may occur east of the Snowy Mountains Highway and Wee Jasper Road.	Yes	N/A	Yes. The habitats include forest with deep, friable soil, amongst rock beside a creek, on rocky forested slopes and in steep gullies between sandstone cliffs (BCS 2022a). Potential habitat present in PCT_281 woodland in BBRS.	No. The subject land is east of the Castlereagh Highway in the northern portion of the Inland Slopes subregion, meeting the geographic limitation. However, the habitat is degraded (section 5.2.3 (2)(a)(ii) of the BAM). BCS (2025b) reports that Cotoneaster Pomaderris has been recorded in a range of habitats in predominantly forested country. The habitats include forest with deep, friable soil, amongst rock beside a creek, on rocky forested slopes and in steep gullies between sandstone cliffs (BCS 2022a). This species is associated with PCT 281, the majority of which is DNG, that has been historically cleared has no intact shrub or canopy species present. The PCT 281_woodland in the additional lots comprises paddock trees with a predominantly exotic understorey from intensive agricultural activities and cropping on the land. Therefore, there is no habitat for this species in the DNG. The exotic pastureland was similarly ruled out.
Prasophyllum petilum	Tarengo Leek Orchid	-	-	N/A	Yes. Found in Box Gum Woodlands with grassy understorey often with *Themeda triandra.*	Yes. Subject land contains potential habitat of grassy ground layer containing areas of Kangaroo Grass under Box-Gum Woodland.
Prasophyllum sp. Wybong	-	-	-	N/A	Yes. Occurs in open Eucalypt woodland and grasslands.	Yes. Subject land contains suitable habitat of open eucalypt woodland and grassland.

Step 1 – Identify threatened species for assessment		Step 2 – Assessment of habitat constraints and vagrant species			Step 3 – Identify candidate species for further assessment	
Scientific name	**Common name**	**Candidate species (yes/no) and rationale**	**Constraint present in subject land?**	**Vagrant species?**	**BBRS** **Candidate species (yes/no) and rationale**	**Additional lots** **Candidate species (yes/no) and rationale**
Swainsona recta[1]	Small Purple-pea	-	-	N/A	Yes. Found in grasslands and grassy woodlands in association with *Eucalyptus blakelyi* and *E. melliodora*.	Yes. Found in grasslands and grassy woodlands in association with *Eucalyptus blakelyi* and *E. melliodora*.
Swainsona sericea	Silky Swainson-pea	-	-	N/A	Yes. Species is associated with Box Gum Woodland, which occurs within the subject land.	Yes. Species is associated with Box Gum Woodland, which occurs within the subject land.
Fauna						
Anthochaera phrygia	Regent Honeyeater (Breeding)	As per Important Habitat Map.	No	N/A	No. The subject land is not within mapped important habitat.	No. The subject land is not within mapped important habitat.
Aprasia parapulchella	Pink-tailed Legless Lizard	Rocky areas, or within 50 m of rocky areas.	No	N/A	No. Habitat constraints. Rocky areas are absent from the subject land.	No. Habitat constraints. Rocky areas are absent from the subject land.
Burhinus grallarius	Bush Stone-curlew	Fallen/standing dead timber including logs.	Yes	No	Yes. Yes, fallen/standing dead timber including logs are present throughout remnant woodland patches within the study area.	No. The study area contains some open areas of Box Gum Woodland with fallen timber; however, these areas are outside the subject land and are to be retained.
Callocephalon fimbriatum	Gang-gang Cockatoo (Breeding)	Eucalypt tree species with hollows at least 3 m above the ground and with hollow diameter of 7 cm or larger.	No	No	Yes. Several hollow bearing trees are present throughout the biodiversity study area which conform to this species' requirements.	No. No suitable breeding hollows were located within the subject land. Wooded areas of PCT 281 are to be retained.

Step 1 – Identify threatened species for assessment		Step 2 – Assessment of habitat constraints and vagrant species			Step 3 – Identify candidate species for further assessment	
Scientific name	**Common name**	**Candidate species (yes/no) and rationale**	**Constraint present in subject land?**	**Vagrant species?**	**BBRS** **Candidate species (yes/no) and rationale**	**Additional lots** **Candidate species (yes/no) and rationale**
Cercartetus nanus[1]	Eastern Pygmy-possum	N/A	N/A	No	Yes. This species may occupy small patches of vegetation in fragmented landscapes and although the species prefers habitat with a rich shrub understory, they are known to occur in grassy woodlands and the presence of Eucalypts alone is sufficient to support populations in low densities (TBDC 2023).	No. Not a predicted candidate species.
Chalinolobus dwyeri	Large-eared Pied Bat	Cliffs; within 2 km of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within 2 km of old mines or tunnels.[1]	Yes	No	No. Roosting/breeding: The BBRS does not intersect with a 2 km buffer of Barney's Reef rock formation, known breeding habitat for the Large-eared Pied Bat. Accordingly, native vegetation in the BBRS was excluded from the species polygon.	Yes. Roosting/breeding: A portion of the southern additional lot is within a 2 km buffer of Barney's Reef rock formation, known breeding habitat for the Large-eared Pied Bat. As the subject land is not within 100 m of the breeding habitat, no breeding habitat polygon has been drawn. In accordance with '*Species credit' threatened bats and their habitat: NSW survey guide for the Biodiversity Assessment Method* (OEH 2018), the portion of the subject land intersecting with the 2 km buffer of the breeding habitat represents potential foraging/hunting habitat for the species. Accordingly, this is how the species polygon extent was determined. The remaining portion of the subject land does not intersect with the 2km buffer and is therefore excluded from the species polygon.
Delma impar[1]	Striped Legless Lizard	South of the Mid-Western Highway.	No	No	No. The subject land is not located south of the Mid-Western Highway.	No. The subject land is not located south of the Mid-Western Highway.

Step 1 – Identify threatened species for assessment		Step 2 – Assessment of habitat constraints and vagrant species			Step 3 – Identify candidate species for further assessment	
Scientific name	**Common name**	**Candidate species (yes/no) and rationale**	**Constraint present in subject land?**	**Vagrant species?**	**BBRS** **Candidate species (yes/no) and rationale**	**Additional lots** **Candidate species (yes/no) and rationale**
Haliaeetus leucogaster	White-bellied Sea-Eagle (Breeding)	Living or dead mature trees within suitable vegetation within 1 km of a rivers, lakes, large dams or creeks, wetlands and coastlines.	Yes	No	Yes. Several stick nests were recorded throughout the BBRS study area. Further survey was required to determine if White-bellied Sea-Eagle were utilising these nests.	Yes. The subject land contains ephemeral creeks but is greater than 1 km from major rivers, creeks, wetlands. Potential nest trees occur within the subject land; however, targeted surveys were undertaken during the breeding season and no large stick nests were located.
Hieraaetus morphnoides	Little Eagle (Breeding)	Nest trees – live (occasionally dead) large old trees within vegetation.	Yes	No	Yes. Several stick nests were recorded throughout the BBRS study area. Further survey was required to determine if Little Eagles were utilising these nests.	Yes. Potential nest trees occur within the subject land; however, targeted surveys were undertaken during the breeding season and no large stick nests were located.
Keyacris scurra[1]	Key's Matchstick Grasshopper	N/A	N/A	No	Yes. Potential to occur in higher condition vegetation zones.	N/A. Not a predicted candidate species.
Lathamus discolor	Swift Parrot (Breeding)	As per Important Habitat Map.	No	No	No. The subject land is not within mapped important habitat.	No. The subject land is not within mapped important habitat.

Step 1 – Identify threatened species for assessment		Step 2 – Assessment of habitat constraints and vagrant species			Step 3 – Identify candidate species for further assessment	
Scientific name	**Common name**	**Candidate species (yes/no) and rationale**	**Constraint present in subject land?**	**Vagrant species?**	**BBRS** **Candidate species (yes/no) and rationale**	**Additional lots** **Candidate species (yes/no) and rationale**
Litoria booroolongensis	Booroolong Frog	N/A	N/A	No	No. There is no permanent or near permanent river environment with rocky structures (bedrock or cobble) within the BBRS study area and therefore surveys were not required.	No. Habitat degraded. The subject land does not support permanent streams, with all waterways declining to disconnected man-made dams during low flow. Furthermore, waterways within the subject land do not support cobble banks or other rock substrate along stream margins that would provide breeding habitat for this species. The subject land does not provide suitable habitat for this species.
Lophoictinia isura	Square-tailed Kite (Breeding)	Nest trees.	Yes	No	Yes. Several stick nests were recorded throughout the BBRS study area. Further survey was required to determine if Square-tailed Kites were utilising these nests.	Yes. Potential nest trees occur within the subject land; however, targeted surveys were undertaken during the breeding season and no large stick nests were located.
Miniopterus orianae oceanensis	Large Bent-winged Bat (Breeding)	Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code "IC - in cave;" observation type code "E nest-roost;" with numbers of individuals >500.[1]	No	No	No. Breeding habitat is absent from the BBRS study area.	No. Breeding habitat is absent from the BBRS study area.

Step 1 – Identify threatened species for assessment		Step 2 – Assessment of habitat constraints and vagrant species			Step 3 – Identify candidate species for further assessment	
Scientific name	**Common name**	**Candidate species (yes/no) and rationale**	**Constraint present in subject land?**	**Vagrant species?**	**BBRS** **Candidate species (yes/no) and rationale**	**Additional lots** **Candidate species (yes/no) and rationale**
Myotis macropus	Southern Myotis	Waterbodies with permanent pools/stretches 3 m or wider, including rivers, large creeks, billabongs, lagoons, estuaries, dams and other waterbodies, on or within 200 m of the site.	Yes	No	Yes.Suitable habitat is located within the 200 m of the BBRS study area.	Yes. The subject land contains a number of farm dams which are 3 m or wider. Derelict buildings do occur within the subject land which may provide sub-optimal roosting for the species. It is considered unlikely the species would be breeding in these structures given the large areas of more suitable breeding habitat within the broader landscape.
Ninox connivens	Barking Owl (Breeding)	Living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above the ground.	No	No	Yes. Several hollow bearing trees conforming to the species requirements are present throughout the BBRS study area.	No. Habitat constraints. The subject land does not contain living or dead trees with hollows greater than 20 cm diameter and greater than 4 m above the ground. Wooded areas outside of the subject land are to be retained. However, owl surveys and nocturnal stag watches were conducted within the study area as a precaution.
Ninox strenua	Powerful Owl (Breeding)	Living or dead trees with hollow greater than 20 cm diameter.	No	No	Yes. Several hollow bearing trees conforming to the species requirements are present throughout the BBRS study area.	No. Habitat constraints. The subject land does not contain living or dead trees with hollow greater than 20 cm diameter. However, owl surveys and nocturnal stag watches were conducted within the study area as a precaution.

Step 1 – Identify threatened species for assessment		Step 2 – Assessment of habitat constraints and vagrant species			Step 3 – Identify candidate species for further assessment	
Scientific name	**Common name**	**Candidate species (yes/no) and rationale**	**Constraint present in subject land?**	**Vagrant species?**	**BBRS** **Candidate species (yes/no) and rationale**	**Additional lots** **Candidate species (yes/no) and rationale**
Petaurus norfolcensis	Squirrel Glider	N/A	N/A	No	Yes. This species inhabits mature or old growth Box, Box Ironbark and River Red Gum Forest west of the Great Dividing Range (TSDC 2023).	No. Habitat degraded. Potential foraging trees occur within the canopied areas of PCT 281 outside of the subject land, which are to be retained. This habitat is small and highly fragmented being surrounded by large areas of open grassland and therefore does not provide suitably connected habitat for this species. Areas of DNG for PCT 281 within the subject land do not provide habitat for this species.
Petaurus norfolcensis - endangered population[1]	Squirrel Glider in the Wagga Wagga LGA	Wagga Wagga LGA.	No	No	No. The subject land is not located within the Wagga Wagga LGA.	No. The subject land is not located within the Wagga Wagga LGA.
Petrogale penicillata	Brush-tailed Rock-wallaby	Land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or cliff lines.	No	No	No. The BBRS study area is greater than 1 km from clifflines and rocky areas.	No. Habitat constraints. The subject land is located approximately 1.5 km north of the ridgeline to the south, and the species is unlikely to utilise the pastures or native woodland patches surrounding this ridgeline due to the isolated and degraded condition of these vegetation zones within the subject land. This habitat is highly fragmented and does not provide suitably connected foraging habitat.

Step 1 – Identify threatened species for assessment		Step 2 – Assessment of habitat constraints and vagrant species			Step 3 – Identify candidate species for further assessment	
Scientific name	**Common name**	**Candidate species (yes/no) and rationale**	**Constraint present in subject land?**	**Vagrant species?**	**BBRS** **Candidate species (yes/no) and rationale**	**Additional lots** **Candidate species (yes/no) and rationale**
Phascogale tapoatafa	Brush-tailed Phascogale	North of Hwy from Ulan to Gulgong, North of Hwy East from Gulgong to Wellington, N/NW of highway from Wellington to Molong, W/NW of Hwy from Molong to Forbes.	N/A	No	Yes. Found in dry sclerophyll forest with sparse ground cover.	No. Habitat degraded. Potential foraging trees occur within the canopied areas of PCT 281, outside of the subject land, which are to be retained. This habitat is nonetheless small and highly fragmented being surrounded by large areas of open grassland and therefore does not provide suitably connected habitat for this species. Areas of DNG for PCT 281 do not provide habitat for this species.
Phascolarctos cinereus	Koala	Important' habitat (however this is not a mapped important habitat area), defined by the density of koalas and quality of habitat determined by on-site survey.	No	No	Yes. Feed trees, as per Schedule 3 of the State Environment Planning Policy (Biodiversity and Conservation) 2021 are present throughout the BBRS study area.	No. Habitat degraded. Potential foraging trees occur within the canopied areas of PCT 281, outside of the subject land, which are to be retained. Areas of DNG for PCT 281 within the subject land do not provide habitat for this species.

Step 1 – Identify threatened species for assessment		Step 2 – Assessment of habitat constraints and vagrant species			Step 3 – Identify candidate species for further assessment	
Scientific name	**Common name**	**Candidate species (yes/no) and rationale**	**Constraint present in subject land?**	**Vagrant species?**	**BBRS** **Candidate species (yes/no) and rationale**	**Additional lots** **Candidate species (yes/no) and rationale**
Polytelis swainsonii	Superb Parrot (Breeding)	Living or dead *E. blakelyi, E. melliodora, E. albens, E. camaldulensis, E. microcarpa, E. polyanthemos, E. mannifera, E. intertexta* with hollows greater than 5 cm diameter; greater than 4 m above ground or trees with a DBH of greater than 30 cm.	No	Yes	Yes. Several hollow bearing trees are present throughout the BBRS study area which conform to this species' requirements.	No. The subject land does not contain suitable hollows for breeding and all potential foraging habitat is within the woodland areas of PCT 281, which are to be retained. Areas of DNG for PCT 281 do not provide sufficient habitat for this species.
Pteropus poliocephalus	Grey-headed Flying-fox (Breeding)	Breeding camps	No	No	No. An assessment of habitat confirmed that no breeding camps are present within BBRS study area.	No. This species occurs in a wide variety of habitat types including tall sclerophyll forests and woodlands. Suitable woodland habitat may occur outside the subject land, but these areas are to be retained.
Synemon plana[1]	Golden Sun Moth	Occurs south of the Mid-Western Highway.	No	No	No. The BBRS study area is north of the Mid-Western Highway.	No. The additional lots are north of the Mid-Western Highway.

Step 1 – Identify threatened species for assessment		Step 2 – Assessment of habitat constraints and vagrant species			Step 3 – Identify candidate species for further assessment	
Scientific name	**Common name**	**Candidate species (yes/no) and rationale**	**Constraint present in subject land?**	**Vagrant species?**	**BBRS** **Candidate species (yes/no) and rationale**	**Additional lots** **Candidate species (yes/no) and rationale**
Tyto novaehollandiae	Masked Owl (Breeding)	Hollow bearing trees Living or dead trees with hollows greater than 20 cm diameter.	-	-	Yes. Several hollow bearing trees are present throughout the BBRS study area which conform to this species' requirements.	No. Habitat constraints. The subject land does not contain living or dead trees with hollow greater than 20 cm diameter. However, owl surveys and nocturnal stag watches were conducted within the study area as a precaution.
Vespadelus troughtoni	Eastern Cave Bat (breeding/foraging	Cliffs; within 2 km of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within 2 km of old mines or tunnels.[1]	Yes	No	No. Roosting/breeding: The BBRS does not intersect with a 2 km buffer of Barney's Reef rock formation, known breeding habitat for the Large-eared Pied Bat. Accordingly, native vegetation in the BBRS was excluded from the species polygon.	Yes. Roosting/breeding: A portion of the southern additional lot is within a 2 km buffer of Barney's Reef rock formation, known breeding habitat for the Large-eared Pied Bat. As the subject land is not within 100 m of the breeding habitat, no breeding habitat polygon has been drawn. In accordance with '*Species credit' threatened bats and their habitat: NSW survey guide for the Biodiversity Assessment Method* (OEH 2018), the portion of the subject land intersecting with the 2 km buffer of the breeding habitat represents potential foraging/hunting habitat for the species. Accordingly, this is how the species polygon extent was determined. The remaining portion of the subject land does not intersect with the 2km buffer and is therefore excluded from the species polygon.

1. Species only predicted for the BBRS within the BAMC.

5.3.2 Candidate species credit species requiring further assessment

Candidate species for further assessment were identified in accordance with Step 1 to 2 (sections 5.2.1 to 5.2.2) of the BAM (DPIE 2020).

An additional PCT was identified within BBRS. As such, some species have been identified as requiring further assessment within BBRS and not the additional lots. A list of species requiring further assessment for the additional lots and BBRS is provided in Table 5.3 and Table 5.4 respectively.

Table 5.3 Candidate species credit species requiring further assessment for the additional lots

Scientific name	Common name	EPBC Act	BC Act	Flora or fauna
Acacia ausfeldii	Ausfeld's Wattle	-	Vulnerable	Flora
Chalinolobus dwyeri	Large-eared Pied Bat	Endangered	Endangered	Fauna
Dichanthium setosum	Bluegrass	Vulnerable	Vulnerable	Flora
Euphrasia arguta	-	Critically endangered	Critically endangered	Flora
Haliaeetus leucogaster	White-bellied Sea-eagle	-	Vulnerable	Fauna
Hieraaetus morphnoides	Little Eagle	-	Vulnerable	Fauna
Lophoictinia isura	Square-tailed Kite	-	Vulnerable	Fauna
Myotis macropus	Southern Myotis	-	Vulnerable	Fauna
Prasophyllum petilum	Tarengo Leek Orchid	Endangered	Endangered	Flora
Prasophyllum sp. Wybong	-	Critically endangered	-	Flora
Swainsona sericea	Silky Swainson-pea	-	Vulnerable	Flora
Tyto novaehollandiae	Masked Owl	-	Vulnerable	Flora
Vespadelus troughtoni	Eastern Cave Bat	-	Vulnerable	Fauna

Table 5.4 Candidate species credit species requiring further assessment for Birriwa Bus Route South (ELA 2025)

Scientific name	Common name	EPBC Act	BC Act	Flora or fauna
Acacia ausfeldii	Ausfeld's Wattle	-	Vulnerable	Flora
Burhinus grallarius	Bush Stone-curlew	-	Endangered	Fauna
Callocephalon fimbriatum	Gang-gang Cockatoo	Endangered	Vulnerable	Fauna
Cercartetus nanus	Eastern Pygmy-possum	-	Vulnerable	Fauna
Cullen parvum	Small Scurf-pea	-	Endangered	Flora
Dichanthium setosum	Bluegrass	Vulnerable	Vulnerable	Flora
Euphrasia arguta	Euphrasia arguta	Critically endangered	Critically endangered	Flora
Haliaeetus leucogaster	White-bellied Sea-Eagle	-	Vulnerable	Fauna

Scientific name	Common name	EPBC Act	BC Act	Flora or fauna
Hieraaetus morphnoides	Little Eagle	-	Vulnerable	Fauna
Keyacris scurra	Key's Matchstick Grasshopper	Endangered	Endangered	Fauna
Lophoictinia isura	Square-tailed Kite	-	Vulnerable	Fauna
Myotis macropus	Southern Myotis	-	Vulnerable	Fauna
Ninox connivens	Barking Owl	-	Vulnerable	Fauna
Ninox strenua	Powerful Owl	-	Vulnerable	Fauna
Petaurus norfolcensis	Squirrel Glider	-	Vulnerable	Fauna
Phascogale tapoatafa	Brush-tailed Phascogale	Vulnerable	Endangered	Fauna
Phascolarctos cinereus	Koala	Endangered	Endangered	Fauna
Polytelis swainsonii	Superb Parrot	Vulnerable	Vulnerable	Fauna
Pomaderris cotoneaster	Cotoneaster Pomaderris	Critically endangered	Critically endangered	Flora
Prasophyllum petilum	Tarengo Leek Orchid	Endangered	Critically endangered	Flora
Prasophyllum sp. Wybong	Prasophyllum sp. Wybong	Critically endangered	-	Flora
Swainsona recta	Small Purple-pea	Endangered	Endangered	Flora
Swainsona sericea	Silky Swainson-pea	-	Vulnerable	Flora
Tyto novaehollandiae	Masked Owl	-	Vulnerable	Fauna

5.3.3 Targeted survey methods

Targeted surveys for the additional lots were conducted by EMM while surveys for BBRS were assessed by ELA. As these two components represent two different project stages, separate candidate species assessments were undertaken, meaning that some species were identified as requiring further assessment within BBRS and not the additional lots. As such, the species targeted during surveys and the targeted survey methods conducted differ between the project components. The targeted survey methods are described in the following sections.

i Targeted flora surveys

a Additional lots (EMM)

Targeted flora surveys within the additional lots were undertaken over four separate survey periods. Flora species *Acacia ausfeldii* (Ausfield's Wattle), *Prasophyllum petilum* (Tarengo Leek Orchid), *Prasophyllum sp. Wybong*, and *Swainsona sericea* (Silky Swainson-pea) were surveyed between 10 and 11 October 2023, and then a third survey was completed on 3 September 2024. Surveys for *Dichanthium setosum* (Bluegrass) and *Euphrasia arguta* were completed between 23 and 25 January 2024, and additional surveys were completed for Bluegrass between 20 and 22 May 2024 due to the large areas of potentially suitable habitat. Surveys were undertaken in accordance with DPIE (2020b) and Commonwealth (DoE 2013) guidelines and consisted of transects spaced at intervals of 10 m. An overview of the target species and the survey timing is provided in Table 5.5. The targeted flora transect locations are illustrated on Figure 5.1.

Targeted flora transects were generally conducted throughout the DNG areas of PCT 281 within the additional lots as well as the low condition areas of PCT 281 located outside of the additional lots but within the study area (Figure 5.1), as these areas supported higher native species cover than the exotic pasture. Despite supporting a higher native species cover, the areas of DNG within the additional lots were still subject to disturbance through ongoing agricultural practices such as livestock grazing and improvement with fertiliser.

Targeted surveys were not conducted in areas of exotic pasture. These areas had a low native species diversity, dominated by grazing tolerant grasses and sown species. Agricultural practices conducted within these areas include tilling/ploughing, improvement with fertiliser, hay making and livestock grazing. This has altered the original PCT irrevocably and was considered unsuitable habitat for threatened flora species, including those disturbance- tolerant species, especially given that no threatened species were recorded in higher condition habitats (refer to Section 5.3.3iii). There were also no known populations of threatened flora species adjacent to the study area, reducing the chance of local dispersal into the study area.

Table 5.5 Targeted threatened flora method

Scientific name	Common name	Recommended survey period (BioNet TBDC/BAMC)	Survey date
Acacia ausfeldii	Ausfeld's Wattle	August-October	10-11 October 2023 3 September 2024
Dichanthium setosum	Bluegrass	November-May	23-25 January 2024 20-22 May 2024
Euphrasia arguta	–	November-March	23-25 January 2024
Prasophyllum petilum	Tarengo Leek Orchid	September-December	10-11 October 2023 3 September 2024
Prasophyllum sp. Wybong	–	September-October	10-11 October 2023 3 September 2024
Swainsona sericea	Silky Swainson-pea	September-November	10-11 October 2023 3 September 2024

b BBRS (ELA)

Flora surveys were conducted in accordance with the Threatened Flora Survey Guideline (DPIE 2020b), which outlines two assessment methods based on size of suitable habitat. Parallel targeted surveys (10 m wide) were undertaken within the BBRS study area in November 2023, March 2024 and September 2024. Further survey targeting *Cullen Parvum*, a recent requirement from the BAMC, was completed in December 2024. Two shrubs, *Acacia ausfeldii* and *Pomaderris cotoneaster* were surveyed outside their required flowering period, however, these species are large and conspicuous, readily enabling identification to genus level which if found, would trigger a requirement for further survey. Prior to the spring surveys in 2023 and 2024, local reference sites were visited. At these reference sites in and around Mudgee, *Prasophyllum petilum* (Plate 5.1), *Swainsona recta* and *S. sericea* were observed flowering, confirming that the timing of the surveys within the BBRS study area was appropriate. Flora surveys undertaken including survey timing is detailed below in Table 5.6 and shown on Figure 5.1.

Table 5.6 Targeted threatened flora timing (ELA)

Scientific name	Common name	Recommended survey period (BioNet TBDC/BAMC)	Survey date
Acacia ausfeldii	Ausfeld's Wattle	August-October	27-29 November 2023
Cullen parvum	Small Scurf-pea	December-January	11 December 2024
Dichanthium setosum	Bluegrass	November-May	27-29 November 2023 19 March 2024
Euphrasia arguta	–	November-March	27-29 November 2023 19 March 2024
Pomaderris cotoneaster	Cotoneaster Pomaderris	October-November	27-29 November 2023
Prasophyllum petilum	Tarengo Leek Orchid	September-December	27-29 November 2023 25 September 2024
Prasophyllum sp. Wybong	–	September-October	27-29 November 2023 25 September 2024
Swainsona recta	Small Purple-pea	September-November	27-29 November 2023 25 September 2024
Swainsona sericea	Silky Swainson-pea	September-November	27-29 November 2023 25 September 2024

Plate 5.1 *Prasophyllum petilum* at local reference site (Photo credit R. Croake (23 Sep 2024))

ii Targeted fauna surveys for additional lots (EMM)

Targeted surveys in the additional lots were conducted for potential breeding habitat for birds of prey by identifying any large stick nests.

As a precautionary measure and to further inform the project's design process, including the avoid and minimise, and offset approach, diurnal surveys were conducted for potential woodland birds and nocturnal surveys were undertaken for threatened owl species. These surveys provided additional insight into habitat values and potential species presence, ensuring that biodiversity impacts were appropriately assessed and mitigated.

Targeted fauna surveys within the additional lots were undertaken over 11 days between 20 May 2024 and 4 September 2024. Details of these surveys are provided in Table 5.7 and Table 5.8 . Surveys were conducted in accordance with various NSW (DEC 2004) and Commonwealth (DSEWPaC 2010) guidelines. The targeted fauna survey locations are illustrated on Figure 5.1.

a Diurnal birds

Diurnal bird surveys were undertaken within the additional lots for the following raptor species:

- Little Eagle (*Hieraaetus morphnoides*)
- Square-tailed Kite (*Lophoictinia isura*)
- White-bellied Sea-eagle (*Haliaeetus leucogaster*).

Additional species which were opportunistically surveyed for included Superb Parrot (*Polytelis swainsonii*) and Gang-gang Cockatoo (*Callocephalon fimbriatum*) given the suitability of habitat within the study area.

Bird survey methods and survey effort have been developed in accordance with DEC (2004) and DSEWPaC (2010) guidelines. Methods include areas searches and targeted nest searches for the hollow nesting birds and birds of prey. Methods and survey effort are outlined in Table 5.7.

Table 5.7 Methods and survey effort – diurnal birds

Method and dates	Survey description	Survey effort
Area searches 10 and 11 October 2024 22 and 23 January 2024 3 September 2024	• Land based areas searches and transects. • Surveyors traversed the site paying particular attention to remnant trees and looking for soaring birds of prey. • All calls and habitat features were investigated. • Birds observed or heard were recorded.	DEC (2004) has not resolved bird survey requirements and does not provide guidance on survey effort. DSEWaPaC (2010a) was reviewed and sympatric species survey efforts indicated a requirement for 10 hours over 5 days (2 hours per day) for sites less than 50 ha. No survey effort for larger sites is provided. A total of 5 bird surveys have been completed for the additional lots within the study area, with a total of 8 person hours. There is no minimum survey requirement as these species did not require targeted survey.

Method and dates	Survey description	Survey effort
Targeted nest searches 10 and 11 October 2024 22 and 23 January 2024 3 September 2024	• Observers travelled across available habitat, seeking out habitat features including nest trees and hollows. • Suitable nest or breeding hollows were marked and watched to determine if they are being used by the target species.	DEC (2004) has not resolved nest search requirements and does not provide guidance on survey effort. DSEWPaC (2010a) was reviewed and sympatric species survey efforts indicated 8 hours over 4 days (2 hours per day) for sites less than 50 ha. A total of 5 bird surveys have been completed for the additional lots within the study area, with a total of 8 person hours. There is no minimum survey requirement as these species did not require targeted survey.

b Nocturnal birds

Nocturnal bird surveys were undertaken for the following species:

- Barking Owl
- Powerful Owl
- Masked Owl.

Whilst no hollow bearing trees are located within the additional lots, three hollow bearing trees were recorded within the study area and adjacent to the additional lots that were identified as potentially suitable habitat for these species. These hollow bearing trees are not proposed to be removed as part of the project.

Bird survey methods and survey effort were developed in accordance with DEC (2004). Methods included call playback and spotlighting. Methods and survey effort are outlined in Table 5.8. The three hollow bearing trees that were stag watched during the nocturnal bird surveys are shown on Figure 5.1.

Table 5.8 Methods and survey effort – nocturnal birds

Method and dates	Survey description	Survey effort
Targeted nest searches and stag watching 1, 2, 22 and 23 August 2024	The TBDC previously outlined that active nest should be assessed for the presence of each target species. This was a requirement whilst surveys were taking place, however, stag watching potential forest owl nests is no longer required. Previously, the TBDC stated that surveyors should look for signs of breeding forest owls and identify actual nest trees. These are no longer requirements under the BAM. DEC (2004) suggests stag watching potential roost hollows (for 30 minutes prior to sunset and 60 minutes after sunset).	A total of 12 stag watches of potential owl roosting hollows were undertaken for the additional lots within the study area, 30 minutes prior to sunset and up to 60 minutes after sunset. There is no survey requirement for these species as there are no suitable hollows within the subject land. Therefore, there is no minimum level of surveys required.

iii Targeted fauna surveys – BBRS (ELA)

Threatened fauna field surveys were undertaken to establish the presence/absence of candidate species produced by the BAM-C, listed in Table 5.4. Targeted surveys were conducted in accordance with established fauna guidelines including:

- NSW Survey Guide for Threatened Frogs. A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method (DPIE 2020b)
- Koala (Phascolarctos cinereus) Biodiversity Assessment Method Survey Guide (DPE 2022a)

- Threatened Reptiles – Biodiversity Assessment Method Survey Guide (DPE 2022b) • 'Species credits' threatened bats and their habitat NSW survey guide for the Biodiversity Assessment Method (DPIE 2021)
- NSW survey guide for the Biodiversity Assessment Method (DPIE 2020c)
- Threatened biodiversity survey and assessment. Guidelines for developments and activities (2004 working draft). NSW (DEC 2004).

Surveys were completed under ELA's scientific licence number SL100243.

a Diurnal bird surveys

Diurnal bird surveys were undertaken in spring 2023 and spring 2024 at 11 locations. The surveys employed an area search method covering 2 ha for 20 minutes, conducted either early in the morning (6:00 to 11:00 am) or afternoon (2:00 to 5:00 pm). All species observed or heard during these times were recorded. Additionally, ecologists made note of opportunistic sightings throughout other activities and whilst traversing the site. The field guide application Morcombe and Stewart (2024) was used to assist with bird identification and calls. Transect walks though the vegetation were used as a method to flush potential Bush Stone-curlews. Hollow Bearing Trees (HBTs) were recorded and assessed for hollow size and location to determine suitability as breeding habitat for specific species. Stick nests were also recorded. This assessment facilitated a targeted survey approach, with suitable HBTs and nests being monitored for the presence of breeding birds.

The diurnal bird survey effort is detailed below in Table 5.9 and shown in Figure 5.1.

Table 5.9 Candidate diurnal birds requiring targeted surveys (ELA)

Scientific name	Common name	Recommended survey period (BioNet TBDC/BAMC)	Survey date
Burhinus grallarius	Bush Stone-curlew	All year	27-29 November 2023 25 September 2024
Callocephalon fimbriatum	Gang-gang Cockatoo	October-January	27-29 November 2023 25 September 2024
Haliaeetus leucogaster	Bluegrass	November-May	27-29 November 2023 25 September 2024
Hieraaetus morphnoides	–	November-March	25 September 2024
Lophoictinia isura	Cotoneaster Pomaderris	October-November	27-29 November 2023
Polytelis swainsonii	Superb Parrot	September-December	27-29 November 2023 25 September 2024

b Nocturnal bird surveys

Surveys for threatened forest owls and the Bush Stone-curlew (Table 5.10) were conducted using spotlighting combined with call-play back techniques at four locations (Figure 5.1). Locations were set approximately 1 km apart in accordance with methods included within the TBDC (updated 2024). Owl calls were played for 15 seconds followed by 30 seconds of listening, repeated over a 15-minute period per survey. The volume of the broadcast call was increased with each consecutive call and the area around the broadcast call was searched using a handheld spotlight for a minimum of 15 minutes (total 30 minutes per survey). Calls for threatened owls were repeated at each location for six nights. Calls for Bush Stone-curlew were played for 30 seconds followed by 4.5 minutes of listening, repeated in a 5-minute cycle for 15 minutes per location. Surveys were repeated at each location for six nights.

Table 5.10 Candidate nocturnal birds requiring targeted surveys (ELA)

Scientific name	Common name	Recommended survey period (BioNet TBDC/BAMC)	Survey date
Burhinus grallarius	Bush Stone-curlew	All year	11-13 June 2024 17-20 June 2024
Ninox connivens	Barking Owl	All year	11-13 June 2024 17-20 June 2024
Ninox strenua	Powerful Owl	All year	11-13 June 2024 17-20 June 2024
Tyto novaehollandiae	Masked Owl	All year	11-13 June 2024 17-20 June 2024

c Mammal surveys

Mammals were surveyed using a combination of techniques, including remote cameras, spotlighting and hair and scat analysis. Spotlighting surveys were conducted using handheld LED spotlights, from either a slow-moving vehicle when tree canopy was sparse or on foot. Mammal survey effort is detailed below in Table 5.11 and shown in Figure 5.1.

Twenty-two remote cameras, deployed on 18 March 2024 were positioned approximately 1 to 2 m above the ground facing baited hair tubes attached to logs or on trees to target Eastern Pygmy Possums, Brush-tailed Phascogales and Squirrel Gliders (Figure 5.1).

In accordance with the TBDC, to survey for Brush-tailed Phascogales, a minimum of four cameras must be used for sites up to 1 ha, then an additional two cameras for every hectare of suitable habitat thereafter. Field plans were submitted to the BOS helpdesk on the 30 March 2024. The total area of suitable habitat and the number of cameras required is shown in Table 5.12. Replies for the BOS helpdesk confirmed that the survey efforts for each section were adequate (Appendix C). Cameras were deployed on the 19 March to 19 April 2024. Cameras were left in the field for approximately four weeks to ensure the survey effort for Brush-tailed Phascogales was met. Baits were sprayed with honey-water and checked after 14 days, rebaited as needed and re-sprayed with honey-water. An additional eight hair tubes were set on the ground.

Table 5.11 Candidate mammal species requiring targeted surveys (ELA)

Scientific name	Common name	Recommended survey period (BioNet TBDC/BAMC)	Survey date
Cercartetus nanus	Eastern Pygmy-possum	October-March	18 March-1 April 2024
Petaurus norfolcensis	Squirrel Glider	All year	18 March-19 April 2024 11-13 June 2024 17-20 June 2024
Phascogale tapoatafa	Brush-tailed Phascogale	December-June	18 March-19 April 2024 11-13 June 2024 17-20 June 2024

Table 5.12 Number of cameras deployed across the BBRS study area based on suitable patch size (ELA)

Suitable habitat patch	Area (ha)	Number of baited cameras
Area 1	0.79	4
Area 2	Single tree	1
Area 3	1.18	5
Area 4	0.38	4
Area 5	0.14	4
Area 6	0.38	4
Total	**4.02**	**22**

Koalas were surveyed using both spotlighting and call playback over six nights in June 2024. Koala detecting dogs were also deployed by ReconEco consisting of two handlers, two dogs and an ELA ecologist during 2 to 4 April 2024 (Figure 5.1). The dogs were led through the BBRS study area with particular focus around Koala feed trees.

d Bat surveys

Bat surveys during January 2024, (Table 5.13) were conducted at four locations with one ultrasonic Anabat Detector deployed within the BBRS study area and three deployed in the surrounding landscape close to caves and cliff habitat specifically targeting *C. dwyeri*. An additional four devices were deployed during March 2024, all within the BBRS study area as close as possible to neighbouring farm dams.

Anabat detectors were set to record 30 min before dusk and 30 minutes after dawn for a minimum of four nights equating to a total of 32 trap nights. Data was analysed using Anabat Insite by ELA bat specialists and Corymbia Ecology (Appendix D).

Table 5.13 Candidate bat species requiring targeted surveys (ELA)

Scientific name	Common name	Recommended survey period (BioNet TBDC/BAMC)	Survey date	Number of Detectors
Chalinolobus dwyeri	Large-eared Pied Bat	November-January	17-22 January 2024	4 Anabat detectors
Myotis macropus	Southern Myotis	October-March	17-22 January 2024 21-27 March 2024	4 Anabat detectors 4 Anabat detectors

e Keys Matchstick Grasshopper surveys

Insects are not included in the Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Working Draft, DEC 2004). Advice was sought from the BOS helpdesk to seek guidance for the survey methodology for *Keyacris scurra* (Keys Matchstick). The recommended survey methodology (email dated 30/07/2024: Appendix C) involves meandering slowly through preferred habitat (areas with preferred flora species; tussock grasses, with a range of herbs and forbs) disturbing the vegetation to enhance detectability. Meandering transects were conducted for *Keyacris scurra* on the 25 September 2024 within PCT 277 along BBRS (Figure 5.1). A grasshopper net was used to disturb the vegetation. The net was checked for grasshoppers after 50 sweeps.

f Weather conditions for BBRS field surveys

Weather conditions during survey periods are provided below in Table 5.14.

Table 5.14 Weather conditions during field survey (Dunedoo Post Office; 064009)

Date	Minimum temperature (°C)	Maximum temperature (°C)	Rainfall (mm)
27-Nov-23	12.9	31.8	3.0
27-Nov-23	17.8	28.7	0.0
27-Nov-23	16.8	28.0	0.0
17-Jan-24	16.9	28.5	0.0
18-Jan-24	20.0	28.8	0.0
19-Jan-24	11.6	32.6	0.0
20-Jan-24	16.0	35.7	29.0
21-Jan-24	15.0	39.0	13.7
22-Jan-24	16.8	34.0	0.0
19-Mar-24	16.5	33.7	0.0
20-Mar-24	18.7	23.4	0.0
21-Mar-24	13.0	24.3	0.0
22-Mar-24	11.9	N/A	6.1
23-Mar-24	N/A	27.6	2.0
24-Mar-24	13.9	27.4	0.0

Date	Minimum temperature (°C)	Maximum temperature (°C)	Rainfall (mm)
25-Mar-24	10.3	29.1	0.0
26-Mar-24	9.4	31.7	0.0
27-Mar-24	12.8	29.4	0.0
2-Apr-24	15.9	24.2	0.0
3-Apr-24	9.7	25.3	0.0
4-Apr-24	9.4	20.0	0.0
11-Jun-24	1.1	18.0	0.0
12-Jun-24	4.5	15.6	0.0
13-Jun-24	-2.5	15.0	0.0
17-Jun-24	0.0	14.2	0.0
18-Jun24	-0.9	14.0	0.0
19-Jun-24	-1.5	14.4	0.0
20-Jun-24	0.8	16.5	0.0
25-Sept-24	15.7	27.3	1.3
11-Dec-24	15.5	30.8	0.0

5.3.4 Targeted survey results

Whilst the additional lots and BBRS have been assessed independently, the results of targeted surveys conducted across the entire subject land have been complied in the following sections.

i Targeted flora surveys

No threatened flora species were identified during surveys.

ii Targeted fauna surveys

a Diurnal birds

No threatened diurnal birds were recorded during targeted surveys.

b Nocturnal birds

No threatened nocturnal birds were recorded during targeted surveys for the additional lots.

An individual Masked Owl (*Tyto novaehollandiae*) was recorded during call playback and spotlighting surveys conducted for the BBRS (ELA 2025). The individual could not be conclusively differentiated from the common Barn Owl (*Tyto alba*); nonetheless, the individual was recorded as Masked Owl on a conservative basis as the species is known to inhabit the locality.

c Microbats

Targeted surveys for microbat species within the BBRS recorded the presence of three threatened microbat species, with two additional threatened microbat species potentially recorded. A summary of these species is provided in Table 5.15 (reproduced from ELA 2025).

Table 5.15 Microbat species recorded within the Birriwa Bus Route South (ELA 2025)

Scientific name	Common name	EPBC Act	BC Act
Positively recorded			
Chalinolobus dwyeri	Large-eared Pied Bat	Endangered	Endangered
Miniopterus orianae oceanensis	Large Bent-winged Bat	-	Vulnerable
Saccolaimus flaviventris	Yellow-bellied Sheath-tailed bat	-	Vulnerable
Potentially recorded			
Myotis macropus	Southern Myotis	-	Vulnerable
Vespadelus troughtoni	Eastern Cave Bat	-	Vulnerable

iii Candidate species presence, extent and habitat quality

Table 5.16 defines the presence (or absence) of candidate species in the subject land and habitat quality. The area of habitat impacted is provided for area-based species and has been used to define the species polygon, in accordance with Step 4 to 6 of the BAM (sections 5.2.4 to 5.2.6).

Table 5.16 Candidate species presence, extent and habitat quality

Scientific name	Common name	Step 4 – Determine candidate species presence/absence	Step 5 - Determine the area or count, and location of suitable habitat for a species credit species		Step 6 - Determine the habitat condition within the species polygon for species assessed by area	
			Individuals impacted (count-based species)	Area impacted (ha) (area-based species)	Associated vegetation zone/s	Vegetation integrity score
Acacia ausfeldii	Ausfeld's Wattle	Not recorded	-	-	-	-
Burhinus grallarius	Bush Stone-curlew	Not recorded	-	-	-	-
Callocephalon fimbriatum	Gang-gang Cockatoo	Not recorded	-	-	-	-
Cercartetus nanus	Eastern Pygmy-possum	Not recorded	-	-	-	-

Scientific name	Common name	Step 4 – Determine candidate species presence/absence	Step 5 - Determine the area or count, and location of suitable habitat for a species credit species		Step 6 - Determine the habitat condition within the species polygon for species assessed by area	
			Individuals impacted (count-based species)	Area impacted (ha) (area-based species)	Associated vegetation zone/s	Vegetation integrity score
Chalinolobus dwyeri	Large-eared Pied Bat	Recorded at BBRS and assumed present within 2km buffer of breeding habitat. Breeding habitat absent, foraging habitat (i.e. native PCTs) intersecting the 2 km buffer of Barneys Reef Rock Formation.	-	43.11	281_DNG (additional lots)	18
				0.05	281_woodland (additional lots)	41.6
Cullen parvum	Small Scurf-pea	Not recorded	-	-	-	-
Dichanthium setosum	Bluegrass	Not recorded	-	-	-	-
Euphrasia arguta	-	Not recorded	-	-	-	-
Haliaeetus leucogaster	White-bellied Sea-eagle	Not recorded	-	-	-	-
Hieraaetus morphnoides	Little Eagle	Not recorded	-	-	-	-
Keyacris scurra	Key's Matchstick Grasshopper	Not recorded	-	-	-	-
Lophoictinia isura	Square-tailed Kite	Not recorded	-	-	-	-
Myotis macropus	Southern Myotis	Potentially recorded at BBRS. 200 m buffer of all dams. Species polygon is all associated PCTs with the species.	-	0.73	281_Woodland (BBRS)	55.6
			-	0.43	277_Woodland (BBRS)	41.1
			-	0.18	281_DNG (BBRS)	59.1
			-	0.50	277_DNG (BBRS)	35.8
			-	53.10	281_DNG (additional lots)	18
				0.07	281_Woodland (additional lots)	41.6
Ninox connivens	Barking Owl	Not recorded	-	-	-	-

Scientific name	Common name	Step 4 – Determine candidate species presence/absence	Step 5 - Determine the area or count, and location of suitable habitat for a species credit species		Step 6 - Determine the habitat condition within the species polygon for species assessed by area	
			Individuals impacted (count-based species)	Area impacted (ha) (area-based species)	Associated vegetation zone/s	Vegetation integrity score
Ninox strenua	Powerful Owl	Not recorded	-	-	-	-
Petaurus norfolcensis	Squirrel Glider	Not recorded	-	-	-	-
Phascogale tapoatafa	Brush-tailed Phascogale	Not recorded	-	-	-	-
Phascolarctos cinereus	Koala	Not recorded	-	-	-	-
Polytelis swainsonii	Superb Parrot	Not recorded	-	-	-	-
Pomaderris cotoneaster	Cotoneaster Pomaderris	Not recorded	-	-	-	-
Prasophyllum petilum	Tarengo Leek Orchid	Not recorded	-	-	-	-
Prasophyllum sp. Wybong	-	Not recorded	-	-	-	-
Swainsona recta	Small Purple-pea	Not recorded	-	-	-	-
Swainsona sericea	Silky Swainson-pea	Not recorded	-	-	-	-
Tyto novaehollandiae	Masked Owl	Recorded at BBRS. 800 m buffer of Masked Owl sightings. Species polygon comprises all PCTs containing suitably sized hollows for the species.	-	0.81	281_Woodland (BBRS)	55.6
			-	0.22	277_Woodland (BBRS)	41.1
				0.11	281_Woodland (additional lots)	41.6
Vespadelus troughtoni	Eastern Cave Bat	Potentially recorded at BBRS and conservatively assumed. Breeding habitat absent, foraging habitat (i.e. native PCTs) intersecting the 2 km buffer of Barneys Reef Rock Formation.		43.11	281_DNG (additional lots)	18
				0.05	281_Woodland (additional lots)	41.6

KEY

- Subject land
- Birriwa Bus Route South (Assessed by ELA)

Existing environment

- Major road
- Minor road
- Watercourse/drainage line

EMM survey results

- Hollow bearing tree (targeted nest searches and stagwatching)
- EMM survey track

ELA survey results

- Koala spotlighting tracks
- ELA flora survey tracks

Source: EMM (2025); DCSSS (2023, 2024); GA (2011); ACEN (2022); ELA (2025)

0 250 500 m

GDA 1994 MGA Zone 55

N

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Targeted survey results

Birriwa Solar and Battery Project
Biodiversity Development Assessment Report
Figure 5.1

EMM
creating opportunities

KEY

- Subject land
- Birriwa Bus Route South (Assessed by ELA)

Existing environment

- Major road
- Minor road
- Watercourse/drainage line

EMM survey results

- Masked owl call playback survey
- EMM survey track

ELA survey results

- Bird survey
- Hair tube
- Hollow bearing tree
- Owl call playback site
- Camera location
- Eastern Cave Bat
- Koala spotlighting tracks
- Keyacris survey
- Detector dog transect
- ELA flora survey tracks

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Source: EMM (2025); DCSSS (2023, 2024); GA (2011); ACEN (2022); ELA (2025)

0 250 500 m

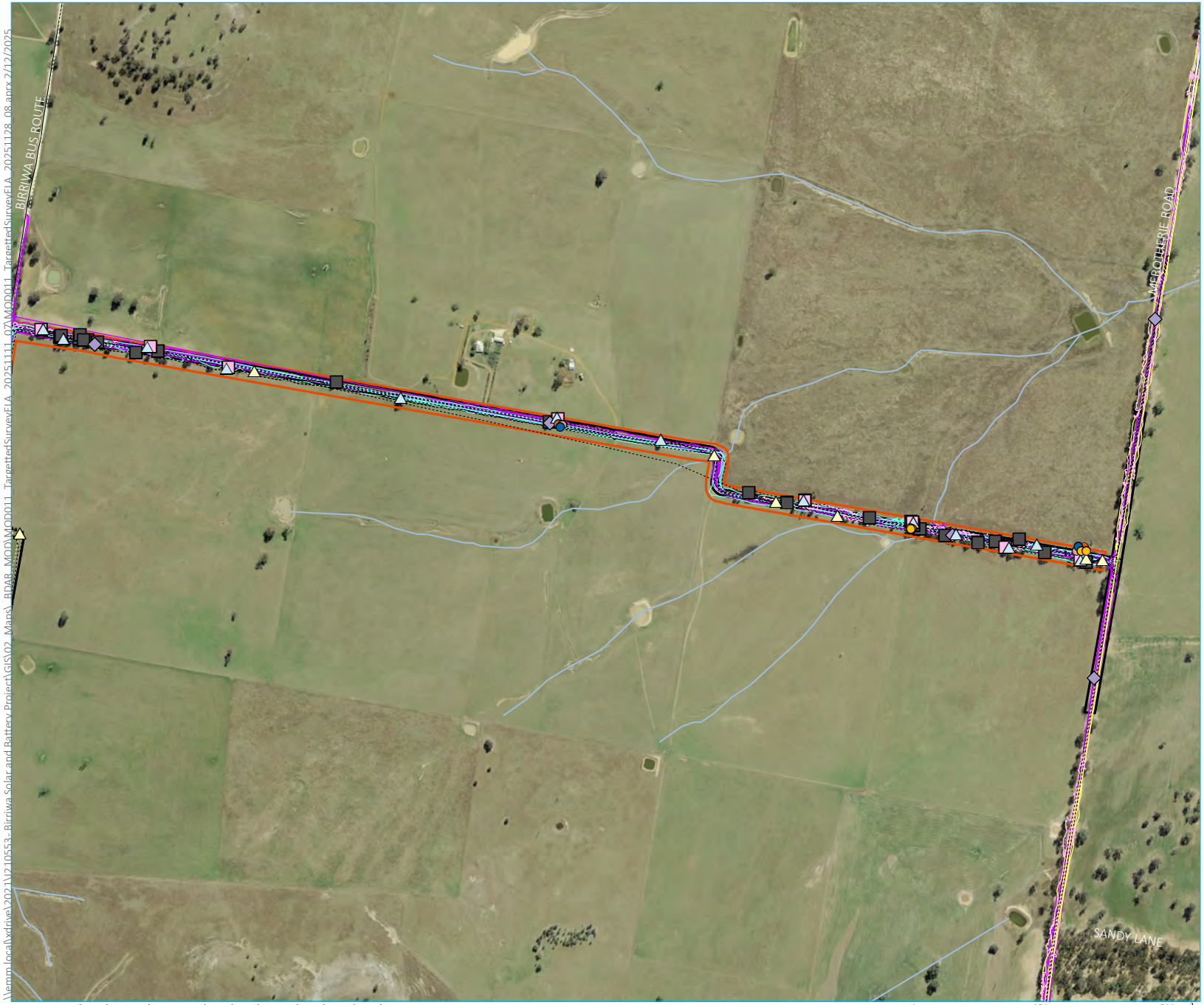
GDA 1994 MGA Zone 55

N

Targeted survey results

Birriwa Solar and Battery Project
Biodiversity Development Assessment Report
Figure 5.1

EMM creating opportunities



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- Large Bent-winged Bat
- Large-eared Pied Bat
- Southern Myotis
- Yellow-bellied Sheath-tailed bat
- Koala spotlighting tracks
- Koala detector dog tracks
- Keyacris survey
- Detector dog transect
- ELA flora survey tracks

Source: EMM (2025); DCSSS (2023, 2024); GA (2011); ACEN (2022); ELA (2025)

0 250 500 m

GDA 1994 MGA Zone 55

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Targeted survey results

Birriwa Solar and Battery Project
Biodiversity Development Assessment Report
Figure 5.1

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Part B

Impact assessment

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6 Impact assessment

This chapter identifies the potential impacts on the biodiversity values. Measures taken to date to avoid and minimise impacts are summarised and recommendations to assist in the design of the project that further avoids, minimises and mitigates impacts are provided.

6.1 Potential direct and indirect impacts

6.1.1 Impacts of the modification

Without any measures to avoid, minimise or mitigate impacts, the impacts to the subject land would result in the following potential impacts:

- reduction in habitat critical to the survival of Box Gum Woodland
- reduction in or disturbance of potential habitat for threatened fauna
- removal of logs and debris from the subject land
- loss of riparian habitat connectivity within the locality
- inadvertent impacts on native vegetation to be retained, including Box Gum Woodland
- erosion and sedimentation of waterways
- weed introduction and spread
- dust disturbance
- vehicle strike on fauna species including the Masked Owl.

Wherever possible, direct impacts have been avoided and/or minimised through the design of the subject land. Impacts will be further managed and mitigated through the development of a biodiversity management plan, using the measures recommended in the below sections. Any residual impacts would be compensated through implementation of the biodiversity offset scheme. Measures designed to address the above potential direct and indirect impacts and prescribed impacts are provided in Table 6.5.

6.1.2 Impacts of the project as modified

The project as modified (i.e. the approved project and modification combined) will result in the same range of impacts as described in Section 6.1.1.

Impacts on PCTs and candidate species habitats for the project as modified are provided in Table 6.1. The project as modified will result in increased impacts on PCTs 281 and 277, the Large-eared Pied Bat, Masked Owl and Southern Myotis.

Table 6.1 Direct Impacts of the project as modified

Entity	Direct impacts (approved project)		Credits required (modification)		Total impacts of the project as modified (ha)[1]
	Road upgrade corridor works (ha)	Solar project and BESS (ha)	Additional lots (ha)	Birriwa Bus Route South upgrade works (ha)	
Plant community types					
PCT 281	0.3	7.14	69.31	1.56	78.31
PCT 277	0	0	0	1.29	1.29
PCT 80	0.49	0.69	0	0	1.18
Total native vegetation impacts (ha)	**0.79**	**7.83**	**69.31**	**2.85**	**80.78**
Species habitats					
Large-eared Pied Bat	0	0.48	43.16	0	43.64
Southern Myotis	0	0	53.17	1.85	55.02
Masked Owl	0	0	0.11	1.03	1.14
Koala	0.79	7.83	0	0	8.62
Total species habitat impacts (ha)	**0.79**	**8.31**	**96.44**	**2.88**	**-**

Notes: 1. A cumulative total is not provided for all species as the species habitat impact areas overlap.

Measures designed to address the impacts of the project as modified will be included in the project Biodiversity Management Plan.

6.2 Prescribed impacts

6.2.1 Impacts of the modification

An assessment of prescribed impacts for the modification is provided in Table 6.2.

Table 6.2 Prescribed impact assessment for the modification

Feature	Present	Description and location	Potential impact	Threatened species or community dependent on feature
Karst, caves, crevices, cliffs, rocks or other geological features of significance	☐Yes/☒No	Cliffs and rocky areas occur approximately 1.3 km south, outside of the subject land.	No disturbance to habitat for cave dwelling species.	• Large-eared Pied Bat • Large Bent-winged Bat • Eastern Cave Bat • Brush-tailed Rock Wallaby
Human-made structures	☒Yes/☐No	Small building	Demolition of roosting site for microbats.	• Eastern Cave Bat
Non-native vegetation	☒Yes/☐No	Mature planted Peppercorn shrubs/trees. Areas of pasture/exotic grassland.	Nil. Unlikely to provide any habitat.	None identified
Habitat connectivity	☒Yes/☐No	Riparian corridor along creek that flows through the study area and links to the 1,500 m assessment area. The vegetation within BBRS provides connectivity along the road corridor.	Vegetation disturbance for creek crossings Increase in vegetation fragmentation in BBRS road corridor	White Box Yellow Box Blakely's Red Gum Woodland
Waterbodies, water quality and hydrological processes	☒Yes/☐No	Several drainage lines intersect with the subject land; however, these are all ephemeral in nature and do not support riparian vegetation.	Disturbance of spring feeding creek likely to threaten riparian corridor health. Vegetation disturbance for creek crossings	None identified White Box Yellow Box Blakely's Red Gum Woodland
Wind farm development	☐Yes/☒No	N/A	No wind farm proposed on site	N/A
Vehicle strikes	☒Yes/☐No	BBRS, Castlereagh Hwy, Barneys Reef Rd, Merothrie Road	Increased traffic volumes may increase the risk of Masked Owl collisions during construction activities in winter, when daylight hours are shorter. No expected impacts to bat species in torpor during this time.	• Eastern Cave Bat • Large Bent-winged Bat • Large-eared Pied Bat • Masked Owl • Southern Myotis

6.2.2 Impacts of the project as modified

An assessment of prescribed impacts for the project as modified is provided in Table 6.3. Given the similarity of biodiversity values in the approved and proposed modification areas, the project as modified will result in a similar range of impacts to the approved project, however with a larger extent.

Table 6.3 Prescribed impact assessment for the modification

Feature	Present	Description and location	Potential impact	Threatened species or community dependent on feature
Karst, caves, crevices, cliffs, rocks or other geological features of significance	☐Yes/☒No	Cliffs and rocky areas occur within the combined assessment areas, but outside of the subject land.	No disturbance to habitat for cave dwelling species.	• Large-eared Pied Bat • Large Bent-winged Bat • Eastern Cave Bat • Brush-tailed Rock Wallaby
Human-made structures	☒Yes/☐No	Small building in additional lots	Demolition of potential roosting site for microbats.	• Eastern Cave Bat
Non-native vegetation	☒Yes/☐No	Mature planted Peppercorn shrubs/trees. Areas of pasture/exotic grassland across the combined subject land.	Nil. Unlikely to provide any habitat.	None identified
Habitat connectivity	☒Yes/☐No	Riparian corridor along creek that flows through the study area and links to the 1,500 m assessment area for the additional lots. The vegetation within BBRS provides connectivity along the road corridor. Vegetated road corridor along western extent of the solar project and BESS areas.	Vegetation disturbance for creek crossings Increase in vegetation fragmentation in BBRS road corridor and western extent of the solar project and BESS area	White Box Yellow Box Blakely's Red Gum Woodland
Waterbodies, water quality and hydrological processes	☒Yes/☐No	Several drainage lines intersect with the combined subject land; however, these are all ephemeral in nature and do not support riparian vegetation.	Disturbance of spring feeding creek likely to threaten riparian corridor health. Vegetation disturbance for creek crossings	None identified White Box Yellow Box Blakely's Red Gum Woodland
Wind farm development	☐Yes/☒No	N/A	No wind farm proposed on site	N/A

Feature	Present	Description and location	Potential impact	Threatened species or community dependent on feature
Vehicle strikes	☒Yes/☐No	BBRS, Castlereagh Hwy, Barneys Reef Rd, Merothrie Road	Increased traffic volumes may increase the risk of Masked Owl collisions during construction activities in winter, when daylight hours are shorter. No expected impacts to bat species in torpor during this time. Potential for increased animal strike on	• Eastern Cave Bat • Large Bent-winged Bat • Large-eared Pied Bat • Masked Owl • Southern Myotis

6.3 Avoidance, minimisation and management

6.3.1 Avoidance and minimisation strategy for the proposed modification

This BDAR has been carried out in parallel with, and has informed the evolution of, the project design. After technical assessments, the original design of the modification has been located, where possible, to avoid sensitive biodiversity areas. To compensate for unavoidable disturbance, biodiversity offsets will be provided.

As shown in Figure 4.1, the lots within the subject land largely consist of exotic pastureland or DNG of low biodiversity value. Areas of high biodiversity value including wooded areas of PCT 277 and PCT 281 have been retained where possible, limiting impacts to threatened fauna species within the locality.

Two third order streams within the study area were excluded from the subject land, thereby avoiding impacts to riparian areas, with the exception of that required for the provision of fencing, access and electrical reticulation (i.e. private internal access roads and electrical cables). Creek crossings cannot be avoided, therefore have been located within the subject land within areas of minimal native vegetation, to minimise impacts on biodiversity. These creek crossings have been carefully placed in areas of lower condition vegetation and have avoided the removal of trees.

ELA surveyed the BBRS "study area" shown on Figure 4.1, to determine a placement that best avoided/minimised direct impacts on White Box Yellow Box Blakely's Red Gum Woodland and hollow-bearing trees. The study area for BBRS contains a total of 6.32 ha of native woodland and DNG zones of PCT 277 and PCT 281, 2.85 ha of which will be directly impacted by BBRS, and 3.47 ha which will be avoided/minimised (Table 6.4).

Table 6.4 Avoidance for BBRS

Condition	PCT	Study area (ha)	Impacted (ha)	Avoidance (ha)
DNG	277	1.68	0.72	0.96
Woodland	277	1	0.57	0.43
DNG	281	0.42	0.18	0.24
Woodland	281	3.22	1.38	1.84
Total		**6.32**	**2.85**	**3.47**

All trees within the study area for BBRS were geo-referenced by a surveyor to ensure the road design avoids removing trees where possible. Accordingly, the 3.47 ha avoided prioritises protection of large *Eucalyptus blakelyi* with good quality hollows conforming to listed critically endangered ecological community of 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 and foraging habitat for the Masked Owl and Southern Myotis.

Engagement with Mid-Western Regional Council has informed design considerations that avoid impacts on some HBTs along the BBRS. The current design and layout will impact less native vegetation than the original concept plan for the road design. The original design cannot be shown for privacy reasons, however correspondence with MWRW is attached at Appendix C.

For the purposes of the revised BDAR, it is conservatively assumed that 2.85 ha of native vegetation within the subject land would be impacted for BBRS. Notwithstanding, ACEN will continue discussions with Mid-Western Regional Council that commenced on 17 April 2025 and look for opportunities to further avoid impacts to native vegetation and hollow-bearing trees through the final road design.

Residual impacts to biodiversity values can be mitigated through pre-clearance surveys, planting locally native species characteristic of Box Gum woodland in future landscaping, retention of logs and debris in the subject land post-construction, and weed hygiene measures.

6.3.2 Avoidance and minimisation strategy for the project as modified

The avoidance and minimisation strategy for the project as modified has comprised:

- maximising placement of project infrastructure and road crossings in cleared areas and, wherever possible, limiting impacts to native vegetation of low quality
- exclusion of as many higher order streams from the subject land, as possible.
- avoidance of impacts on areas of PCT 277 and 281 totalling 24.17 ha
- minimisation of impacts to higher condition areas of TECs wherever feasible (PCT 281-high and PCT 80-high)
- minimisation of direct impacts by utilising an existing access tracks within the subject land
- avoidance of impacts on Huxleys Creek, Browns Creek and White Creek where possible and avoidance of instream impacts as part of the bridge design
- avoidance of all areas of PCT 479 high and moderate condition zones, due to micro siting of the accommodation facility and associated access tracks in areas of lower quality PCT 479 DNG and PCT 281 pasture
- avoidance of approximately 2 ha of rocky habitat that is suitable for Pink-tailed Legless Lizard (*Aprasia parapulchella*) (in 'southern' accommodation facility option) via selection of the 'northern' accommodation facility option.

6.3.3 Avoidance, minimisation and mitigation measures

Avoidance, minimisation and mitigation measures to be included in the modification Biodiversity Management Plan (BMP) are summarised in Table 6.5.

Table 6.5 Impact avoidance and minimisation strategy

Impact type	Impact description	Action	Intended outcome	Timing	Responsibility
Direct	Reduction in habitat critical to the survival of Box Gum Woodland	Project designed to avoid canopied areas of Box Gum Woodland.	Prioritise retention of better-quality Box Gum Woodland and minimise impact on TEC resulting from modification and continue discussions with MWRC to avoid and minimise impacts on BBRS through detailed design.	Design	The Applicant
		Following construction, include species of PCT 277 and 281 into landscaping.	Increase the floristic and structural diversity present in the subject land to be consistent with PCT 277 and PCT 281.	Post-construction	Site manager Project ecologist Bush regeneration team leader
Direct	Reduction in or disturbance of potential habitat for threatened fauna	Project designed to avoid canopied areas of Box Gum Woodland and hollow-bearing trees.	Prioritise retention of better-quality fauna habitat and minimise impacts resulting from the modification.	Design	The Applicant
		Pre-clearance surveys, by a suitably qualified ecologist to be conducted prior to removal of potential fauna habitat, e.g. demolition of buildings and hollow-bearing tree clearing, with ecologist or fauna-spotter catcher present during demolition and hollow-bearing tree clearing.	Mitigate injury to potential fauna species inhabiting man-made structures. Any fauna utilising within the BBRS study areas will be identified and managed to ensure clearing works minimise the likelihood of injuring resident fauna Any healthy fauna captured during clearing would be released at a suitable location by the ecologist, with any injured or juvenile fauna taken to a wildlife carer.	Pre-construction	Site manager Project ecologist

Impact type	Impact description	Action	Intended outcome	Timing	Responsibility
Direct and indirect		Clearing works will be timed, where practicable, to avoid critical life cycle events for fauna species, including but not limited to breeding and nursing of young. Timing clearing works to avoid critical life cycle events such as breeding or nursing or when migratory species are absent from the site– active breeding or nesting identified during pre-clearance surveys will be avoided in August, September and October, which is the breeding/nesting period for most fauna species.	Mitigate indirect impacts to fauna inhabiting retained and/or adjacent habitat. Impacts to fauna during nesting/nursing avoided.	Pre-construction	Site manager Project ecologist
		Where practicable, noise barriers will be implemented and/or works will be timed to limit the impact of noise from construction and operational activities.	Minimise indirect impacts to fauna inhabiting retained and/or adjacent habitat.	Construction	Site manager Project ecologist
		Where practicable, light shields will be implemented and/or construction works will be conducted during the day to limit the impact of light spill. No night lights will be used. Lights associated with operation will be positioned to avoid light spill into surrounding habitat, or adjacent retained vegetation, where possible.	Minimise indirect impacts to fauna inhabiting retained and/or adjacent habitat. Light impacts of construction will be avoided as all works will occur during daylight hours. Light spill into adjacent vegetation is reduced.	Construction Operation	Site manager Project ecologist
		Hollows from felled trees will be salvaged where possible for later re-use in rehabilitation. Prior to clearing, a hollow-bearing tree survey will be completed to determine the number and type of hollows to be impacted by the detailed design. Prior to clearing, nest boxes will be installed adjacent to the construction area at a 2:1 ratio to compensate for hollows lost to clearing.	Reduction in loss of natural hollows from the study area. Fauna have alternate hollows to occupy prior to clearing.	Pre-construction	Site manager

Impact type	Impact description	Action	Intended outcome	Timing	Responsibility
		Project designed to avoid canopied areas of Box Gum Woodland.	Minimise impact on potential threatened flora habitat resulting from the project.	Design	The Applicant
Direct	Reduction in potential habitat for threatened fauna	Retain hollow logs and debris to be used in rehabilitation, post construction.	Retain and improve potential fauna habitat within the retained vegetation in the subject land and adjacent study area.	Pre-construction Post-construction	Site manager Project ecologist
	Removal of logs and debris from the subject land	Avoidance of riparian corridor of third order tributary of White Creek in lot 34.	Minimise impact on riparian and aquatic connectivity resulting from the project.	Design	The Applicant
	Loss of riparian habitat and connectivity within the locality	All workers to be made aware of ecologically sensitive areas and the need to avoid impacts. This includes adjacent native vegetation. Clearing protocols will be developed that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance (e.g. removal of native vegetation by chainsaw instead of heavy machinery where only partial clearing is proposed). Temporary fencing (or other barriers as required) or signage is to be placed at the edges of areas of vegetation to be retained to prevent accidental construction damage and provide a permanent barrier between the development footprint and retained areas. The type of fencing during construction may be of a temporary nature and scale that is robust enough to withstand damage during this stage of work.	Avoid unintentional impacts to Box Gum Woodland and other native vegetation. Vegetation to be retained outside of the modification development footprint will not be disturbed.	Pre-construction Construction	The Applicant Site manager
Indirect	Inadvertent impacts on native vegetation to be retained including Box Gum Woodland to be retained	Temporary fencing to protect significant environmental features such as riparian zones – all potential waterway crossings will be designed in accordance with *Policy and Guidelines for Fish Friendly Waterway Crossing*, where appropriate.	Crossing constructed with negligible impacts to aquatic habitats.	Detailed design	Site manager

Impact type	Impact description	Action	Intended outcome	Timing	Responsibility
		All personnel working on the project will undertake an environmental induction as part of their site familiarisation. This will include: • Site environmental procedures (vegetation management, sediment and erosion control, exclusion fencing and noxious weed management). • What to do in case of environmental emergency (e.g. chemical spills, fire, injured fauna (key contacts in the case of an environmental emergency.	Staff trained and aware of environmental issues and responsibilities on site.	Construction	Site manager
Indirect		Chemicals and fuel will be managed in accordance with Safe Work Australia guidelines (e.g. employ use of barriers, inspecting tanks and containers, etc.) use of appropriate spill containment materials (or spill kits) to clean-up spills if they occur.	Avoid unintentional impacts to Box Gum Woodland and native vegetation due to chemical or fuel runoff.	Construction	The Applicant Site manager
		Sediment controls, including fencing and sediments traps, should be installed in any areas where works will occur in proximity to waterways.	Avoid increased sedimentation and erosion of watercourses within the subject land.	Pre-construction	The Applicant Site manager
	Erosion and sedimentation of waterways	Appropriate controls will be implemented to manage exposed soil surfaces and stockpiles to prevent sediment discharge into waterways. All works within proximity to the drainage lines will have adequate sediment and erosion controls (e.g. sediment barriers, sedimentation ponds). Revegetation will also commence as soon as is practicable to minimise risks of erosion. Suitable species will be used as ground cover in any revegetation areas.	Erosion and sedimentation will be controlled.	Construction and decommissioning	Site manager

Impact type	Impact description	Action	Intended outcome	Timing	Responsibility
		Dependent on the weed species and cover in any particular construction area, remove weeds prior to or during clearing. Weeds are to be stockpiled appropriately prior to removal from the subject land to avoid the spread of seed and other propagules.	Avoid introduction and spread of priority and environmental weeds within the subject land. Adjacent habitat protected.	Pre-construction Construction	The Applicant Site manager
Indirect	Weed introduction and spread	Weed hygiene protocols are in place prior to entering the subject land. This includes wash-down procedures to all plant and machinery.	Avoid introduction and spread of priority and environmental weeds within the subject land. Adjacent habitat protected Reduce dust settlement on native vegetation and habitat for native species.	Pre-construction Construction Decommissioning	The Applicant Site manager
		Coolatai Grass (*Hyparrhenia hirta)* and St. Johns Wort (*Hypericum perforatum*) are to be managed as per the *Biosecurity Act 2015* and their regional recommended measures (Section 7.3). If any other priority weeds of NSW are identified in the subject land during construction, they must be removed from the subject land. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practical.			
		A BMP will be developed and implemented to facilitate the adequate management of weed introduction and spread. The BMP will include, at a minimum, the actions listed above. The BMP will identify management of remnant vegetation that will be retained within the BBRS study area.			
		Monitor dust levels and implement suppression strategies where required such as wetting down dirt roads or reducing vehicles speeds. Revegetation will also be commenced as soon as practicable to minimise areas likely to create dust.			

Impact type	Impact description	Action	Intended outcome	Timing	Responsibility
	Dust disturbance	Suitable species will be used as ground cover species in any revegetation areas.Development of a Traffic Management Plan (TMP) for the modification including speed limits, reductions to driving at night, and wildlife awareness training to minimise risk of vehicle strike during the construction of the solar and BESS and operation of the accommodation facility during the construction phase of the solar and BESS when there is expected to be an increase in traffic movements.	Mitigation dust created during construction activities.	Construction	The Applicant Site manager
Indirect	Vehicle strike on fauna	Development of a Traffic Management Plan (TMP) for the modification including speed limits, reductions to driving at night, and wildlife awareness training to minimise risk of vehicle strike during the construction of the solar and BESS and operation of the accommodation facility during the construction phase of the solar and BESS when there is expected to be an increase in traffic movements. Weekly carcass monitoring of road reserves within the project area for Masked Owl. Monitoring will be conducted during construction of the BESS and solar and operation of the accommodation facility.	Mitigate risk of prescribed impact of vehicle strike on threatened species and other native fauna.	Construction of the solar and BESS and operation of the accommodation facility during the construction phase of the solar and BESS.	The Applicant Site manager

The above avoidance, minimisation and mitigation measures were developed with consideration of recovery strategies and actions for Box Gum Woodland and threatened fauna species that would be potentially impacted by the modification. The National Recovery Plan for White Box Yellow Box Blakely's Red Gum Woodland (DECCW 2010) identifies the protection of key sites as a recovery strategy. Accordingly, the avoidance and minimisation of clearing these areas for the project aligns with the recovery strategy to protect key sites.

6.3.4 Adaptive management strategy for prescribed and uncertain impacts

An adaptive management strategy has been developed for the modification to monitor and respond to prescribed and uncertain biodiversity impacts (Table 6.6). This adaptive management strategy would be included in the BMP for the modification.

Table 6.6 Adaptive management strategy

Prescribed/uncertain biodiversity impact	Project component	Response	Trigger for management
Impacts of human made structure demolition on potential roosting habitat threatened microbats	Solar and BESS development	A buffer zone will be enforced around any derelict buildings suspected to have the potential to host threatened microbats. A pre-clearance inspection will be conducted prior to the demolition of any potential roosting buildings to determine the presence of threatened microbats.	Roosting habitat is disturbed, and population of local threatened microbat species is impacted, leading to potential decline.
Habitat connectivity impacts on White Box Yellow Box Blakely's Red Gum Woodland	Solar and BESS development	Boundary fencing will be placed around the disturbance footprint and maintained in good working order during clearing and construction. The condition of retained White Box Yellow Box Blakely's Red Gum Woodland will be assessed prior and following construction at four VI plots to determine if condition has declined.	Protective fencing is breached (where installed). The health of the Box Gum Woodland declines when compared to baseline assessment.
Potential for increased fauna vehicle strikes during construction and operation	Solar and BESS development (construction) Accommodation facility (operation)	Development of a TMP for the modification including speed limits, reductions to driving at night, and wildlife awareness training to minimise risk of vehicle strike during the construction of the solar and BESS and operation of the accommodation facility during the construction phase of the solar and BESS when there is expected to be an increase in traffic movements.	Masked Owl collision with vehicle.

6.4 Serious and Irreversible Impacts

6.4.1 SAII principles

An impact is to be regarded as serious and irreversible (SAII) if it is likely to contribute significantly to the risk of a threatened species (including endangered populations) or an ecological community becoming extinct based on the following 4 principles:

- **Principle 1**: The impact will cause a further decline of a species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline.
- **Principle 2**: The impact 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.
- **Principle 3**: The impact is made on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution.
- **Principle 4**: The impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity, and therefore its members are not replaceable.

6.4.2 Candidate SAII entities for the modification

Candidate SAII entities are listed in Table 6.7, along with the relevant principles for the listing of the SAII entity, based on information from the Threatened Biodiversity Data Collection (TBDC).

Although Eastern Cave Bat and Large-eared Pied Bat are SAII entities, they are listed under SAII Criterion 4 – unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable. With respect to these bat species, Criterion 4 has been applied to protect their breeding habitat. As their breeding habitat (caves in Barneys Reef Rock Formation) would not be impacted by the modification, a SAII assessment was not completed for the bat species.

Table 6.7 Candidate SAII entities for the modification

Threatened community or species	Principle			
	1	2	3	4
White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC	Y	Y	-	-

6.4.3 Current status

An assessment of the current status of the TEC is provided in Table 6.8, while a SAII assessment is provided in Table 6.9.

Table 6.8 Current status of Box Gum Woodland CEEC

Criteria	Data/ information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information
Current total geographic extent (ha) of the TEC in NSW	White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland has undergone a very large reduction in geographic distribution. The best estimate of the extent of occurrence (EOO) is 702,800 km^2, based on a minimum convex polygon enclosing likely occurrences of the community. The best estimate of the area of occupancy (AOO) is 151,100 km^2.	• NSW TSSC (2020)	Not all areas occupied by the community are covered by maps of appropriate scale and accuracy. Therefore, the values for EOO and AOO quoted may underestimate the true values.
Estimated reduction in geographic extent of the TEC since 1970	Approximately greater than 90% reduction in pre-1750 distribution. According to the NSW TSSC (2020): • The TSSC (2006) estimated that less than 5% of the original distribution remained, however the extent to which remaining examples continue to support characteristic biota, their interactions and function is unknown. • The very large historical decline in geographic distribution is corroborated by other sources although there is some uncertainty surrounding the current extent of the community and its pre-1750 distribution. Considering the evidence for historical, recent and contemporary clearing in combination, it is very likely that the reduction in the distribution of White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland exceeds 90% when averaged across the entire range of the community.	• NSW TSSC (2020) • Commonwealth TSSC (2006)	No estimate of vegetation extent as of 1970 is available.

Criteria	Data/ information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information
Extent of reduction in ecological function, describing the degree of environmental degradation or disruption to biotic processes	The Threatened Biodiversity Profile description (BCS 2025b) lists the following threats affecting the ecological function of the TEC: • habitat loss, degradation and fragmentation from agricultural, forestry, mining, infrastructure and residential development • degradation by over grazing and trampling by introduced and native herbivores resulting in losses of plant species and structural diversity (simplification of the understorey and ground layer and suppression of overstorey regeneration), erosion and other soil changes (e.g. loss of cryptogams, increased nutrient status) • degradation by remnants by non-native plant species, including noxious weeds, exotic pasture species and environmental weeds, including garden escapes, olives and pines • degradation of remnants by feral pest animals resulting in the loss or modification of habitat and predation of native fauna that are part of the White Box Yellow Box Blakely's Red Gum Woodland TEC • removal of native ground layer in box-gum woodland remnants where trees have been partially or fully removed • altered fire regimes. These threats affect the ecological function of the TEC at varying levels and lead to different states of the TEC. The extent to which this causes a permanent or temporary loss depends on the mechanism and severity of disturbance as well as any measures that are undertaken to reverse decline. As such, the extent of reduction in ecological function is unknown.	• BCS 2025b • NSW TSSC 2020	Data on the extent of reduction is not available.
Evidence of restricted geographic distribution based on the TEC's geographic range in NSW			
Extent of occurrence (ha)	702,800 km^2	NSW TSSC 2020	Not all areas occupied by the community are covered by maps of appropriate scale and accuracy. Therefore, the values for EOO and AOO quoted may underestimate the true values.

Criteria	Data/ information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information
Area of occupancy (ha)	151,100 km^2	NSW TSSC 2020	Not all areas occupied by the community are covered by maps of appropriate scale and accuracy. Therefore, the values for EOO and AOO quoted may underestimate the true values.
Number of threat-defined locations [1]	The BAM (DPIE 2020) defines threat-defined locations in terms of threatened species but does not mention TECs. According to the Guidelines for the application of IUCN Red List of Ecosystems Categories and Criteria (IUCN 2017), a threat-defined location is: • a geographically or ecologically distinct area in which a single threatening event can rapidly affect all occurrences of an ecosystem type. The IUCN definition is similar to that included in the BAM (DPIE 2020) and is considered to encompass the intent of the requirements of BAM (DPIE 2020) for TECs. The most serious plausible threat to the TEC is land clearing, particularly for agriculture, including the intensification of agricultural activity through conversion of land use from grazing of native pastures to improved pastures or cropping. In line with the approach suggested in IUCN (2017), broad interpretation of threat-defined locations identifies two jurisdictional zones with different regulatory controls on land clearing: • the leasehold Western Division of New South Wales • the freehold Central Division and Eastern Division of New South Wales. An alternative interpretation of threat-defined locations based on biogeographical regions (bioregions) would produce an estimate of six threat-defined locations.	• DPIE 2020 • IUCN 2017 • NSW TSSC 2020	Data is not strictly defined by the BAM (DPIE 2020). Assumptions have been made from additional data sources.

Notes: 1. Threat-defined locations is defined under BAM 2020 as geographically or ecologically distinct areas in which a single threatening event may rapidly affect species occurrences. Where two or more subpopulations occur in an area that may be threatened by one such event, they are counted as a single location. Where a subpopulation covers an area larger than what a single event is likely to impact, this is counted as two or more locations.

6.4.4 Impacts of the modification

The potential for a SAII relating to the modification is assessed in Table 6.9

Table 6.9 SAII assessment for the modification- Box Gum Woodland CEEC

Criteria	Data/ information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information
Impact on the geographic extent of the TEC (Principles 1 and 3)			
Area of TEC to be impacted by the proposal (ha)	The modification would impact on 72.16 ha of the TEC, comprising 2.29 ha of woodland and 69.87 ha of DNG.	-	-
Area of TEC to be impacted by the proposal as a % of the current geographic extent in NSW (%)	The best estimate of the extent of occurrence (EOO) is 702,800 km^2. The modification would impact on 0.0001% of its current extent.	NSW TSSC 2020	Not all areas occupied by the community are covered by maps of appropriate scale and accuracy. Therefore, the values for EOO and AOO quoted may underestimate the true values.
Direct/indirect impacts likely as a result of the proposal to contribute to loss of flora/fauna species characteristic of the TEC	The modification would result in the removal of 72.16 ha of the TEC, which is 0.0001% of the current extent. Indirect impacts to the TEC include weed introduction and spread and erosion and sedimentation. Retained areas of the TEC within woodland areas and adjacent to the subject land will be avoided. Weed management and erosion mitigation measures in accordance with Table 6.4 will also be developed and implemented in retained areas of the community within the indirect impact areas. There will be no change to fire regimes.	-	-
Impacts likely to contribute to further environmental degradation or disruption of biotic processes (Principle 2)			
Remaining size of isolated areas of TEC (ha)	The vegetation within the BBRS is highly disturbed and modified. Much of the surrounding landscape as per SVTM identifies the areas as PCT 0. Given the high level of current fragmentation, the modification does not substantially increase the TEC's fragmentation in the locality.	DPIE 2015	Patch connectivity has been assessed using regional vegetation mapping.
Current average distance between areas of the TEC (m)	Current average connectivity between areas of the TEC is greater than 100 m. This TEC is very fragmented in the locality by vast areas of cropping and exotic grassland.	-	-

Criteria	Data/ information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information
Average distance between areas of the TEC if the project proceeds (m)	The average distance of the retained woodland TEC to other patches in the landscape exceeds 800 m. Most of the surrounding landscape is identified as Category 1 land.		-
Estimated maximum dispersal distance of native flora species associated with the TEC (km)	According to Corlett (2009), typical maximum dispersal distances for different dispersal mechanisms are as follows: • No specialised mechanism 0–10 m • Ant dispersal 0–10 m • Wind (large-winged fruits) 10–100 m • Rodents 10–100 m • Small to medium-sized forest birds and arboreal mammals 100 m – 1 km • Flying-foxes (large seeds) 100 m – 1 km • Large and open-country birds 1 km – 10 km • Wind (small plumed seeds) 1 km – 10 km • Terrestrial mammals 1 km – 10 km • Wind (tiny seeds/spores, and very small plumed seeds) >10 km • Flying-foxes (small seeds) >10 km Eucalyptus spp. (including *Eucalyptus blakelyi* characteristic of the tree growth form component of the TEC within the subject land) have very limited seed dispersal capabilities, likely in the 0–10 range or 10–100 m range for any given event and species and are considered capable of migrating across landscapes only in the order of ~71–142 m in 71 years (Booth, 2017).	Corlett 2009 Booth 2017	-
	Native flora species associated with Box Gum Woodland CEEC (as identified in NSW TSSC 2020) include: • *Acacia dealbata* • *Acacia filicifolia* • *Acacia implexa* • *Acacia mearnsii* • *Acaena agnipila* • *Acaena ovina* • *Ajuga australis* • *Angophora floribunda* • *Anthosachne scabra* • *Aristida behriana*		

Criteria	Data/ information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information
	• *Aristida jerichoensis* • *Aristida latifolia* • *Aristida ramoda* • *Asperula conferta* • *Austrostipa aristiglumis* • *Austrostipa blackii* • *Austrostipa densiflora* • *Austrostipa nodosa* • *Austrostipa scabra* • *Bothriochlora macra* • *Brachychiton populneus* • *Brunoniella australis* • *Bulbine spinosa* • *Bursaria spinosa* • *Callitris glaucophylla* • *Cheilanthes sieberi* • *Chloris ventricosa* • *Chrysocephalum apiculatum* • *Chrysocephalum semipapposum* • *Convolvulus spp.* • *Cymbonotus lawsonianus* • *Cymbopogon refractus* • *Cynoglossum suaveolens* • *Desmodium varians* • *Dianella longifolia* • *Dichanthium sericeum* • *Dichondra spp.* • *Dichopogon fimbriatus* • *Einadia nutans* • *Eremophila debilis* • *Eucalyptus albens*		

Criteria	Data/ information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information
	• *Eucalyptus blakelyi* • *Eucalyptus bridgesiana* • *Eucalyptus macrorhyncha* • *Eucalyptus melliodora* • *Eucalyptus moluccana* • *Eucalyptus polyanthemos* • *Eucalyptus rubida* • *Euchiton involucratum* • *Euchiton sphaericus* • *Euphorbia drummondii* • *Exocarpos cupressiformis* • *Galium spp.* • *Geranium retrorsum* • *Geranium solanderi* • *Glycine spp.* • *Gonocarpus elatus* • *Gonocarpus tetragynus* • *Goodenia bellidifolia* • *Goodenia hederacea* • *Goodenia pinnatifida* • *Hydrocotyle laxiflora* • *Hypericum gramineum* • *Jacksonia scoparia* • *Jasminum suavissimum* • *Leptorhynchos squamatus* • *Lissanthe strigosa* • *Lomandra filiformis* • *Lomandra multiflora* • *Melichrus urceolatus* • *Microlaena stipoides* • *Microseris lanceolata*		

Criteria	Data/ information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information
	• *Microtis unifolia* • *Notelaea microcarpa* • *Olearia elliptica* • *Opercularia aspera* • *Oxalis perennans* • *Panicum effusum* • *Plantago debilis* • *Plantago gaudichaudii* • *Plantago varia* • *Poa labillardieri* • *Poa sieberiana* • *Poranthera microphylla* • *Ranunculus lappaceus* • *Rostellularia adscendens* • *Rubus parvifolius* • *Rumex brownii* • *Rytidosperma auriculatum* • *Rytidosperma pilosum* • *Rytidosperma racemosum* • *Rytidosperma setaceum* • *Schoenus apogon* • *Scleranthus biflorus* • *Sida corrugata* • *Solengyne gunnii* • *Sorghum leiocladum* • *Sporobolus creber* • *Stackhousia monogyna* • *Stackhousia viminea* • *Stellaria pungens* • *Swainsona galegifolia* • *Templetonia stenophylla*		

Criteria	Data/ information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information
	• *Themeda triandra* • *Tricoryne elatior* • *Velleia paradoxa* • *Veronica plebeia* • *Wahlenbergia communis* • *Wahlenbergia luteola* • *Wahlenbergia planiflora* • *Wurmbea dioica* • *Xerochrysum viscosum* PCTs in the subject land contain characteristic grass species of the TEC in the genera *Aristida* and *Austrostipa* and are likely to be animal-dispersed and capable of dispersing between 1–10 km. The grasses in the genera *Bothriochloa* spp. are likely wind-dispersed, as are most species of forbs in the family Asteraceae. The wind-dispersed grasses are likely to be capable of dispersing between 1–10 km. The very small, plumed seeds of many species in the Asteraceae (daisy family) are likely to be capable of dispersing more than 10 km. Many of the forb and grass species that make up the ground layer of the TEC are likely to have no specialised dispersal mechanism or to be ant-dispersed and only capable of dispersal to distances of less than 10 m. *Themeda triandra* is likely to be animal-dispersed and capable of dispersing between 1–10 km. Most species of forbs in the family Asteraceae family are likely to be capable of dispersing between 1–10 km. Many of the forb and grass species that make up the ground layer of the TEC are likely to have no specialised dispersal mechanism or to be ant-dispersed and only capable of dispersal to distances of less than 10 m.		
Area to perimeter ratio of remaining remnants (ratio)	The modification is unlikely to significantly increase the edge to area ratio of remaining areas of the TEC, due to the high condition woodland patches occurring adjacent to an existing road. The existing areas of the TEC are already exposed to edge effects including weed encroachment.		

<table>
<tr><th>Criteria</th><th>Data/ information</th><th>Data sources</th><th>Details of data deficiency, assumptions, reasons for low confidence in information</th></tr>
<tr><td>Vegetation integrity analysis</td><td>Vegetation integrity for the TEC within the additional lots is presented in the summary table below:
<table>
<tr><th>Project component</th><th>Vegetation zone</th><th>Direct impacts (ha)</th><th>VI score</th><th>Composition score</th><th>Structure score</th><th>Function score</th></tr>
<tr><td>BBRS</td><td>281_woodland</td><td>1.38</td><td>55.6</td><td>76.7</td><td>76.9</td><td>29.1</td></tr>
<tr><td></td><td>277_woodland</td><td>0.57</td><td>41.1</td><td>66.3</td><td>41.0</td><td>25.5</td></tr>
<tr><td></td><td>281_DNG</td><td>0.35</td><td>59.1</td><td>85.1</td><td>32.1</td><td>75.5</td></tr>
<tr><td></td><td>277_DNG</td><td>0.55</td><td>35.8</td><td>45.3</td><td>57.5</td><td>17.5</td></tr>
<tr><td>Additional lots</td><td>281_DNG</td><td>68.96</td><td>18.0</td><td>36.9</td><td>55.2</td><td>2.9</td></tr>
<tr><td></td><td>281_woodland</td><td>0.35</td><td>41.6</td><td>48.9</td><td>88.0</td><td>16.7</td></tr>
</table></td><td>-</td><td>-</td></tr>
</table>

6.4.5 Impacts of the project as modified

The SAII assessment for the project as modified is provided in Table 6.10.

Table 6.10 SAII assessment for the project as modified- Box Gum Woodland CEEC

Criteria	Data/ information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information
Impact on the geographic extent of the TEC (Principles 1 and 3)			
Area of TEC to be impacted by the proposal (ha)	The project as modified would impact on 372.62 ha of the TEC, comprising 9.74 ha of woodland in various conditions states ranging from poor to high; and 362.88 ha of derived grasslands ranging from low to moderate condition.	-	-
Area of TEC to be impacted by the proposal as a % of the current geographic extent in NSW (%)	The best estimate of the extent of occurrence (EOO) is 702,800 km^2. The project as modified would impact on 0.0005% of its current extent.	NSW TSSC 2020	Not all areas occupied by the community are covered by maps of appropriate scale and accuracy. Therefore, the values for EOO and AOO quoted may underestimate the true values.
Direct/indirect impacts likely as a result of the proposal to contribute to loss of flora/fauna species characteristic of the TEC	The project as modified would result in the removal of 372.62 ha of the TEC, which is 0.0005% of the current extent. Indirect impacts to the TEC include weed introduction and spread and erosion and sedimentation. Retained areas of the TEC within woodland areas and adjacent to the subject land will be avoided. Weed management and erosion mitigation measures in accordance with Table 6.4 will also be developed and implemented in retained areas of the community within the indirect impact areas. There will be no change to fire regimes.	-	-
Impacts likely to contribute to further environmental degradation or disruption of biotic processes (Principle 2)			
Remaining size of isolated areas of TEC (ha)	The vegetation within the BBRS study area and roadside vegetation in the western edge of the solar project is highly disturbed and modified. Much of the surrounding landscape as per SVTM identifies the areas as PCT 0. Given the high level of current fragmentation, the project as modified does not substantially increase the TEC's fragmentation in the locality.	DPIE 2015	Patch connectivity has been assessed using regional vegetation mapping.
Current average distance between areas of the TEC (m)	Current average connectivity between areas of the TEC is greater than 100 m. This TEC is very fragmented in the locality by vast areas of cropping and exotic grassland.	-	-

Criteria	Data/ information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information
Average distance between areas of the TEC if the project proceeds (m)	The average distance of the retained woodland TEC to other patches in the landscape exceeds 800 m. Most of the surrounding landscape is identified as Category 1 land.		-
Estimated maximum dispersal distance of native flora species associated with the TEC (km)	According to Corlett (2009), typical maximum dispersal distances for different dispersal mechanisms are as follows: • No specialised mechanism 0–10 m • Ant dispersal 0–10 m • Wind (large-winged fruits) 10–100 m • Rodents 10–100 m • Small to medium-sized forest birds and arboreal mammals 100 m – 1 km • Flying-foxes (large seeds) 100 m – 1 km • Large and open-country birds 1 km – 10 km • Wind (small plumed seeds) 1 km – 10 km • Terrestrial mammals 1 km – 10 km • Wind (tiny seeds/spores, and very small plumed seeds) >10 km • Flying-foxes (small seeds) >10 km Eucalyptus spp. (including *Eucalyptus blakelyi* characteristic of the tree growth form component of the TEC within the subject land) have very limited seed dispersal capabilities, likely in the 0–10 range or 10–100 m range for any given event and species and are considered capable of migrating across landscapes only in the order of ~71–142 m in 71 years (Booth, 2017).	Corlett 2009 Booth 2017	-
	Native flora species associated with Box Gum Woodland CEEC (as identified in NSW TSSC 2020) include: • *Acacia dealbata* • *Acacia filicifolia* • *Acacia implexa* • *Acacia mearnsii* • *Acaena agnipila* • *Acaena ovina* • *Ajuga australis* • *Angophora floribunda* • *Anthosachne scabra* • *Aristida behriana*		

Criteria	Data/ information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information
	• *Aristida jerichoensis* • *Aristida latifolia* • *Aristida ramoda* • *Asperula conferta* • *Austrostipa aristiglumis* • *Austrostipa blackii* • *Austrostipa densiflora* • *Austrostipa nodosa* • *Austrostipa scabra* • *Bothriochlora macra* • *Brachychiton populneus* • *Brunoniella australis* • *Bulbine spinosa* • *Bursaria spinosa* • *Callitris glaucophylla* • *Cheilanthes sieberi* • *Chloris ventricosa* • *Chrysocephalum apiculatum* • *Chrysocephalum semipapposum* • *Convolvulus spp.* • *Cymbonotus lawsonianus* • *Cymbopogon refractus* • *Cynoglossum suaveolens* • *Desmodium varians* • *Dianella longifolia* • *Dichanthium sericeum* • *Dichondra spp.* • *Dichopogon fimbriatus* • *Einadia nutans* • *Eremophila debilis* • *Eucalyptus albens*		

Criteria	Data/ information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information
	• *Eucalyptus blakelyi* • *Eucalyptus bridgesiana* • *Eucalyptus macrorhyncha* • *Eucalyptus melliodora* • *Eucalyptus moluccana* • *Eucalyptus polyanthemos* • *Eucalyptus rubida* • *Euchiton involucratum* • *Euchiton sphaericus* • *Euphorbia drummondii* • *Exocarpos cupressiformis* • *Galium spp.* • *Geranium retrorsum* • *Geranium solanderi* • *Glycine spp.* • *Gonocarpus elatus* • *Gonocarpus tetragynus* • *Goodenia bellidifolia* • *Goodenia hederacea* • *Goodenia pinnatifida* • *Hydrocotyle laxiflora* • *Hypericum gramineum* • *Jacksonia scoparia* • *Jasminum suavissimum* • *Leptorhynchos squamatus* • *Lissanthe strigosa* • *Lomandra filiformis* • *Lomandra multiflora* • *Melichrus urceolatus* • *Microlaena stipoides* • *Microseris lanceolata*		

Criteria	Data/ information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information
	• *Microtis unifolia* • *Notelaea microcarpa* • *Olearia elliptica* • *Opercularia aspera* • *Oxalis perennans* • *Panicum effusum* • *Plantago debilis* • *Plantago gaudichaudii* • *Plantago varia* • *Poa labillardieri* • *Poa sieberiana* • *Poranthera microphylla* • *Ranunculus lappaceus* • *Rostellularia adscendens* • *Rubus parvifolius* • *Rumex brownii* • *Rytidosperma auriculatum* • *Rytidosperma pilosum* • *Rytidosperma racemosum* • *Rytidosperma setaceum* • *Schoenus apogon* • *Scleranthus biflorus* • *Sida corrugata* • *Solengyne gunnii* • *Sorghum leiocladum* • *Sporobolus creber* • *Stackhousia monogyna* • *Stackhousia viminea* • *Stellaria pungens* • *Swainsona galegifolia* • *Templetonia stenophylla*		

Criteria	Data/ information	Data sources	Details of data deficiency, assumptions, reasons for low confidence in information
	• *Themeda triandra* • *Tricoryne elatior* • *Velleia paradoxa* • *Veronica plebeia* • *Wahlenbergia communis* • *Wahlenbergia luteola* • *Wahlenbergia planiflora* • *Wurmbea dioica* • *Xerochrysum viscosum* PCTs in the subject land contain characteristic grass species of the TEC in the genera *Aristida* and *Austrostipa* and are likely to be animal-dispersed and capable of dispersing between 1–10 km. The grasses in the genera *Bothriochloa* spp. are likely wind-dispersed, as are most species of forbs in the family Asteraceae. The wind-dispersed grasses are likely to be capable of dispersing between 1–10 km. The very small, plumed seeds of many species in the Asteraceae (daisy family) are likely to be capable of dispersing more than 10 km. Many of the forb and grass species that make up the ground layer of the TEC are likely to have no specialised dispersal mechanism or to be ant-dispersed and only capable of dispersal to distances of less than 10 m. *Themeda triandra* is likely to be animal-dispersed and capable of dispersing between 1–10 km. Most species of forbs in the family Asteraceae family are likely to be capable of dispersing between 1–10 km. Many of the forb and grass species that make up the ground layer of the TEC are likely to have no specialised dispersal mechanism or to be ant-dispersed and only capable of dispersal to distances of less than 10 m.		
Area to perimeter ratio of remaining remnants (ratio)	The clearing of the additional lots is unlikely to significantly increase the edge to area ratio of remaining areas of the TEC, due to the high condition woodland patches occurring adjacent to an existing road. The existing areas of the TEC are already exposed to edge effects including weed encroachment.		

<table>
<tr><th>Criteria</th><th>Data/ information</th><th>Data sources</th><th>Details of data deficiency, assumptions, reasons for low confidence in information</th></tr>
<tr><td>Vegetation integrity analysis</td><td>Vegetation integrity for the TEC within the additional lots is presented in the summary table below:
<table>
<tr><th>Project component</th><th>Vegetation zone</th><th>Direct impacts (ha)</th><th>VI score</th></tr>
<tr><td>Solar project and BESS</td><td>PCT 281_high</td><td>0.35</td><td>99.8</td></tr>
<tr><td></td><td>PCT 281_medium</td><td>0.55</td><td>58.3</td></tr>
<tr><td></td><td>PCT 281_pasture</td><td>293.02</td><td>3.6</td></tr>
<tr><td></td><td>PCT 281_planted</td><td>2.59</td><td>50</td></tr>
<tr><td></td><td>PCT 281_poor</td><td>3.95</td><td>39</td></tr>
<tr><td>BBRS</td><td>281_woodland</td><td>1.38</td><td>55.6</td></tr>
<tr><td></td><td>277_woodland</td><td>0.57</td><td>41.1</td></tr>
<tr><td></td><td>281_DNG</td><td>0.35</td><td>59.1</td></tr>
<tr><td></td><td>277_DNG</td><td>0.55</td><td>35.8</td></tr>
<tr><td>Additional lots</td><td>281_DNG</td><td>68.96</td><td>18.0</td></tr>
<tr><td></td><td>281_woodland</td><td>0.35</td><td>41.6</td></tr>
<tr><td>Total</td><td>-</td><td>372.62</td><td>-</td></tr>
</table></td><td>-</td><td>-</td></tr>
</table>

6.5 Impacts not requiring offsets

In accordance with section 9.2.1 of BAM (DPIE 2020), impacts on vegetation zones and threatened species habitat do not require offsets where:

- a vegetation zone representative of a critically endangered or endangered ecological community has a vegetation integrity score less than 15; and/or
- a vegetation zone representative of a vulnerable ecological community and/or threatened species habitat has a vegetation integrity score less than 17; and/or
- a vegetation zone that is not listed has a vegetation integrity score less than 20.

Areas not requiring assessment in accordance with Section 9.3 of BAM (DPIE 2020) include:

- existing roads and hardstand
- cleared and highly disturbed land
- watercourses.

Areas not requiring offsets include exotic planted vegetation and pasture totalling 148.40 ha (Table 4.3) vegetation, and in the case of this assessment, those particularly associated with past grazing and cropping activities.

6.6 Impacts requiring offset

This section provides an assessment of the impacts requiring offsetting in accordance with section 9.2 of BAM (DPIE 2020).

i Impacts on native vegetation

The direct impacts on native vegetation and a summary of the resulting ecosystem credits required for the additional lots, including changes in vegetation integrity score, are provided in Table 6.11. A credit report is provided in Appendix F.

Table 6.11 Summary of ecosystem credits required for the additional lots

Vegetation zone number	PCT	Vegetation zone name	Area	Vegetation integrity score	Future vegetation integrity score	Change in vegetation integrity score	Credits required
1	281- Rough-barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	281_DNG	68.96	18	0.0	-18	778
2	281- Rough-barked Apple – Red Gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	281_Woodland	0.35	41.6	0.0	-41.6	9
Total	-	-	**69.31**	-	-	-	**787**

The direct impacts and a summary of the resulting ecosystem credits required for the BBRS, including changes in vegetation integrity score, are provided in Table 6.12. A credit report is provided in Appendix F.

Table 6.12 Summary of ecosystem credits required for the Birriwa Bus Route South

Vegetation zone number	PCT	Vegetation zone name	Area	Vegetation integrity score	Future vegetation integrity score	Change in vegetation integrity score	Credits required
1	281 - Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	281_Woodland	1.38	55.6	0.0	-55.6	48
2	277 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	277_Woodland	0.57	41.1	0.0	-41.1	15
3	281 - Rough-Barked Apple – red gum – Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	281_DNG	0.18	59.1.	0.0	-59.1	7
4	277 - Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	277_DNG	0.72	35.8	0.0	-35.8	16
Total			**2.85**				**86**

Offsets will be provided through implementation of the biodiversity offset scheme. Figure 6.1 shows the areas requiring offsets and those areas that require no offsetting.

ii Impacts on threatened species

A summary of the direct impacts and resulting species credits required for the additional lots is provided in Table 6.13. Species polygons are shown on Figure 6.2. Credit reports for the additional lots and BBRS are provided in Appendix F.

Table 6.13 Summary of species credits required for the additional lots

Species	Vegetation zone name	Area (ha)	Habitat condition	Future habitat condition	Loss of habitat condition	Candidate SAII	Species credits
Eastern Cave Bat (*Vespadelus troughtoni*)	281_DNG	43.11	18	0.0	-18	True	583
	281_Woodland	0.05	41.6	0.0	-41.6	True	2
Subtotal							**585**
Large-eared Pied Bat (*Chalinolobus dwyeri*)	281_DNG	43.11	18	0.0	-18	True	583
	281_Woodland	0.05	41.6	0.0	-41.6	True	2
Subtotal							**585**
Masked Owl (*Tyto novaehollandiae*)	281_Woodland	0.11	41.6	0.0	-41.6	False	2
Subtotal							**2**
Southern Myotis (*Myotis macropus*)	281_DNG	53.10	18	0.0	-18	False	479
	281_Woodland	0.07	41.6	0.0	-41.6	False	1
Subtotal							**480**

A summary of the species credits required for all vegetation zones within BBRS occupied by threatened species, including changes in vegetation integrity score, are provided in Table 6.14. Figure 6.2 displays the species polygons, while credit reports are provided in Appendix F.

Table 6.14 Summary of species credits required for BBRS

Species	Vegetation zone name	Area (ha)/ individual (HL)	Habitat condition	Future habitat condition	Loss of habitat condition	Candidate SAII	Species credits
Southern Myotis (*Myotis macropus*)	277_DNG	0.50	35.8	0.0	-35.8	False	9
	277_Woodland	0.43	41.1	0.0	-41.1	False	9
	281_DNG	0.18	59.1	0.0	-59.1	False	5
	281_Woodland	0.73	55.6	0.0	-55.6	False	20
Subtotal							**43**
Masked Owl (*Tyto novaehollandiae*)	277_Woodland	0.22	41.1	0.0	-41.1	False	5
	281_Woodland	0.81	55.6	0.0	-55.6	False	23
Subtotal							**28**

iii Impacts of the project as modified

The offset requirements for the project as modified are provided in Table 6.15.

Table 6.15 Offset requirements for the project as modified

Entity	Credits required (approved project)		Credits required (modification)		Total
	Road upgrade corridor works	Solar project and BESS	Additional lots (modification)	Birriwa Bus Route South upgrade works (modification)	
Ecosystem credits					
PCT 281	19	200	787	55	1061
PCT 277	0	0	0	31	31
PCT 80	23	29	0	0	52
Total – ecosystem credits	**42**	**229**	**787**	**86**	**1144**
Species credits					
Eastern Cave Bat	0	0	585	0	585
Large-eared Pied Bat	0	17	585	0	602
Southern Myotis	0	0	480	43	523
Masked Owl	0	0	2	28	30
Koala	38	189	0	0	227
Total - species credits	**38**	**206**	**1652**	**71**	**1967**

The biodiversity credit obligation relating to the approved project has not been acquitted yet.

6.7 Biodiversity offset strategy

The project will offset the residual impacts on biodiversity via conservation mechanisms established under the NSW BOS. The BOS offset rules are established by the Biodiversity Conservation Regulation 2017 and the mechanisms available to meet offset obligations include:

- retiring like-for-like credits
- payment into the Biodiversity Conservation Fund (BCF).

6.7.1 Staged offsetting

As credit acquisition (either through establishing a Biodiversity Stewardship Agreement (BSA) over existing landholdings or sourcing from market) can take time, opportunities to incorporate longer lead-in times into the program of the project can be advantageous to allow credits to be acquired before they must be retired.

Opportunities to stage the credit retirement are available to state significant projects and would be based on a staged development schedule that would enable a partial retirement of the credit obligation at construction commencement.

Regarding the satisfaction of credit obligations prior to commencing any on-ground works for the project, it is the intent of ACEN to clear vegetation in stages, comprising:

- Stage 1 – consisting of BBRS (as referred to in this report and Appendix A (ELA 2025))
- Stage 2 – consisting of the additional lots (as referred to in this report).

Biodiversity offset liabilities for each stage of clearing will be finalised before the commencement of the relevant vegetation clearing stage. The credit requirements per stage are provided in Table 6.16 for ecosystem credit species and Table 6.17 for species credit species. The credit reports for each stage are provided within Appendix F.

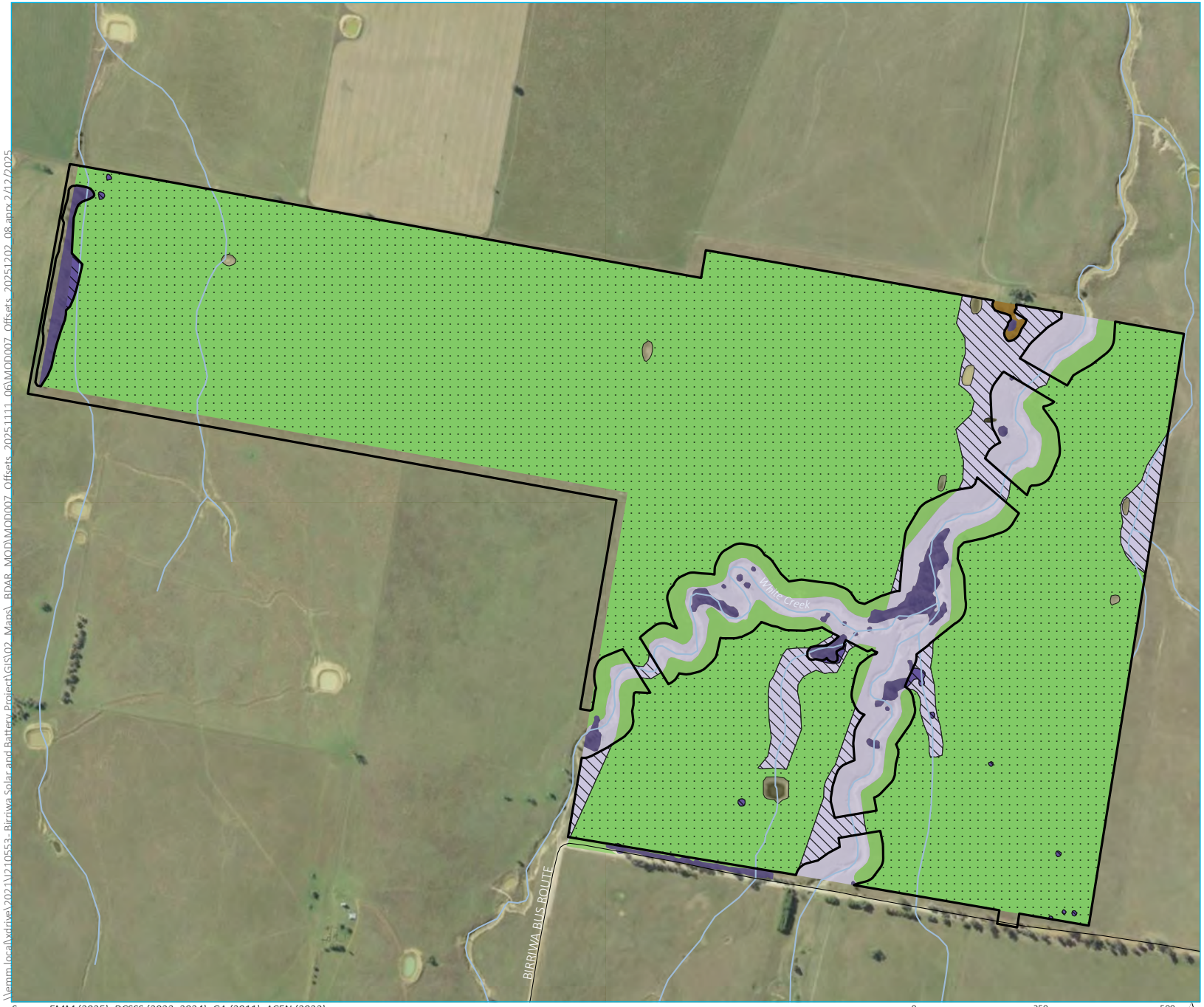
Table 6.16 Summary of staged offset delivery – ecosystem credits

Species	Vegetation zone name	Change in VI score	Biodiversity Risk Weighting	Area (ha)	Credits
Stage 1 - BBRS					
281	281_Woodland	-55.6	2.5	1.38	48
277	277_Woodland	-41.1	2.5	0.57	15
281	281_DNG	-59.1	2.5	0.35	7
277	277_DNG	-35.8	2.5	0.55	16
Subtotal				**2.85**	**86**
Stage 2 – additional lots					
281	281_DNG	-18	2.5	68.96	778
	281_Woodland	-41.6	2.5	0.35	9
Subtotal				**69.31**	**787**

Table 6.17 Summary of staged offset delivery – species credits

Species	Vegetation zone name	Change in VI score	Biodiversity Risk Weighting	Area (ha)	Credits
Stage 1 - BBRS					
Southern Myotis (*Myotis macropus*)	277_DNG	-35.8	2	0.50	9
	277_Woodland	-41.1	2	0.43	9
	281_DNG	-59.1	2	0.18	5
	281_Woodland	-55.6	2	0.73	20
Masked Owl (*Tyto novaehollandiae*)	277_Woodland	-41.1	2	0.22	5
	281_Woodland	-55.6	2	0.81	23
Stage 2 – additional lots					
Eastern Cave Bat (*Vespadelus troughtoni*)	281_DNG	-18	3	43.11	583
	281_Woodland	-41.6	3	0.05	2

Species	Vegetation zone name	Change in VI score	Biodiversity Risk Weighting	Area (ha)	Credits
Large-eared Pied Bat (*Chalinolobus dwyeri*)	281_DNG	-18	3	43.91	583
	281_Woodland	-41.6	3	0.05	2
Masked Owl (*Tyto novaehollandiae*)	281_Woodland	-41.6	2	0.11	2
Southern Myotis (*Myotis macropus*)	281_DNG	-18	2	53.10	479
	281_Woodland	-41.6	2	0.07	1



KEY

- Subject land

Offsets

- Impacts not requiring offsets
- Impacts requiring offsets

Plant community type

- Exotic (planted vegetation)
- Pasture

PCT 277 | Blakely's Red Gum- Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

- Derived native grassland (DNG)
- Woodland

PCT 281 | Rough-Barked Apple- red gum- Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion

- Derived native grassland (DNG)
- Woodland

Existing environment

- Minor road
- Watercourse/drainage line

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Source: EMM (2025); DCSSS (2023, 2024); GA (2011); ACEN (2022)

0 250 500 m

GDA 1994 MGA Zone 55

N

Impacts requiring offsets, impacts not requiring offsets and areas not requiring assessment

Birriwa Solar and Battery Project
Biodiversity Development Assessment Report
Figure 6.1

EMM creating opportunities

KEY

- Birriwa Bus Route South (Assessed by ELA)
- Subject land

Offsets

- Impacts not requiring offsets
- Impacts requiring offsets

Plant community type

- Exotic (planted vegetation)
- Pasture

PCT 277 | Blakely's Red Gum- Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

- Derived native grassland (DNG)
- Woodland

PCT 281 | Rough-Barked Apple- red gum- Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion

- Derived native grassland (DNG)
- Woodland

Existing environment

- Minor road
- Watercourse/drainage line

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Source: EMM (2025); DCSSS (2023, 2024); GA (2011); ACEN (2022)

0 250 500 m

GDA 1994 MGA Zone 55

N

Impacts requiring offsets, impacts not requiring offsets and areas not requiring assessment

Birriwa Solar and Battery Project
Biodiversity Development Assessment Report
Figure 6.1

EMM creating opportunities

KEY

- Birriwa Bus Route South (Assessed by ELA)
- Subject land

Offsets

- Impacts not requiring offsets
- Impacts requiring offsets

Plant community type

- Exotic (planted vegetation)
- Pasture

PCT 277 | Blakely's Red Gum- Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

- Derived native grassland (DNG)
- Woodland

PCT 281 | Rough-Barked Apple- red gum- Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion

- Derived native grassland (DNG)
- Woodland

Existing environment

- Major road
- Minor road
- Watercourse/drainage line

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Source: EMM (2025); DCSSS (2023, 2024); GA (2011); ACEN (2022)

0 250 500 m

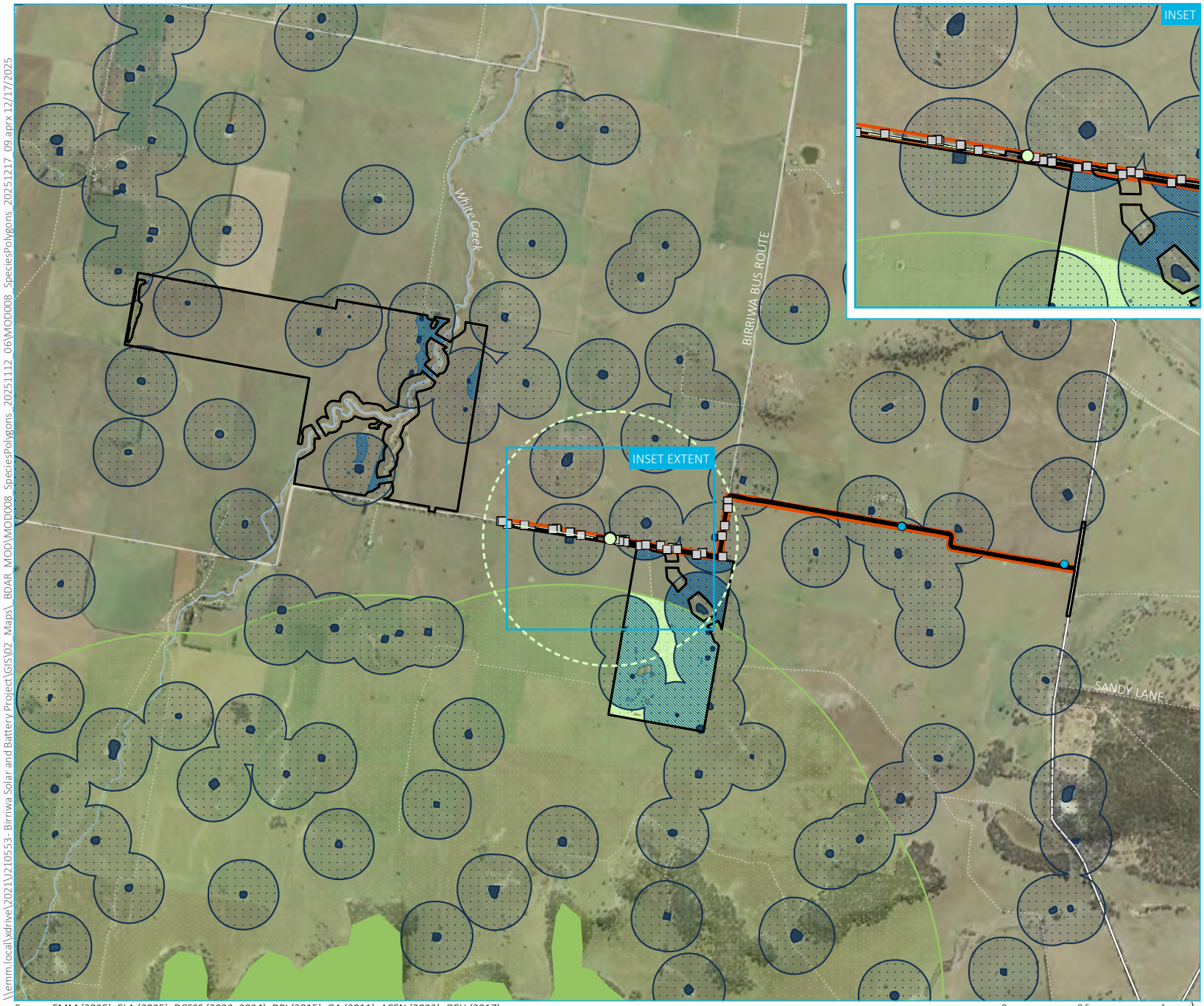
GDA 1994 MGA Zone 55

N

Impacts requiring offsets, impacts not requiring offsets and areas not requiring assessment

Birriwa Solar and Battery Project
Biodiversity Development Assessment Report
Figure 6.1

EMM creating opportunities



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Source: EMM (2025); ELA (2025); DCSSS (2023, 2024); DPI (2015); GA (2011); ACEN (2022); OEH (2017)

Species polygons

Birriwa Solar and Battery Project
Biodiversity Development Assessment Report
Figure 6.2

EMM
creating opportunities

7 Assessment of other relevant biodiversity legislation

7.1 Environment Protection and Biodiversity Conservation Act 1999

This chapter provides an assessment of the project's impacts specific to species and communities listed under the EPBC Act. A likelihood of occurrence assessment for protected matters is presented in Section 7.1.1.

7.1.1 EPBC Referral

The approved project relating to the construction of a solar project, battery energy storage system (BESS) and accommodation facility was referred to the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) on 24 June 2024. The approved project was referred based on the following impacts on Matters of National Environmental Significance (MNES):

- removal of 1.01 ha of Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia Endangered Ecological Community (EEC) listedunder the EPBC Act.
- removal of 0.35 ha of White Box-Yellow Box-Blakely's Red Gum Grassy Woodlandand Derived Native Grassland Critically Endangered Ecological Community (CEEC) under the EPBC Act.
- removal of 8.62 ha of native woodland habitat for threatened species including the Painted Honeyeater (*Grantiella picta*), Regent Honeyeater (*Anthochaera phrygia*), White-throated Needletail (*Hirundapus caudacutus*), Gang-gang Cockatoo (*Callocephalon fimbriatum*), Brown Treecreeper (eastern subspecies) (*Climacteris picumnus victoriae*), Hooded Robin (south-eastern form) (*Melanodryas cucullata cucullata),* Large-eared Pied Bat *(Chalinolobus dwyeri)* and Koala *(Phascolarctos cinereus)*
- removal of 3.25 ha of native grassland habitat for the Superb Parrot *(Polytelis swainsonii*)
- removal of 406 ha of native grassland and woodland for the Diamond Firetail (*Stagonopleura guttata*)

Assessments of significance were undertaken for the above MNES, with a significant impact deemed unlikely for all matters. A referral decision was made by DCCEEW on 6 September 2024 that the approved project was not a controlled action.

The proposed modification is expected to have the following impacts on MNES:

- removal of 1.95 ha of potential habitat for the Regent Honeyeater (*Anthochaera phrygia*)
- removal of 2.85 ha of potential habitat for the Fork-tailed Swift (*Apus pacificus*)
- removal of 2.85 ha of foraging habitat for the Large-eared Pied Bat (*Chalinolobus dwyeri*)
- removal of 1.95 ha of potential foraging habitat for the Brown Treecreeper (*Climacteris picumnus victoriae*)
- removal of 2.85 of potential habitat for the White-throated Needletail (*Hirundapus caudacutus*)
- removal of 2.85 of potential habitat for Corben's Long-eared Bat (*Nyctophilus corbeni*)
- removal of 2.85 ha of potential habitat for the Diamond Firetail (*Stagnopleura guttata*)

Assessments of significance (Appendix E) were completed for the above species, with a significant impact deemed unlikely for all species.

7.1.2 Likelihood of occurrence assessment

The Protected Matters Search Tool (PMST) (DCCEEW 2025) produced a list of MNES that may occur within the additional lots. A likelihood of occurrence (LoO) assessment was undertaken to assess the likelihood that these MNES could occur within or adjacent to the additional lots. The criteria for assessing LoO for the list of MNES predicted by the PMST are listed Table 7.1.

Table 7.1 Likelihood of occurrence criteria

Likelihood	Description	Further assessment conducted?
Negligible	• There is no potential for the species to occur in the subject land. • The species was not recorded during targeted surveys in the subject land.	No
Low	• Based on data collected during field investigations it was considered that the species was unlikely to occur in the subject land or use habitats in the subject land. A species may utilise the subject land on rare occasions. • The species is considered vagrant in the bioregion and is thus considered unlikely to occur in the locality.	No
Moderate	• The species is known to occur in the bioregion and the subject land provides some habitat value for the species. Habitat values are somewhat degraded and considered suboptimal.	Yes
High	• The species is known to occur in the bioregion and the subject land supports optimal habitat features for the species.	Yes
Known	• The species was recorded in the subject land during the current surveys. • The species has been recorded in the subject land previously and there has not been any change in habitat values since this time.	Yes

i Threatened ecological communities

Two TECs were predicted to occur within the subject land by the PMST:

- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland
- Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia.

PCT 277 and PCT 281 are consistent with White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered ecological community (CEEC), listed under the BC Act. The other TEC predicted to occur, Grey Box Grassy Woodlands, was not recorded and this TEC is not considered further.

The EPBC listing for White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland is dependent on condition, patch size and presence or absence of important species. Table 7.2 outlines the assessment process taken place to determine whether PCT 281 (in relation to associated BAM plots) for the additional lots, while Table 7.2 assesses if PCT 277 or 281 in BBRS conforms to the EPBC listing (DEH 2006).

Table 7.2 EPBC listing determination against White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland criteria (DEH 2006) – additional lots

Question	Criteria	Determination	Associated BAM plot	Discussion	Condition pathway
1	Is, or was previously, at least one of the most common overstorey species White Box, Yellow Box or Blakely's Red Gum (or Western Grey Box or Coastal Grey Box in the Nandewar Bioregion)?	Yes	All plots	All vegetation zones are dominated by Blakely's Red Gum, or are considered to be a derived grassland from the TEC.	Move to question 2
2	Does the patch have a predominantly native understorey?	Yes	EMM: Plots 1, 5, 6, 7, 8	Percentages range from native cover of 86% to 99%.	Move to question 3
3	Is the patch 0.1 ha or greater in size?	Yes	EMM: Plots 1, 5, 6, 7, 8	Patch sizes are all > 0.1 ha	Move to question 4
4	There are 12 or more native understorey species present (excluding grasses). There must be at least one important species.	No	EMM: Plots 1, 5, 6, 7, 8	These plots do not have at least 12 or more native understorey species present.	Move to question 5
5	Is the patch 2 ha or greater in size?	Yes	EMM: Plots 1, 5, 6, 7, 8	Patch size is greater than 2 ha	Move to question 6
6	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	EMM: Plot 1, 5, 6, 7, 8	No regeneration of canopy is present.	Not listed under the EPBC Act

Table 7.3 EPBC listing determination against White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland criteria (DEH 2006) – BBRS

Question	Criteria	Determination	Associated BAM plot	Discussion	Condition pathway
1	Is, or was previously, at least one of the most common overstorey species White Box, Yellow Box or Blakely's Red Gum (or Western Grey Box or Coastal Grey Box in the Nandewar Bioregion)?	Yes	All plots	All vegetation zones are dominated by Blakely's Red Gum, or are considered to be a derived grassland from the TEC.	Move to question 2
2	Does the patch have a predominantly native understorey?	No	ELA plots 3, 4, 5 and 7	Percentages are less than 30%	Move to question 3
3	Is the patch 0.1 ha or greater in size?	Yes	ELA plots 3, 4, 5 and 7	Patch sizes are all > 0.1 ha	Move to question 4
4	There are 12 or more native understorey species present (excluding grasses). There must be at least one important species.	No	ELA plots 3, 4, 5 and 7	These plots do not have at least 12 or more native understorey species present.	Move to question 5

Question	Criteria	Determination	Associated BAM plot	Discussion	Condition pathway
5	Is the patch 2 ha or greater in size?	Yes	ELA plots 3, 4, 5 and 7	Patch size is greater than 2 ha	Move to question 6
6	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	ELA plots 3, 4, 5 and 7	Less than 20 mature trees per hectare and canopy regeneration is absent.	Not listed under the EPBC Act

ii Threatened species

The PMST and/or BAMC predicted that 15 flora species and 32 fauna species listed under the EPBC Act could occur within the additional lots, respectively. The likelihood of occurrence for the species predicted for the additional lots is assessed in Table 7.4.

Table 7.4 Likelihood of occurrence

Scientific name	Common Name	EPBC Status	Source	Likelihood of occurrence – additional lots
Plants				
Androcalva procumbens	-	V	PMST	Negligible. The additional lots occur outside of the species mapped range and no associated species occur within the additional lots. No previous records within the locality. The PCTs within the additional lots are not associated with this species.
Bertya mollissima	-	E	PMST	Low. No associated species or suitable habitat (steep hillsides and mountain summits) occur within the additional lots. No previous records within the locality.
Dichanthium setosum	Bluegrass	V	BAMC, PMST	Low. Suitable habitat within the additional lots occurs within the DNG areas of PCT 281. Targeted surveys in these areas did not locate the species and there are no previous records within the locality. The exotic pastureland within the additional lots was considered too degraded for the species to occur.
Euphrasia arguta	-	CE	BAMC, PMST	Low. Suitable habitat occurs within the additional lots - eucalypt forest with a mixed grass and shrub understorey, often in open disturbed areas and along the road side. The exotic pastureland within the additional lots was considered too degraded for the species to occur. Targeted surveys along the better areas of creekline within PCT 281 DNG did not find the species within the additional lots. No previous records within the locality.
Homoranthus darwinioides	Fairy Bells	V	PMST	Low. No associated species or suitable habitat (gravelly soils) occur within the additional lots.
Lepidium aschersonii	Spiny Peppercress	V	PMST	Low. The additional lots do not contain suitable microhabitats for the species to occur. The additional lots lack ridges or gilgai clays, in addition to lacking the associated species.

Scientific name	Common Name	EPBC Status	Source	Likelihood of occurrence – additional lots
Lepidium monoplocoides	Winged Peppercress	E	PMST	Negligible. The additional lots are not located within the species known predicted range. No previous records within the locality. No associated species occur within the additional lots.
Ozothamnus tesselatus	-	V	PMST	Low. Potential habitat for this species occurs in the wooded vegetation zones of PCT 281 within the study area of the additional lots, however, these areas were surveyed, and no shrub species were present due to past underscrubbing. Additionally, the wooded areas of PCT 281 are outside of the additional lots.
Prasophyllum petilum	Tarengo Leek Orchid	E	BAMC PMST	Low. Potentially suitable habitat for this species occurs in the wooded and good condition DNG vegetation zones of PCT 281. The exotic pastureland within the additional lots was considered too degraded for the species to occur. Targeted surveys within PCT 281 vegetation did not locate the species. No previous records within the locality.
Prasophyllum sp. Wybong	-	CE	BAMC PMST	Low. Potentially suitable habitat for this species occurs in the wooded and DNG vegetation zones of PCT 281. The exotic pastureland within the additional lots was considered too degraded for the species to occur. Targeted surveys within suitable habitat did not locate the species. No previous records within the locality.
Swainsona murrayana	Slender Darling-pea	V	PMST	Low. Potentially suitable habitat occurs within the additional lots (grassy woodlands), however no associated species (*Maireana sp*.) were present and the additional lots do not occur on clay-based soils which is where the species has been collected (BCS 2025b).
Swainsona recta	Small Purple Pea	E	PMST	Low. Potentially suitable habitat for this species occurs in the wooded and DNG vegetation zones of PCT 281. The exotic pastureland within the additional lots was considered too degraded for the species to occur. Targeted surveys within suitable habitat did not locate any *Swainsona* species. No previous records within the locality.
Thesium australe	Austral Toadflax	V	PMST	Low Potentially suitable habitat for this species occurs in the wooded and DNG vegetation zones of PCT 281. The exotic pastureland within the additional lots was considered too degraded for the species to occur. Targeted surveys within suitable habitat did not locate the species. No previous records within the locality.
Tylophora linearis	-	E	PMST	Low. No associated species or suitable habitat (dry scrub and open forest) occur within the additional lots.

Scientific name	Common Name	EPBC Status	Source	Likelihood of occurrence – additional lots
Zieria ingramii	Keith's Zieria	E	PMST	Low. Potentially suitable habitat for this species occurs in the wooded vegetation zones of PCT 281, however the habitat is degraded due to underscrubbing and none of the associated species including key predictor species *Eucalyptus dwyeri* occur within these areas. Areas of potential habitat in the wooded vegetation are outside the additional lots. Two previous local records exist approximately 19 km south-west of the additional lots from 2010.
Birds				
Anthochaera phrygia	Regent Honeyeater	CE	BAMC PMST	Low. The study area for the additional lots occurs in the species known range and contains woodland associated with this species. However, only two proximal records exist for the species, the nearest of which is approximately 13 km south-west of the additional lots from 2012. A patch of potentially suitable woodland habitat on the western boundary of the additional lot to the north of BBRS is to be retained.
Aphelocephala leucopsis	Southern Whiteface	V	PMST	Low. Species is associated with arid landscapes and their vegetation types and is not known to be associated with PCT 281. Within the locality the species may occur as a vagrant foraging in open woodland areas. All degraded woodland vegetation which provides low potential habitat for the species is located outside the subject land. No previous records within the locality.
Botaurus poiciloptilus	Australasian Bittern	E	PMST	Low. There is no suitable wetland habitat within the additional lots. No previous records within the locality.
Callocephalon fimbriatum	Gang-gang Cockatoo	E	BAMC PMST	Low. The additional lots are located on the edge of species range. Species breeds in higher altitudes associated with tall mountain forests. No hollows are present within the additional lots and all wooded vegetation which could be suitable for foraging is outside of the additional lots. This species was not detected during field surveys. Three previous records exist; all located over 15 km east of the site.
Calyptorhynchus lathami lathami	South-eastern Glossy Black-cockatoo	V	PMST	Low. The additional lots do not contain the necessary foraging trees (Sheoak) and PCT 281 is not associated with Glossy-black Cockatoo. Additionally, no hollows are present within the additional lots. A small number of previous records exist for the species, though it is anticipated these occur in areas of vegetation containing suitable foraging Sheoak species.
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	BAMC PMST	Low. No suitable foraging habitat within the additional lots. No breeding habitat (hollows or tree stumps) was identified within the additional lots. There are 25 previous local records, the majority of which are located in the large areas of intact bushland approximately 10km east of the additional lots.

Scientific name	Common Name	EPBC Status	Source	Likelihood of occurrence – additional lots
Falco hypoleucos	Grey Falcon	V	PMST	Low. Habitat within the additional lots does not contain substantial watercourses for the species to occur. Species may be associated with the Talbragar River north of the subject land where it is more likely to forage. No nests observed during surveys within the additional lots. No previous records within the locality.
Grantiella picta	Painted Honeyeater	V	BAMC PMST	Low. The additional lots contains suitable Box-Gum Woodland; however it only occurs as patchy remnants which are unlikely to be utilised by the species. A number of records (68) occur approximately 10 km east of the additional lots.
Haliaeetus leucogaster	White-bellied Sea-eagle	-	BAMC PMST	Low. Habitat within the additional lots does not contain substantial waterbodies for the species to forage. Species may be associated with the Talbragar River north of the subject land where it is more likely to forage. No nests were recorded during surveys for the additional lots. Three previous records within the locality the nearest from 2019, located approximately 10 km to the south.
Lathamus discolor	Swift Parrot	CE	BAMC PMST	Low. The additional lots do not contain the described associated winter flowering species. Grey Box does occur; however, this is not a winter flowering species and is located outside of the additional lots. The species may occur as a vagrant. Three records within the locality, the most recent from 2007 (NSW DCCEEW 2025a).
Leipoa ocellata	Malleefowl	V	PMST	Negligible. The additional lots does not contain suitable mallee habitat for the species to occur. No previous local records within the locality.
Lophochroa leadbeateri leadbeateri	Major Mitchell's Cockatoo/ Pink Cockatoo	E	PMST	Negligible. The additional lots does not contain the preferred foraging species (native/exotic melons, wattles, saltbush or cypress pines) and PCT 281 is not associated with Pink Cockatoo. Additionally, no hollows are present within the additional lots. No previous records within the locality.
Melanodryas cucullata cucullata	South-eastern Hooded Robin	E	BAMC PMST	Low. PCT 281 in the additional lots generally lack the structurally diverse habitats preferred by this species. A small number of previous records occur predominately located in the large areas of bushland approximately 10 km east of the additional lots.
Neophema chrysostoma	Blue-winged Parrot	V	PMST	Low. Suitable foraging habitat is absent from the additional lots. No suitable hollows meeting the species requirements occur within the additional lots. No previous records within the locality.
Pedionomus torquatus	Plains-wanderer	CE	PMST	Negligible.

Scientific name	Common Name	EPBC Status	Source	Likelihood of occurrence – additional lots
				The additional lots do not contain suitable semi-arid, lowland native grasslands on red-brown soils for the species to occur. No previous local records within the locality.
Polytelis swainsonii	Superb Parrot	V	BAMC PMST	Low. No suitable foraging habitat is present within the additional lots. No suitable hollows occur within the additional lots. No previous records within the locality.
Pycnoptilus floccosus	Pilotbird	V	PMST	Low. The additional lots lack the dense vegetation structure required for the species. The closest previous records are approximately 10 km east of the additional lots.
Stagonopleura guttata	Diamond Firetail	V	BAMC PMST	Low. No suitable foraging habitat is present within the additional lots. A small number of previous records (8) occur within the locality, the closest of which are associated with the large bushland areas located 10 km east of the additional lots.
Fish				
Galaxias rostratus	Flathead Galaxias	CE	PMST	Negligible. The streams within the additional lots are highly disturbed and lack aquatic and riparian vegetation. The streams occur as ephemeral waterways in periods of high rainfall. No suitable habitat occurs within the additional lots. No previous records within the locality.
Maccullochella macquariensis	Trout Cod	E	PMST	Low. The waterways within the additional lots occur upstream of the Murray River and do not provide suitable habitat such as deep pools or an abundance of overhanging riparian vegetation.
Maccullochella peelii	Murray Cod	V	PMST	Low. The waterways within the additional lots do not provide suitable microclimates for the species to occur. No submerged rocks or an abundance of woody debris and snags occurs. The waterways within the additional lots are shallow and slow-flowing and occurs approximately 4.5 km from the Talbragar River. As the species is a main channel specialist, the species is unlikely to occur within the additional lots.
Macquaria australasica	Macquarie Perch	E	PMST	Negligible. The streams within the additional lots are highly disturbed. The streams occur as ephemeral waterways in periods of high rainfall. No suitable habitat occurs within the additional lots. No previous records within the locality.

Scientific name	Common Name	EPBC Status	Source	Likelihood of occurrence – additional lots
Frogs				
Crinia sloanei	Sloane's Froglet	E	PMST	Low. Birriwa occurs on the edge of the species north-eastern range. The additional lots, whilst highly disturbed, supports online dams only, with ephemeral streams occurring between. No previous records within the locality.
Litoria booroolongensis	Booroolong Frog	E	BAMC	Low. The creeks within the additional lots are ephemeral. No suitable permanent habitat. These streams lack cobble banks and established riparian vegetation. No previous records within locality.
Mammals				
Chalinolobus dwyeri	Large-eared Pied Bat	V	BAMC PMST	Low. A large number of historical records (160) exist for the locality, the most recent from 2024, located approximately 12 km to the south-east. This is the location of the majority of records for this species, which are associated with the large areas of intact bushland within the Goulburn River State Conservation Area (DCCEEW 2025b) and the breeding areas in the Barneys Reef Rock Formation. The study area for the additional lots does not provide optimal foraging habitat within the DNG areas of PCT 281 (the only native vegetation zone within the additional lots). It should be noted the most likely foraging habitat for the species is within the wooded areas along BBRS, outside of the additional lots. Further assessment of this species within BBRS is provided in Appendix D. No roosting habitat for this species occurs within the additional lots.
Dasyurus maculatus	Spotted-tail Quoll	E	BAMC PMST	Low. The additional lots contains highly fragmented vegetation and is unlikely to support the species. One previous record within the locality nearly 20 km to the south from 2019 (DCCEEW 2025b).
Nyctophilus corbeni	Corben's Long-eared Bat	V	PMST	Low. The additional lots does not contain hollows for breeding or the dense understorey required for foraging. Three previous records within the locality associated with the large areas of bushland approximately 10 km to the east of the additional lots (DCCEEW 2025b).
Phascolarctos cinereus	Koala (NSW, QLD and ACT)	V	BAMC PMST	Low. It is considered unlikely the species would use the wooded areas within the study area given the areas are small, isolated patches, surrounded by open grassland. Nonetheless, these areas are outside of the additional lots. Scats were recorded during the approved project surveys approximately 2.5 km west of the additional lots. Nine previous records including two records from 2024 approximately 8 km south-east of the additional lots (DCCEEW 2025b).

Scientific name	Common Name	EPBC Status	Source	Likelihood of occurrence – additional lots
Pseudomys novaehollandiae	New Holland Mouse	V	PMST	Low. Unlikely to occur as the required habitat type, heathland understorey, does not occur within the additional lots.
Pteropus poliocephalus	Grey-headed Flying-fox	V	BAMC PMST	Low. Unlikely to occur as there are no roosting camps that occur within the additional lots.
Reptiles				
Aprasia parapulchella	Pink-tailed Worm Lizard	V	BAMC PMST	Low. The additional lots do not contain suitable rocky habitat. No previous records in locality.
Varanus rosenbergi	Rosenberg's Goanna	V	BAMC	Low. The additional lots do not contain suitable termite nests or rocky habitat. No previous records in locality.

The likelihood of occurrence for EPBC matters conducted for BBRS (Appendix E.3) predicted that nine flora species and 27 fauna species listed under the EPBC Act could occur within BBRS. Of the species predicted, the following were assessed as likely to occur within BBRS:

- White-throated Needletail (*Hirundapus caudacutus*)
- Corben's Long-eared Bat (*Nyctophilus corbeni*)
- Brown Treecreeper (*Climacteris picumnus*)
- Diamond Firetail (*Stagonopleura guttata*)
- Large-eared Pied Bat (*Chalinolobus dwyeri*)
- Regent Honeyeater (*Anthochaera phrygia*).

iii Migratory species

Eleven species listed as migratory under the EPBC Act were predicted to occur in the additional lots, based on database searches undertaken.

Table 7.5 provides an assessment of the likelihood of these species utilising habitat within the additional lots. No species listed as migratory under the EPBC Act were recorded as being present in the additional lots.

Table 7.5 Likelihood of occurrence for migratory species

Scientific name	EPBC Status	Source	Potential presence
Australian Painted Snipe (*Rostratula australis*)	E, Ma	PMST	Negligible There is no wetland or estuarine habitat within the subject land. No previous records within the locality.
Common Sandpiper (*Actitis hypoleucos*)	Ma	PMST	Negligible. There is no suitable habitat (wetlands, mudflats, rocky shores, estuaries, lakes) within the subject land. No previous records within the locality.
Curlew Sandpiper (*Calidris ferruginea*)	CE, Mi	PMST	Negligible. There is no suitable habitat (intertidal mudflats, swamps, lakes, lagoons) within the subject land. No previous records within the locality.
Fork-tailed Swift (*Apus pacificus*)	Ma, Mi	PMST	Low. Species is greatly associated with coastal landscapes and vegetation. Within this locality, the species may occur as a vagrant to forage over the native pasture within the subject land.
Latham's Snipe (*Gallinago hardwickii*)	Ma, Mi	PMST	Negligible. There is no wetland or estuarine habitat within the subject land. No previous records within the locality.
Pectoral Sandpiper (*Calidris melanotos*)	Ma, Mi	PMST	Negligible. There is no wetland or estuarine habitat within the subject land. No previous records within the locality.
Rufous Fantail (*Rhipidura rufifrons*)	Ma, Mi, B	PMST	Negligible. No wet sclerophyll forest or gullies within the subject land. No previous records within locality.

Scientific name	EPBC Status	Source	Potential presence
Satin Flycatcher (*Myiagra cyanoleuca*)	Ma, Mi, B	PMST	Negligible. No heavily vegetated forest or gullies within the subject land. No previous records within locality.
Sharp-tailed Sandpiper (*Calidris acuminata*)	Ma, Mi, B C, J, R	PMST	Low. No heavily vegetated forest or gullies within the subject land. One previous record within locality from 2011 (ALA 2025).
White-throated Needletail (*Hirundapus caudacutus*)	Ma, Mi, C, J, R, V	BAMC PMST	Low. The species may utilise the subject land to forage (though this is aerial foraging only) and there are a number of scattered records within the broader locality, though the species is not associated with PCT 281. Wooded areas that may provide foraging habitat will be retained. A low number of previous records (12) occur within the locality, the most recent from 2024, 12 km east of the subject land.
Yellow Wagtail (*Motacilla flava*)	Mi	PMST	Low. The subject land contains ephemeral creeks and dams, however these lack dense riparian vegetation preferred by the species and do not provide permanent, reliable habitat for the species. Mangroves do not occur in the subject land or locality. No previous records within the locality.

The PMST conducted for BBRS predicted eight species listed as migratory under the EPBC Act could occur within BBRS based on database searches undertaken. Of the migratory species predicted, the following were assessed as likely to occur within BBRS:

- White--throated Needletail (*Hirundapus caudacutus*)
- Fork-tailed Swift (*Apus pacificus*).

7.1.3 Significant impact assessments

Significant impact assessments have been completed for all species listed under the EPBC that were considered likely to occur within the subject land (Appendix E). No species were considered likely to occur within the additional lots, while seven species were considered likely to occur within the BBRS.

For the species considered likely to occur within BBRS, significant impact assessments are provided in Appendix E. A summary of these assessments has been reproduced in Table 7.6.

Table 7.6 Summary of significant impact assessments for Birriwa Bus Route South

Scientific name	Nature and consequence	Duration of impact	Quantum of impact	Significant impact?
Regent Honeyeater (*Anthochaera phrygia*)	Indirect	Permanent	1.95	Unlikely
Fork-tailed Swift (*Apus pacificus*)	Indirect / Direct	Permanent	2.85	Unlikely
Large-eared Pied Bat (*Chalinolobus dwyeri*)	Indirect / Direct	Permanent	2.85	Unlikely
Brown Treecreeper (*Climacteris picumnus*)	Direct	Permanent	1.95	Unlikely
White-throated Needletail (*Hirundapus caudacutus*)	Direct	Permanent	2.85	Unlikely
Corben's Long-eared Bat (*Nyctophilus corbeni*)	Direct / Indirect	Permanent	1.95	Unlikely

Scientific name	Nature and consequence	Duration of impact	Quantum of impact	Significant impact?
Diamond Firetail (*Stagnopleura guttata*)	Direct	Permanent	2.85	Unlikely

7.2 Environmental Planning and Assessment Act 1979

7.2.1 SEPP (Biodiversity and Conservation) 2021

Together, Chapter 3 (Koala Habitat Protection 2020) and 4 (Koala Habitat Protection 2021) of *State Environmental Planning Policy (Biodiversity and Conservation) 2021* aim to encourage the proper conservation and management of areas of natural vegetation that provide habitat for Koalas to ensure a permanent free-living population over their present range and reverse the current trend of Koala population decline. In nine metropolitan Sydney local government areas (Blue Mountains, Campbelltown, Hawkesbury, Ku-Ring-Gai, Liverpool, Northern Beaches, Hornsby, Wollondilly) and the Central Coast LGA, Chapter 4 of SEPP (Biodiversity and Conservation 2021 applies to all land use zones. Outside of these areas, Chapter 3 of SEPP (Biodiversity and Conservation) 2021 continues to apply to all land zoned RU1, RU2, and RU3.

The project is part of an SSD and does not require approval from Council, and therefore Koala SEPP 2020 and Koala SEPP 2021 are not triggered. Nonetheless, consideration has been given to the potential occurrence and impacts upon the koala within this report.

7.3 Biosecurity Act 2015

No state priority weeds listed in the *Central Tablelands Regional Strategic Weed Management Plan 2023-2027* (LLS 2022) were identified within the subject land.

However, two regional priority weeds were identified:

- Blue Heliotrope (*Heliotropium amplexicaule*)
- St. Johns Wort (*Hypericum perforatum*).

Blue Heliotrope and St John's Wort are both regulated with a regional recommended measure for the Central Tablelands for land managers to mitigate the risk of the plant being introduced to their land and mitigate the spread of the plant on their land. A person should not buy, sell, move, carry or release the plant into the environment. Land managers should reduce the impact of this plant on assets of high economic, environmental and/or social value (DPI 2024).

The biodiversity management plan for the project would directly address the control of this priority weed. If any other regional or state priority weeds are identified in the subject land during construction, they must be removed from the subject land. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable. Conservation areas, natural environments and primary production lands should be protected that are free of the priority weeds.

7.4 Fisheries Management Act 1994

As discussed in Section 2.4 and 3.1.2, White Creek is mapped as KFH (DPI 2025b) and is also mapped within the freshwater threatened species distribution for the Purple Spotted Gudgeon (*Mogurnda adspersa*) (DPI 2021).

A likelihood of occurrence assessment for species listed under the FM Act was conducted based on database searches (Table 7.4) and concluded that no aquatic threatened ecological communities, endangered populations or species have a moderate to high likelihood of occurring within the subject land.

An Aquatic Ecology Impact Assessment (ELA 2025) was prepared for the nearby Narragamba Solar Project, which included assessment of the watercourses within BBRS. This Aquatic Ecology Impact Assessment concluded that no aquatic threatened ecological communities, endangered populations or species listed under the FM Act would be impacted by the project.

8 Conclusion

This BDAR has been prepared based on the requirements of, and information provided under the BAM (DPIE 2020) and Clause 6.15 of the BC Act.

The modification will impact one SAII candidate entity, namely White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland and four candidate fauna species. Measures to avoid and minimise impacts to the candidate entity and species were developed in parallel with the design, resulting in impact avoidance and minimisation on these biodiversity values.

A key design principle within the iterative design process has been to maximise the placement of project infrastructure in cleared areas of lower biodiversity value and, wherever possible, limiting impacts to native vegetation of lower quality. Areas known to be of moderate or high condition native vegetation have been avoided as much as possible through design, including native vegetation along existing road verges.

A larger study area was assessed for the BBRS to inform placement of the disturbance footprint such that impacts on White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland and hollow-dependent fauna were avoided and minimised. Consultation with Mid Western Regional Council will continue to look for opportunities for further avoidance and minimisation on these biodiversity values through detailed design.

A detailed mitigation strategy has been developed to manage biodiversity impacts, which would be implemented through a Biodiversity Management Plan to be developed for the modification. Residual impacts to White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland and identified biodiversity values will be mitigated through a detailed mitigation strategy and uncertain/prescribed impacts through an adaptive management strategy. These strategies will be detailed in the Biodiversity Management Plan to be prepared for the modification. ACEN will compensate for these residual impacts through the implementation of a biodiversity offset strategy.

The offset requirements to compensate for the modification's residual impacts are summarised in Table 8.1 and all credit reports have been included within Appendix F.

Table 8.1 Biodiversity credits required

Entity	Impacts (ha)			Credits required to offset impacts		
	Additional lots	BBRS	Subject land	Additional lots	BBRS	Subject land
PCT 277 DNG	0	0.72	0.72	0	16	16
PCT 277 woodland	0	0.57	0.57	0	15	15
PCT 281 DNG	68.96	0.18	69.14	778	9	787
PCT 281 woodland	0.35	1.38	1.73	9	48	57
Eastern Cave Bat	43.16	0	43.16	585	0	585
Large-eared Pied Bat	43.16	0	43.16	585	0	585
Masked Owl	0.11	1.03	1.14	2	28	30
Southern Myotis	53.17	1.85	55.02	480	43	523

The BDAR has also considered impacts on species and ecological communities listed under the EPBC Act. The project is not expected to result in significant impacts to MNES including threatened ecological communities and species, and migratory species.

References

Atlas of Living Australia (ALA) 2025, ALA Spatial portal, hosted by the Commonwealth Scientific and Industrial Research Organisation (CSIRO), accessed February 2025 via https://bie.ala.org.au/

BCS 2025a, BAM Important Areas viewer maps, Biodiversity Conservation and Science Directorate, NSW, https://webmap.environment.nsw.gov.au/Html5Viewer291/index.html?viewer=BAM_ImportantAre

BCS 2025b, *Bionet Atlas of NSW Wildlife – Threatened Biodiversity Profile database,* Biodiversity Conservation and Science Directorate, NSW, accessed February 2025 via http://www.environment.nsw.gov.au/atlasapp/

Booth T H, 2017, Going nowhere fast: a review of seed dispersal in eucalypts, Australian Journal of Botany, 2017, 65, 401–410, https://www.publish.csiro.au/bt/pdf/BT17019

Corlett R, 2009, Seed Dispersal Distances and Plant Migration Potential in Tropical East Asia, Biotropica, 41(5), 592-598. Retrieved February 2025, from http://www.jstor.org/stable/27742821

DEC 2004, Threatened Biodiversity Survey and Assessment: Guidelines for Development and Activities, Department of the Environment and Conservation.

DEH 2006, EPBC Act Policy Statements- White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands, Australian Government.

DECCW 2010, National Recovery Plan- White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland- A critically endangered ecological community, Department of Environment, Climate Change and Water NSW, Sydney.

DCCEEW 2023a, Conservation Advice for *Cassina heleniae*. Canberra: Department of Climate Change, Energy, the Environment and Water.

DCCEEW 2023b, Conservation Advice for *Chalinolobus dwyeri* (large-eared pied bat). Canberra: Department of Climate Change, Energy, the Environment and Water.

DCCEEW 2023c, Conservation Advice for the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland. Canberra: Department of Climate Change, Energy, the Environment and Water.

DCCEEW 2025, Protected Matters Search Tool (PMST). Canberra: Department of Climate Change, Energy, the Environment and Water.

DERM 2011, National recovery plan for the large-eared pied bat *Chalinolobus dwyeri*, Canberra: Department of Environment and Resource Management.

DoE 2013a, Draft Survey Guidelines for Australia's Threatened Orchids, Department of the Environment.

DoE 2013b, Matters of National Environmental Significance – Significant Impact Guidelines 1.1, Australian Government, Canberra.

DoE 2015a, Conservation Advice Anthochaera Phrygia regent honeyeater, Australian Government, Canberra.

DoE 2015b, Conservation Advice Grantiella picta painted honeyeater, Australian Government, Canberra.

DoE 2016, National Recovery Plan for the Regent Honeyeater (Anthochaera phrygia), Canberra, ACT: Commonwealth of Australia, accessed February 2025 via http://www.environment.gov.au/biodiversity/threatened/recovery-plans/national-recovery-plan-regent-honeyeater-anthochaera-phrygia-2016.

DoEE 2018, *Interim Biogeographic Realisation of Australia (IBRA) Version 7*, accessed December 2024 via https://datasets.seed.nsw.gov.au/dataset/interim-biogeographic-regionalisation-for-australia-ibra-version-7-regions/resource/anzlic-web-map.

DPI 2013, Policy and Guidelines for Fish Conservation and Management, NSW Government.

DPI 2015, Strahler Stream Order.

DPI 2021, Freshwater threatened species distribution maps, NSW Government, accessed August 2024 via https://www.dpi.nsw.gov.au/fishing/species-protection/threatened-species-distributions-in-nsw/freshwater-threatened-species-distribution-maps.

DPI 2024, NSW Weedwise: Priority Weeds for the Central Tablelands, Department of Primary Industries, accessed August 2024 via https://weeds.dpi.nsw.gov.au/

DPI 2025a, Fish stocking, accessed February 2025 via https://www.dpi.nsw.gov.au/fishing/recreational/resources/stocking

DPI 2025b, Key fish habitat map - Murray Darling Basin North, NSW Government, accessed August 2024 via Fisheries NSW Spatial Data Portal https://webmap.industry.nsw.gov.au/Html5Viewer/index.html?viewer=Fisheries_Data_Portal.

DPI 2025c, NSW DPI Spatial Data Portal, accessed February 2025 via https://webmap.industry.nsw.gov.au/Html5Viewer/index.html?viewer=Fisheries_Data_Portal

DPIE n.d, Basins and catchments - Macquarie-Bogan, NSW Government, via https://water.dpie.nsw.gov.au/about-us/learn-about-water/basins-and-catchments/catchments/macquarie-bogan

DPIE 2015, *State Vegetation Type Map: Central West/Lachlan Region version 1.4. VIS_ID 4468*, NSW Government, accessed December 2024 via https://datasets.seed.nsw.gov.au/dataset/central-west-lachlan-regional-native-vegetation-pct-map-version-1-0-vis_id-4358182f4

DPIE 2020a, Biodiversity Assessment Method, Department of Planning, Industry and Environment

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

DSEWPaC 2010, Survey Guidelines for Australia's Threatened Birds, Department of Sustainability, Environment, Water, Population and Communities.

Eco Logical Australia (ELA) 2024, *Birriwa Bus Route South Biodiversity Assessment Report- prepared for ACEN Pty Ltd*.

EMM 2025, Birriwa Solar and Battery Project Modification report Prepared for ACEN Australia Pty Ltd.

Heydel F, Cunze S, Bernhardt-Romermann M & Tackenberg O 2014, Long-distance seed dispersal by wind: disentangling the effects of species traits, vegetation types, vertical turbulence and wind speed. *Ecological Research,* 29, 641-651.

IUCN (International Union for Conservation of Nature and Natural Resources) 2017, Guidelines for the application of IUCN Red List of Ecosystems Categories and Criteria., Version 1.1.

LLS 2022, *Central Tablelands Regional Strategic Weed Management Plan 2023–2027*, Local Land Services

NSW DCCEEW 2025a, *BioNet Vegetation Classification database*. NSW Department of Climate Change, Energy, the Environment and Water

NSW DCCEEW 2025b, *NSW State Vegetation Type Map,* NSW Department of Climate Change, Energy, the Environment and Water

NSW TSSC 2020, Notice of and reason for the Final Determination- White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland, NSW Threatened Species Scientific Committee.

NSW TSSC 2021, Regent honeyeater (*Anthochaera phrygia*) – critically endangered species listing, NSW Threatened Species Scientific Committee.

OEH 2017, *Mitchell Landscapes*, Version V3.1, NSW Office of Environment and Heritage, Sydney.

OEH 2018, 'Species credit' threatened bats and their habitats. NSW survey guide for the Biodiversity Assessment Method, NSW Office of Environment and Heritage.

OEH 2022a, *Regent Honeyeater – profile*, Office of Environment & Heritage, Sydney.

OEH 2022b, *Painted Honeyeater – profile*, Office of Environment & Heritage, Sydney.

OEH 2025a, *Large-eared Pied Bat – profile*, Office of Environment & Heritage, Sydney.

OEH 2025, *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 – profile*, Office of Environment & Heritage, Sydney.

PlantNET 2024, The NSW Plant Information Network System, Royal Botanic Gardens and Domain Trust, Sydney, accessed August 2024 via https://plantnet.rbgsyd.nsw.gov.au

Prober, S. and Thiele, K. 2005, Restoring Australia's temperate grasslands and grassy woodlands: integrating function and diversity, *Ecological Management and Restoration*: 6(1): 16-27.

TSSC 2006, Commonwealth Listing Advice on White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland. Canberra, ACT.

TSSC 2009, Commonwealth Listing Advice on Weeping Myall Woodlands. Department of the Environment, Water, Heritage and the Arts, Canberra, ACT

Appendix A

Vegetation integrity assessment field datasheets

EMM
creating opportunities

Exotic	High Threat Weed	Growth Form Group	SORT Species data entry	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5		Plot 6		Plot 7		Plot 8	
				Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
		Shrub (SG)	Acacia decora													5	10		
		Shrub (SG)	Acacia implexa							0.1	10								
*	1		Acetosella vulgaris			0.1	5												
		Forb (FG)	Alternanthera denticulata	0.1	1	0.1	1												
*	1		Alternanthera pungens			0.1	1							0.1	20				
		Tree (TG)	Angophora floribunda	20	18			15	20	5	7	20	50	15	10				
		Grass & grasslike (GG)	Anthosachne scabra	0.5	20	0.1	20			0.2	50								
		Grass & grasslike (GG)	Aristida jerichoensis var. jerichoensis											0.1	5				
		Grass & grasslike (GG)	Aristida ramosa									0.1	10	1	50	0.5	50		
		Grass & grasslike (GG)	Austrostipa aristiglumis			0.5	5												
		Grass & grasslike (GG)	Austrostipa scabra subsp. scabra					0.5	50			0.1	10						
		Grass & grasslike (GG)	Austrostipa spp.									0.1	5	1	50				
		Grass & grasslike (GG)	Austrostipa verticillata			0.8	3												
*			Avena fatua					0.1	5										
*			Bidens pilosa var. pilosa	0.1	10	0.1	1	2	50	0.5	50	8	200	2	100	1	100	0.1	20
		Grass & grasslike (GG)	Bothriochloa macra							0.1	20			0.1	20	0.1	20		
		Tree (TG)	Brachychiton populneus subsp. populneus					0.5	1	0.5	5	3	10	0.1	5				
*			Bromus catharticus	0.5	20					0.1	20							0.1	20
*	1		Bromus diandrus	0.1	10														
*			Bromus hordeaceus					0.1	5										
*			Bromus molliformis			0.5	20												
		Forb (FG)	Calotis lappulacea	0.1	5			0.1	5	0.1	20			0.1	20	0.1	20		
*	1		Carthamus lanatus															0.1	5
		Shrub (SG)	Cassinia spp.																
*			Centaurea solstitialis			0.1	1												
		Fern (EG)	Cheilanthes sieberi subsp. sieberi	0.1	5											0.1	10		
		Fern (EG)	Cheilanthes sieberi subsp. sieberi							0.1	20			0.1	5				
*			Chenopodium album					0.2	50										
		Shrub (SG)	Enchylaena spp.									0.1	5						
		Grass & grasslike (GG)	Chloris truncata							0.1	10	0.3	20	0.1	10			0.2	20
		Grass & grasslike (GG)	Chloris ventricosa									0.1	10			0.1	5		
*			Chondrilla juncea					0.1	20							0.1	5		
*			Cirsium vulgare	0.1	1	0.1	1			0.1	5					0.1	5		
*			Conyza bonariensis	0.1	5			0.1	5	0.1	50					0.1	10		
		Grass & grasslike (GG)	Cynodon dactylon	0.8	50					0.1	20			5	100	2	200	4	200
		Grass & grasslike (GG)	Cyperus gracilis			0.5	50												
		Forb (FG)	Daucus glochidiatus			0.1	5					0.1	20						
		Other (OG)	Desmodium spp.	0.1	3			0.1	5										
		Other (OG)	Desmodium varians									0.1	20						
		Forb (FG)	Dianella revoluta var. revoluta	0.1	5							0.1	5	0.1	5	0.1	10	0.1	10
		Forb (FG)	Dichondra repens			3	1000	0.2	100										
		Grass & grasslike (GG)	Digitaria breviglumis							0.1	20								
		Grass & grasslike (GG)	Digitaria parviflora											0.1	20	0.5	50		
		Grass & grasslike (GG)	Digitaria spp.							0.1	20	0.1	20	0.5	50				
		Grass & grasslike (GG)	Digitaria spp.			0.5	10			0.1	5	0.5	20			0.1	10		
		Forb (FG)	Dysphania pumilio							0.1	50	1	100	0.2	50				
*			Echinochloa crus-galli							0.1	5					0.1	10	0.1	10
*			Echium plantagineum							0.1	5							0.1	5
		Forb (FG)	Einadia nutans subsp. nutans	0.1	5			0.1	5	0.2	50	0.1	10	1	100				
		Forb (FG)	Einadia trigonos subsp. stellulata	0.1	5	0.1	5	0.4	20	0.1	20	0.1	20	0.1	20				
*			Eleusine tristachya															0.1	20
		Grass & grasslike (GG)	Eragrostis brownii									0.1	10						
*	1		Eragrostis curvula									1	50			0.5	50	5	200
		Grass & grasslike (GG)	Eragrostis leptostachya							0.1	20			1	50	3	100	4	100
		Shrub (SG)	Eremophila debilis											0.1	2	0.1	5		
		Grass & grasslike (GG)	Eriochloa spp.							0.1	10	0.1	5					0.1	10
		Tree (TG)	Eucalyptus melliodora			30	3	5	2									4	1
		Tree (TG)	Eucalyptus microcarpa					4	2										
		Other (OG)	Glycine clandestina	0.1	100	0.1	20	0.2	500	0.1	20	0.1	20	0.1	20				
		Other (OG)	Glycine tabacina									0.1	20						
			Gomphrena spp.									0.1	5	0.1	5	0.1	5		
		Forb (FG)	Haloragis heterophylla			0.1	5												
*	1		Heliotropium amplexicaule	0.1	1									0.1	2				

Plot 6 excluded from BAMC

*			Hordeum spp.			0.5	50												
*	1		Hypericum perforatum			0.1	10									0.1	20		
*			Hypochaeris radicata											0.1	10	0.1	10		
		Grass & grasslike (GG)	Juncus australis									0.1	3					0.1	10
		Grass & grasslike (GG)	Juncus usitatus	2	15					0.1	2							0.1	10
*			Lactuca serriola f. serriola					0.2	50	0.1	20			0.1	5				
*			Lepidium bonariense	0.1	2	0.1	1					0.1	10	0.1	20			0.1	10
*			Lolium perenne	1	100	5	100	0.2	100										
*			Malva parviflora			0.1	1												
*			Marrubium vulgare			0.8	20	1	50										
*			Medicago sativa			0.1	10												
		Grass & grasslike (GG)	Microlaena stipoides var. stipoides									0.1	10						
*			Modiola caroliniana	0.1	5			0.1	10									0.1	10
		Forb (FG)	Oxalis perennans	0.1	1					0.1	20								
		Grass & grasslike (GG)	Panicum effusum													0.1	20		
		Grass & grasslike (GG)	Paspalidium jubiflorum									0.1	5						
*	1		Paspalum dilatatum	15	50			0.2	20	35	500	10	200	2	50			12	500
		Forb (FG)	Persicaria prostrata					0.1	5										
		Shrub (SG)	Phyllanthus spp.											0.1	2				
*			Phytolacca octandra					0.1	3										
		Forb (FG)	Plantago debilis															0.1	20
*			Plantago lanceolata											0.1	10	0.1	20	0.1	20
		Forb (FG)	Portulaca oleracea							0.1	5	0.1	5						
		Forb (FG)	Pseudognaphalium luteoalbum	0.1	1														
*			Rapistrum rugosum	0.1	8	0.1	5			0.1	20	0.1	10					0.1	10
		Forb (FG)	Rumex brownii	0.1	1					0.1	10			0.1	5	0.1	10		
		Grass & grasslike (GG)	Rytidosperma spp.	0.1	50	0.2	50					0.5	50	6	100	0.5	50	0.5	100
		Forb (FG)	Salvia spp.			0.1	3	0.1	5										
*			Schkuhria pinnata var. abrotanoides	0.1	5					0.1	5					0.1	5	0.1	10
		Forb (FG)	Senecio quadridentatus					0.1	20										
*			Setaria pumila	0.1	20			0.1	5	15	200	10	200	15	200	5	100	7	100
		Forb (FG)	Sida corrugata					0.2	10	0.1	50			0.1	20				
*			Sida rhombifolia							0.1	10					0.1	5		
*			Solanum nigrum					0.1	5	0.1	5	0.1	5			0.1	5		
*			Sonchus oleraceus					0.1	5					0.1	5			0.1	5
		Grass & grasslike (GG)	Sporobolus creber	10	100	0.2	20			2	100	1	50	10	200	40	1000		
		Grass & grasslike (GG)	Sporobolus elongatus	20	100														
*			Tagetes minuta							0.1	5								
		Grass & grasslike (GG)	Themeda triandra	5	20			0.8	20	0.2	50	0.1	20	4	200	2	50	12	200
*			Trifolium repens			0.1	10												
*			Verbena bonariensis	0.1	20			0.1	5	0.5	50	0.1	20			0.3	20		
		Forb (FG)	Wahlenbergia communis	0.1	20	0.1	10	0.1	50	0.1	5			0.1	5	0.1	5		

BAM Site – Field Survey Form

Plot ID:	Plot1	**Date:**	23/01/2024	**Project number:**	J210553	**Plot dimensions:**	20x20, 20x50
Datum:	GDA94	**Easting:**	738,490	**Recorders:**	LO, PF		
Zone:	55	**Northing:**	6,442,412	**IBRA region:**	NSW South Western Slopes (Inland Slopes)	**Midline bearing:**	41
Plant Community Type:		281: Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion		**Condition class:**	DNG	**PCT % cleared:**	67.00%
Vegetation Formation:		Grassy Woodlands		**Veg. Class:**	Western Slopes Grassy Woodlands		

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m2 plot)		Sum values
Count of Native Richness	Trees:	0
	Shrubs:	0
	Grasses etc.:	11
	Forbs:	3
	Ferns:	1
	Other:	0
Sum of Cover of native vascular plants by growth form group	Trees:	0
	Shrubs:	0
	Grasses etc.:	46.7
	Forbs:	0.4
	Ferns:	0.1
	Other:	0
High Threat Weed cover:		5.1

BAM Attribute (1000 m2 plot) DBH			
DBH	Tree stem count	Length of logs (m) (≥10 cm diameter, >50 cm in length)	0
80 + cm:	0		
50 – 79 cm:	0		
30 – 49 cm:	0		
20 – 29 cm:	0	Tree hollow count	0
10 – 19 cm:	0		
5 – 9 cm:	0		
< 5 cm:	0		

Counts apply when no. of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For multi-stemmed tree, only largest living stem is included in the count. Tree stems must be living.
For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				
Subplot:	1	2	3	4	5
Subplot score (%):	40	40	35	20	10
Average litter cover (%):	29				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography and site features			
Soil colour:		Landform element:	
Soil texture:		Landform pattern:	

Plot Disturbance

GF Code: see Growth Form definitions in Appendix 1; N: native, E: exotic, HTE: high threat exotic; GF – circle code if 'top 3'; Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover)
Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Project name:	J210553				
Recorders:	LO, PF	**Plot ID:**	Plot1	**Date:**	23/01/2024

GF Code	Scientific name	Cover	Abundance	Voucher	N, E or HTE
Grass & grasslike (GG)	*Sporobolus creber (Slender Rat's Tail Grass)*	35	2000	no	N
Grass & grasslike (GG)	*Juncus usitatus*	5	200	no	N
Grass & grasslike (GG)	*Dichanthium sericeum (Queensland Bluegrass)*	5	200	no	N
Forb (FG)	*Wahlenbergia gracilis (Sprawling Bluebell)*	0.1	20	no	N
Grass & grasslike (GG)	*Sporobolus caroli (Fairy Grass)*	0.1	10	no	N
	Conyza bonariensis (Flaxleaf Fleabane)	1	100	no	E
	Paspalum dilatatum (Paspalum)	5	200		HTE
	Verbena bonariensis (Purpletop)	0.1	10	no	E
Grass & grasslike (GG)	*Eragrostis brownii (Brown's Lovegrass)*	0.1	20	no	N
	Setaria pumila (Pale Pigeon Grass)	0.1	10	no	E
Grass & grasslike (GG)	*Paspalidium distans*	0.1	20	no	N
Grass & grasslike (GG)	*Rytidosperma caespitosum (Ringed Wallaby Grass)*	0.1	20	no	N
	Carthamus lanatus (Saffron Thistle)	0.1	10	no	HTE
Grass & grasslike (GG)	*Chloris truncata (Windmill Grass)*	0.1	10	no	N
Grass & grasslike (GG)	*Aristida ramosa (Purple Wiregrass)*	1	50	no	N
Fern (EG)	*Cheilanthes sieberi (Rock Fern)*	0.1	1	no	N
Grass & grasslike (GG)	*Fimbristylis dichotoma (Common Fringe-sedge)*	0.1	5	no	N
Forb (FG)	*Haloragis aspera (Rough Raspwort)*	0.1	10	no	N
Forb (FG)	*Lepidium spp. (A Peppercress)*	0.2	50	no	N
Grass & grasslike (GG)	*Bothriochloa macra (Red Grass)*	0.1	20	no	N
	Onopordum acanthium subsp. acanthium (Scotch Thistle)	0.1	1	no	E
	Sonchus asper (Prickly Sowthistle)	0.1	1	no	E

BAM Site – Field Survey Form

Plot ID:	Plot2	**Date:**	23/01/2024	**Project number:**	J210553	**Plot dimensions:**	20x20, 20x50
Datum:	GDA94	**Easting:**	737,081	**Recorders:**	LO, PF		
Zone:	55	**Northing:**	6,443,246	**IBRA region:**	NSW South Western Slopes (Inland Slopes)	**Midline bearing:**	134
Plant Community Type:		281: Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion		**Condition class:**	Poor	**PCT % cleared:**	67.00%
Vegetation Formation:		Grassy Woodlands		**Veg. Class:**	Western Slopes Grassy Woodlands		

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m2 plot)		Sum values
Count of Native Richness	Trees:	1
	Shrubs:	0
	Grasses etc.:	9
	Forbs:	5
	Ferns:	0
	Other:	1
Sum of Cover of native vascular plants by growth form group	Trees:	30
	Shrubs:	0
	Grasses etc.:	40.7
	Forbs:	0.6
	Ferns:	0
	Other:	1
High Threat Weed cover:		0.2

BAM Attribute (1000 m2 plot) DBH			
DBH	Tree stem count	Length of logs (m) (≥10 cm diameter, >50 cm in length)	3
80 + cm:	0		
50 – 79 cm:	3		
30 – 49 cm:	0		
20 – 29 cm:	1	Tree hollow count	1
10 – 19 cm:	0		
5 – 9 cm:	0		
< 5 cm:	0		

Counts apply when no. of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For multi-stemmed tree, only largest living stem is included in the count. Tree stems must be living.
For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				
Subplot:	1	2	3	4	5
Subplot score (%):	10	10	5	5	5
Average litter cover (%):	7				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography and site features			
Soil colour:		Landform element:	
Soil texture:		Landform pattern:	

Plot Disturbance

GF Code: see Growth Form definitions in Appendix 1; N: native, E: exotic, HTE: high threat exotic; GF – circle code if 'top 3'; Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover)
Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Project name:	J210553				
Recorders:	LO, PF	**Plot ID:**	Plot2	**Date:**	23/01/2024

GF Code	Scientific name	Cover	Abundance	Voucher	N, E or HTE
Tree (TG)	*Eucalyptus blakelyi (Blakely's Red Gum)*	30	5	no	N
Grass & grasslike (GG)	*Sporobolus creber (Slender Rat's Tail Grass)*	30	2000	no	N
Grass & grasslike (GG)	*Aristida vagans (Threeawn Speargrass)*	10	1000	no	N
Forb (FG)	*Calotis lappulacea (Yellow Burr-daisy)*	0.2	20	no	N
Forb (FG)	*Portulaca oleracea (Pigweed)*	0.1	10	no	N
Grass & grasslike (GG)	*Juncus usitatus*	0.1	5	no	N
Grass & grasslike (GG)	*Cyperus gracilis (Slender Flat-sedge)*	0.1	20	no	N
Grass & grasslike (GG)	*Eragrostis brownii (Brown's Lovegrass)*	0.1	20	no	N
Other (OG)	*Glycine clandestina (Twining glycine)*	1	200	no	N
Forb (FG)	*Burchardia umbellata (Milkmaids)*	0.1	10	no	N
Forb (FG)	*Wahlenbergia gracilis (Sprawling Bluebell)*	0.1	10	no	N
Grass & grasslike (GG)	*Sporobolus caroli (Fairy Grass)*	0.1	10	no	N
Grass & grasslike (GG)	*Rytidosperma caespitosum (Ringed Wallaby Grass)*	0.1	10	no	N
Grass & grasslike (GG)	*Austrostipa verticillata (Slender Bamboo Grass)*	0.1	10	no	N
Forb (FG)	*Vittadinia cuneata (A Fuzzweed)*	0.1	10	no	N
	Hypericum perforatum (St. Johns Wort)	0.1	5	no	HTE
Grass & grasslike (GG)	*Fimbristylis dichotoma (Common Fringe-sedge)*	0.1	10	no	N
	Digitaria sanguinalis (Crab Grass)	0.1	5	no	E
	Marrubium vulgare (White Horehound)	0.1	1	no	E
	Eragrostis curvula (African Lovegrass)	0.1	10	no	HTE

BAM Site – Field Survey Form

Plot ID:	Plot3	**Date:**	23/01/2024	**Project number:**	J210553	**Plot dimensions:**	
Datum:	GDA94	**Easting:**	738,132	**Recorders:**	LO, PF		
Zone:	55	**Northing:**	6,442,374	**IBRA region:**	NSW South Western Slopes (Inland Slopes)	**Midline bearing:**	225
Plant Community Type:		281: Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion		**Condition class:**	Poor	**PCT % cleared:**	67.00%
Vegetation Formation:		Grassy Woodlands		**Veg. Class:**	Western Slopes Grassy Woodlands		

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m2 plot)		Sum values
Count of Native Richness	Trees:	1
	Shrubs:	0
	Grasses etc.:	9
	Forbs:	3
	Ferns:	0
	Other:	0
Sum of Cover of native vascular plants by growth form group	Trees:	20
	Shrubs:	0
	Grasses etc.:	25.7
	Forbs:	0.3
	Ferns:	0
	Other:	0
High Threat Weed cover:		20.3

BAM Attribute (1000 m2 plot) DBH			
DBH	Tree stem count	Length of logs (m) (≥10 cm diameter, >50 cm in length)	1
80 + cm:	0		
50 – 79 cm:	0		
30 – 49 cm:	0		
20 – 29 cm:	8	Tree hollow count	0
10 – 19 cm:	0		
5 – 9 cm:	0		
< 5 cm:	0		

Counts apply when no. of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For multi-stemmed tree, only largest living stem is included in the count. Tree stems must be living.
For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				
Subplot:	1	2	3	4	5
Subplot score (%):	10	2	20	10	10
Average litter cover (%):	10.4				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography and site features			
Soil colour:		**Landform element:**	
Soil texture:		**Landform pattern:**	

Plot Disturbance

GF Code: see Growth Form definitions in Appendix 1; N: native, E: exotic, HTE: high threat exotic; GF – circle code if 'top 3'; Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover)
Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Project name:	J210553				
Recorders:	LO, PF	**Plot ID:**	Plot3	**Date:**	23/01/2024

GF Code	Scientific name	Cover	Abundance	Voucher	N, E or HTE
Tree (TG)	*Angophora floribunda (Rough-barked Apple)*	20	10	no	N
	Eragrostis curvula (African Lovegrass)	20	200	no	HTE
Grass & grasslike (GG)	*Sporobolus creber (Slender Rat's Tail Grass)*	15	200	no	N
Grass & grasslike (GG)	*Aristida ramosa (Purple Wiregrass)*	5	50	no	N
Forb (FG)	*Portulaca oleracea (Pigweed)*	0.1	10	no	N
	Paspalum dilatatum (Paspalum)	0.1	2	no	HTE
	Verbena bonariensis (Purpletop)	0.5	5	no	E
Grass & grasslike (GG)	*Fimbristylis dichotoma (Common Fringe-sedge)*	0.1	10	no	N
Grass & grasslike (GG)	*Chloris truncata (Windmill Grass)*	0.1	10	no	N
Grass & grasslike (GG)	*Rytidosperma caespitosum (Ringed Wallaby Grass)*	0.1	20	no	N
Grass & grasslike (GG)	*Eragrostis brownii (Brown's Lovegrass)*	0.2	50	no	N
	Conyza bonariensis (Flaxleaf Fleabane)	0.1	10	no	E
	Acetosella vulgaris (Sheep Sorrel)	0.1	10	no	HTE
Forb (FG)	*Vittadinia cuneata (A Fuzzweed)*	0.1	10	no	N
Grass & grasslike (GG)	*Juncus usitatus*	5	50	no	N
	Alternanthera pungens (Khaki Weed)	0.1	10	no	HTE
Grass & grasslike (GG)	*Dichanthium sericeum (Queensland Bluegrass)*	0.1	20	no	N
	Hypericum perforatum subsp. veronense (St John's Wort)	0.1	5	no	E
Grass & grasslike (GG)	*Cynodon dactylon (Common Couch)*	0.1	5	no	N
	Setaria pumila (Pale Pigeon Grass)	0.1	5	no	E
	Lepidium africanum (Common Peppercress)	0.1	10	no	E
Forb (FG)	*Tricoryne elatior (Yellow Autumn-lily)*	0.1	10	no	N

BAM Site – Field Survey Form

Plot ID:	Plot4	**Date:**	23/01/2024	**Project number:**	J210553	**Plot dimensions:**	
Datum:	GDA94	**Easting:**	738,828	**Recorders:**	LO, PF		
Zone:	55	**Northing:**	6,442,778	**IBRA region:**	NSW South Western Slopes (Inland Slopes)	**Midline bearing:**	165
Plant Community Type:		281: Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion		**Condition class:**	Poor	**PCT % cleared:**	67.00%
Vegetation Formation:		Grassy Woodlands		**Veg. Class:**	Western Slopes Grassy Woodlands		

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m2 plot)		Sum values
Count of Native Richness	Trees:	1
	Shrubs:	0
	Grasses etc.:	9
	Forbs:	2
	Ferns:	1
	Other:	1
Sum of Cover of native vascular plants by growth form group	Trees:	10
	Shrubs:	0
	Grasses etc.:	45.6
	Forbs:	0.2
	Ferns:	0.1
	Other:	0.1
High Threat Weed cover:		5

BAM Attribute (1000 m2 plot) DBH			
DBH	Tree stem count	Length of logs (m) (≥10 cm diameter, >50 cm in length)	0
80 + cm:	0		
50 – 79 cm:	0		
30 – 49 cm:	4		
20 – 29 cm:	1	Tree hollow count	0
10 – 19 cm:	1		
5 – 9 cm:	0		
< 5 cm:	1		

Counts apply when no. of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For multi-stemmed tree, only largest living stem is included in the count. Tree stems must be living.
For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				
Subplot:	1	2	3	4	5
Subplot score (%):	20	20	5	10	5
Average litter cover (%):	12				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography and site features			
Soil colour:		Landform element:	
Soil texture:		Landform pattern:	

Plot Disturbance

GF Code: see Growth Form definitions in Appendix 1; N: native, E: exotic, HTE: high threat exotic; GF – circle code if 'top 3'; Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover)
Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Project name:	J210553				
Recorders:	LO, PF	**Plot ID:**	Plot4	**Date:**	23/01/2024

GF Code	Scientific name	Cover	Abundance	Voucher	N, E or HTE
Tree (TG)	*Angophora floribunda (Rough-barked Apple)*	10	3	no	N
Grass & grasslike (GG)	*Aristida ramosa (Purple Wiregrass)*	30	2000	no	N
Grass & grasslike (GG)	*Sporobolus creber (Slender Rat's Tail Grass)*	10	1000	no	N
Fern (EG)	*Cheilanthes sieberi (Rock Fern)*	0.1	20	no	N
	Eragrostis curvula (African Lovegrass)	5	200	no	HTE
Grass & grasslike (GG)	*Fimbristylis dichotoma (Common Fringe-sedge)*	5	200	no	N
Grass & grasslike (GG)	*Themeda triandra*	0.1	10	no	N
Other (OG)	*Glycine tabacina (Variable Glycine)*	0.1	20	no	N
Grass & grasslike (GG)	*Eragrostis brownii (Brown's Lovegrass)*	0.1	20	no	N
Forb (FG)	*Calotis lappulacea (Yellow Burr-daisy)*	0.1	5	no	N
Grass & grasslike (GG)	*Panicum effusum (Hairy Panic)*	0.1	10	no	N
	Conyza bonariensis (Flaxleaf Fleabane)	0.1	5	no	E
Grass & grasslike (GG)	*Digitaria divaricatissima (Umbrella Grass)*	0.1	10	no	N
Grass & grasslike (GG)	*Enteropogon acicularis (Curly Windmill Grass)*	0.1	5	no	N
Grass & grasslike (GG)	*Eragrostis benthamii*	0.1	10	no	N
Forb (FG)	*Rumex brownii (Swamp Dock)*	0.1	3	no	N

BAM Site – Field Survey Form

Plot ID:	Plot 5	**Date:**	25/01/2024	**Project number:**	J210553	**Plot dimensions:**	20x50
Datum:	GDA94	**Easting:**	739,268	**Recorders:**	PF		
Zone:	55	**Northing:**	6,442,866	**IBRA region:**	NSW South Western Slopes (Inland Slopes)	**Midline bearing:**	167
Plant Community Type:		281: Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion		**Condition class:**	DNG	**PCT % cleared:**	67.00%
Vegetation Formation:		Grassy Woodlands		**Veg. Class:**	Western Slopes Grassy Woodlands		

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m2 plot)		Sum values
Count of Native Richness	Trees:	0
	Shrubs:	0
	Grasses etc.:	6
	Forbs:	3
	Ferns:	1
	Other:	0
Sum of Cover of native vascular plants by growth form group	Trees:	0
	Shrubs:	0
	Grasses etc.:	56.2
	Forbs:	0.3
	Ferns:	0.1
	Other:	0
High Threat Weed cover:		6.4

BAM Attribute (1000 m2 plot) DBH			
DBH	Tree stem count	Length of logs (m) (≥10 cm diameter, >50 cm in length)	0
80 + cm:	0		
50 – 79 cm:	0		
30 – 49 cm:	0		
20 – 29 cm:	0	Tree hollow count	0
10 – 19 cm:	0		
5 – 9 cm:	0		
< 5 cm:	0		

Counts apply when no. of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For multi-stemmed tree, only largest living stem is included in the count. Tree stems must be living.
For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				
Subplot:	1	2	3	4	5
Subplot score (%):	40	40	30	30	40
Average litter cover (%):	36				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography and site features			
Soil colour:		**Landform element:**	
Soil texture:		**Landform pattern:**	

Plot Disturbance
Grazing

GF Code: see Growth Form definitions in Appendix 1; N: native, E: exotic, HTE: high threat exotic; GF – circle code if 'top 3'; Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover)
Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Project name:	J210553				
Recorders:	PF	**Plot ID:**	Plot 5	**Date:**	25/01/2024

GF Code	Scientific name	Cover	Abundance	Voucher	N, E or HTE
Grass & grasslike (GG)	*Sporobolus creber (Slender Rat's Tail Grass)*	45	2000	no	N
Grass & grasslike (GG)	*Bothriochloa macra (Red Grass)*	5	200	no	N
	Setaria pumila (Pale Pigeon Grass)	0.2	50	no	E
Fern (EG)	*Cheilanthes sieberi (Rock Fern)*	0.1	20	no	N
	Eragrostis curvula (African Lovegrass)	5	200	no	HTE
Grass & grasslike (GG)	*Fimbristylis dichotoma (Common Fringe-sedge)*	0.1	20	no	N
	Hypericum perforatum (St. Johns Wort)	0.2	50		HTE
Grass & grasslike (GG)	*Aristida ramosa (Purple Wiregrass)*	1	500	no	N
	Carthamus lanatus (Saffron Thistle)	0.2	100	no	HTE
	Conyza bonariensis (Flaxleaf Fleabane)	0.3	200	no	E
	Paspalum dilatatum (Paspalum)	1	200		HTE
	Verbena bonariensis (Purpletop)	0.1	10	no	E
Grass & grasslike (GG)	*Eragrostis benthamii*	5	1000	no	N
Grass & grasslike (GG)	*Austrostipa scabra (Speargrass)*	0.1	20	no	N
Forb (FG)	*Craspedia variabilis (Common Billy-buttons)*	0.1	5	no	N
	Bromus catharticus (Praire Grass)	0.1	10	no	E
Forb (FG)	*Rumex brownii (Swamp Dock)*	0.1	2	no	N
Forb (FG)	*Euchiton sphaericus (Star Cudweed)*	0.1	5	no	N

BAM Site – Field Survey Form

Plot ID:	Plot 6	**Date:**	25/01/2024	**Project number:**	J210553	**Plot dimensions:**	20x50
Datum:	GDA94	**Easting:**	739,024	**Recorders:**	PF		
Zone:	55	**Northing:**	6,443,148	**IBRA region:**	NSW South Western Slopes (Inland Slopes)	**Midline bearing:**	33
Plant Community Type:		281: Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion		**Condition class:**	DNG	**PCT % cleared:**	67.00%
Vegetation Formation:		Grassy Woodlands		**Veg. Class:**	Western Slopes Grassy Woodlands		

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m2 plot)		Sum values
Count of Native Richness	Trees:	0
	Shrubs:	0
	Grasses etc.:	7
	Forbs:	2
	Ferns:	0
	Other:	0
Sum of Cover of native vascular plants by growth form group	Trees:	0
	Shrubs:	0
	Grasses etc.:	70.9
	Forbs:	0.2
	Ferns:	0
	Other:	0
High Threat Weed cover:		10.2

BAM Attribute (1000 m2 plot) DBH			
DBH	Tree stem count	Length of logs (m) (≥10 cm diameter, >50 cm in length)	0
80 + cm:	0		
50 – 79 cm:	0		
30 – 49 cm:	0		
20 – 29 cm:	0	Tree hollow count	0
10 – 19 cm:	0		
5 – 9 cm:	0		
< 5 cm:	0		

Counts apply when no. of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For multi-stemmed tree, only largest living stem is included in the count. Tree stems must be living.
For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				
Subplot:	1	2	3	4	5
Subplot score (%):	15	15	5	5	2
Average litter cover (%):	8.4				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography and site features			
Soil colour:		Landform element:	
Soil texture:		Landform pattern:	

Plot Disturbance
Grazing, weeds, rubbish

GF Code: see Growth Form definitions in Appendix 1; N: native, E: exotic, HTE: high threat exotic; GF – circle code if 'top 3'; Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover)
Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Project name:	J210553				
Recorders:	PF	**Plot ID:**	Plot 6	**Date:**	25/01/2024

GF Code	Scientific name	Cover	Abundance	Voucher	N, E or HTE
Grass & grasslike (GG)	*Aristida ramosa (Purple Wiregrass)*	50	1000	no	N
Grass & grasslike (GG)	*Sporobolus creber (Slender Rat's Tail Grass)*	15	1000	no	N
	Eragrostis curvula (African Lovegrass)	5	200	no	HTE
Grass & grasslike (GG)	*Cynodon dactylon (Common Couch)*	5	200		N
Grass & grasslike (GG)	*Austrostipa scabra (Speargrass)*	0.1	50	no	N
	Conyza bonariensis (Flaxleaf Fleabane)	0.1	20	no	E
	Setaria pumila (Pale Pigeon Grass)	1	500	no	E
Forb (FG)	*Rumex brownii (Swamp Dock)*	0.1	5	no	N
	Paspalum dilatatum (Paspalum)	5	200	no	HTE
Grass & grasslike (GG)	*Bothriochloa macra (Red Grass)*	0.1	10	no	N
	Carthamus lanatus (Saffron Thistle)	0.1	10	no	HTE
Grass & grasslike (GG)	*Juncus usitatus*	0.5	10	no	N
	Xanthium spinosum (Bathurst Burr)	0.1	5	no	HTE
Forb (FG)	*Dysphania pumilio (Small Crumbweed)*	0.1	5	no	N
	Verbena bonariensis (Purpletop)	0.1	2	no	E
Grass & grasslike (GG)	*Digitaria divaricatissima (Umbrella Grass)*	0.2	50	no	N

BAM Site – Field Survey Form

Plot ID:	P7	**Date:**	21/05/2024	**Project number:**	J210553	**Plot dimensions:**	20x20m
Datum:	GDA94	**Easting:**	740,634	**Recorders:**	LH MH		
Zone:	55	**Northing:**	6,441,145	**IBRA region:**	NSW South Western Slopes (Inland Slopes)	**Midline bearing:**	263
Plant Community Type:				**Condition class:**		**PCT % cleared:**	
Vegetation Formation:				**Veg. Class:**			

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m2 plot)		Sum values
Count of Native Richness	Trees:	0
	Shrubs:	0
	Grasses etc.:	6
	Forbs:	2
	Ferns:	0
	Other:	0
Sum of Cover of native vascular plants by growth form group	Trees:	0
	Shrubs:	0
	Grasses etc.:	110.8
	Forbs:	0.2
	Ferns:	0
	Other:	0
High Threat Weed cover:		0.2

BAM Attribute (1000 m2 plot) DBH			
DBH	Tree stem count	Length of logs (m) (≥10 cm diameter, >50 cm in length)	0
80 + cm:	0		
50 – 79 cm:	0		
30 – 49 cm:	0		
20 – 29 cm:	0	Tree hollow count	0
10 – 19 cm:	0		
5 – 9 cm:	0		
< 5 cm:	0		

Counts apply when no. of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For multi-stemmed tree, only largest living stem is included in the count. Tree stems must be living.
For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				
Subplot:	1	2	3	4	5
Subplot score (%):	1	0	1	2	2
Average litter cover (%):	1.2				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography and site features			
Soil colour:		**Landform element:**	
Soil texture:		**Landform pattern:**	

Plot Disturbance
Grassland in a paddock

GF Code: see Growth Form definitions in Appendix 1; N: native, E: exotic, HTE: high threat exotic; GF – circle code if 'top 3'; Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover)
Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Project name:	J210553				
Recorders:	LH MH	**Plot ID:**	P7	**Date:**	21/05/2024

GF Code	Scientific name	Cover	Abundance	Voucher	N, E or HTE
Grass & grasslike (GG)	*Sporobolus creber (Slender Rat's Tail Grass)*	85	1000		N
Grass & grasslike (GG)	*Bothriochloa macra (Red Grass)*	25	500		N
	Carthamus lanatus (Saffron Thistle)	0.1	20		HTE
Grass & grasslike (GG)	*Eragrostis leptostachya (Paddock Lovegrass)*	0.5	100		N
	Alternanthera pungens (Khaki Weed)	0.1	5		HTE
Forb (FG)	*Oxalis perennans*	0.1	25		N
	Echinochloa crus-galli (Barnyard Grass)	0.1	5		E
	Conyza bonariensis (Flaxleaf Fleabane)	0.1	10		E
Grass & grasslike (GG)	*Cynodon dactylon (Common Couch)*	0.1	15		N
Forb (FG)	*Rumex brownii (Swamp Dock)*	0.1	5		N
	Verbena rigida var. rigida (Veined Verbena)	0.1	5		E
	Setaria pumila (Pale Pigeon Grass)	0.1	10		E
	Hypochaeris radicata (Catsear)	0.1	5		E
	Onopordum acanthium subsp. acanthium (Scotch Thistle)	0.1	10		E
Grass & grasslike (GG)	*Paspalidium constrictum (Knottybutt Grass)*	0.1	20		N
Grass & grasslike (GG)	*Juncus usitatus*	0.1	30		N
	Sida rhombifolia (Paddy's Lucerne)	0.1	25		E
	Trifolium repens (White Clover)	0.1	100		E
	Soliva sessilis (Bindyi)	0.1	10		E

BAM Site – Field Survey Form

Plot ID:	P8	**Date:**	20/05/2024	**Project number:**	J210553	**Plot dimensions:**	20x20
Datum:	GDA94	**Easting:**	740,320	**Recorders:**	LH MH		
Zone:	55	**Northing:**	6,441,352	**IBRA region:**	NSW South Western Slopes (Inland Slopes)	**Midline bearing:**	283
Plant Community Type:				**Condition class:**		**PCT % cleared:**	
Vegetation Formation:				**Veg. Class:**			

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m2 plot)		Sum values
Count of Native Richness	Trees:	0
	Shrubs:	0
	Grasses etc.:	6
	Forbs:	2
	Ferns:	0
	Other:	0
Sum of Cover of native vascular plants by growth form group	Trees:	0
	Shrubs:	0
	Grasses etc.:	95.3
	Forbs:	0.2
	Ferns:	0
	Other:	0
High Threat Weed cover:		0.5

BAM Attribute (1000 m2 plot) DBH			
DBH	Tree stem count	Length of logs (m) (≥10 cm diameter, >50 cm in length)	0
80 + cm:	0		
50 – 79 cm:	0		
30 – 49 cm:	0		
20 – 29 cm:	0	Tree hollow count	0
10 – 19 cm:	0		
5 – 9 cm:	0		
< 5 cm:	0		

Counts apply when no. of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For multi-stemmed tree, only largest living stem is included in the count. Tree stems must be living.
For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				
Subplot:	1	2	3	4	5
Subplot score (%):	5	5	2	2	1
Average litter cover (%):	3				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography and site features			
Soil colour:		**Landform element:**	
Soil texture:		**Landform pattern:**	

Plot Disturbance
grassland in a paddock

GF Code: see Growth Form definitions in Appendix 1; N: native, E: exotic, HTE: high threat exotic; GF – circle code if 'top 3'; Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover)
Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Project name:	J210553				
Recorders:	LH MH	**Plot ID:**	P8	**Date:**	20/05/2024

GF Code	Scientific name	Cover	Abundance	Voucher	N, E or HTE
Grass & grasslike (GG)	*Sporobolus creber (Slender Rat's Tail Grass)*	80	1000		N
Grass & grasslike (GG)	*Bothriochloa macra (Red Grass)*	0.1	30		N
	Setaria pumila (Pale Pigeon Grass)	0.1	20		E
	Echinochloa crus-galli (Barnyard Grass)	0.1	10		E
Grass & grasslike (GG)	*Eragrostis leptostachya (Paddock Lovegrass)*	0.1	10		N
	Xanthium spinosum (Bathurst Burr)	0.1	7		HTE
	Modiola caroliniana (Red-flowered Mallow)	0.1	5		E
Forb (FG)	*Dysphania pumilio (Small Crumbweed)*	0.1	5		N
	Schkuhria pinnata var. abrotanoides (Dwarf Marigold)	0.1	5		E
	Verbena bonariensis (Purpletop)	0.1	20		E
	Alternanthera pungens (Khaki Weed)	0.1	10		HTE
	Carthamus lanatus (Saffron Thistle)	0.2	50		HTE
Forb (FG)	*Oxalis perennans*	0.1	100		N
Grass & grasslike (GG)	*Juncus usitatus*	10	50		N
	Conyza bonariensis (Flaxleaf Fleabane)	0.1	15		E
Grass & grasslike (GG)	*Austrostipa scabra (Speargrass)*	0.1	20		N
	Eragrostis cilianensis (Stinkgrass)	0.1	10		E
Grass & grasslike (GG)	*Cynodon dactylon (Common Couch)*	5	100		N
	Paspalum dilatatum (Paspalum)	0.1	10		HTE
	Onopordum acanthium subsp. acanthium (Scotch Thistle)	0.1	5		E
	Lysimachia arvensis (Scarlet Pimpernel)	0.1	5		E
	Lepidium africanum (Common Peppercress)	0.1	5		E

BAM Site – Field Survey Form

Plot ID:	P09	**Date:**	03/11/2025	**Project number:**	E240117	**Plot dimensions:**	20x50
Datum:	GDA94	**Easting:**	738,783	**Recorders:**	Louise Neville,Other, AS		
Zone:	55	**Northing:**	6,443,215	**IBRA region:**	NSW South Western Slopes (Northern Inland, Upper slopes)	**Midline bearing:**	260
Plant Community Type:		281: Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion		**Condition class:**	Pasture	**PCT % cleared:**	67.00%
Vegetation Formation:		Grassy Woodlands		**Veg. Class:**	Western Slopes Grassy Woodlands		

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m2 plot)		Sum values
Count of Native Richness	Trees:	0
	Shrubs:	0
	Grasses etc.:	0
	Forbs:	3
	Ferns:	0
	Other:	0
Sum of Cover of native vascular plants by growth form group	Trees:	0
	Shrubs:	0
	Grasses etc.:	0
	Forbs:	0.3
	Ferns:	0
	Other:	0
High Threat Weed cover:		0.1

BAM Attribute (1000 m2 plot) DBH			
DBH	Tree stem count	Length of logs (m) (≥10 cm diameter, >50 cm in length)	0
80 + cm:	0		
50 – 79 cm:	0		
30 – 49 cm:	0		
20 – 29 cm:	0	Tree hollow count	0
10 – 19 cm:	0		
5 – 9 cm:	0		
< 5 cm:	0		

Counts apply when no. of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For multi-stemmed tree, only largest living stem is included in the count. Tree stems must be living.
For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				
Subplot:	1	2	3	4	5
Subplot score (%):	0	0	0	0	0
Average litter cover (%):	0				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography and site features			
Soil colour:		**Landform element:**	Flat
Soil texture:	Sand	**Landform pattern:**	Rises

Plot Disturbance
Cropping, grazing

GF Code: see Growth Form definitions in Appendix 1; N: native, E: exotic, HTE: high threat exotic; GF – circle code if 'top 3'; Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover)
Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Project name:	E240117				
Recorders:	Louise Neville,Other, AS	**Plot ID:**	P09	**Date:**	11/03/25

GF Code	Scientific name	Cover	Abundance	Voucher	N, E or HTE
	Lolium rigidum (Wimmera Ryegrass)	10	5000		E
	Avena sativa (Oats)	80	10000		E
	Hypochaeris radicata (Catsear)	0.1	50		E
	Trifolium subterraneum (Subterranean Clover)	0.2	200		E
	Spergularia rubra (Sandspurry)	0.1	100		E
	Gamochaeta spp.	0.1	50		E
	Sonchus asper (Prickly Sowthistle)	0.1	30		E
	Vulpia muralis (Wall Fescue)	0.5	500		E
Forb (FG)	*Oxalis spp.*	0.1	10		N
	Carthamus lanatus (Saffron Thistle)	0.1	10		HTE
Forb (FG)	*Wahlenbergia gracilis (Sprawling Bluebell)*	0.1	20		N
Forb (FG)	*Lythrum hyssopifolia (Hyssop Loosestrife)*	0.1	1		N
	Tolpis barbata (Yellow Hawkweed)	0.1	1		E
	Avena barbata (Bearded Oats)	0.2	30		E

BAM Site – Field Survey Form

Plot ID:	P10	**Date:**	03/11/2025	**Project number:**	E240117	**Plot dimensions:**	20x50
Datum:	GDA94	**Easting:**	738,995	**Recorders:**	Louise Neville,Other, AS		
Zone:	55	**Northing:**	6,443,018	**IBRA region:**	NSW South Western Slopes (Northern Inland, Upper slopes)	**Midline bearing:**	155
Plant Community Type:		281: Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion		**Condition class:**	Pasture	**PCT % cleared:**	67.00%
Vegetation Formation:		Grassy Woodlands		**Veg. Class:**	Western Slopes Grassy Woodlands		

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m2 plot)		Sum values
Count of Native Richness	Trees:	0
	Shrubs:	0
	Grasses etc.:	3
	Forbs:	3
	Ferns:	1
	Other:	2
Sum of Cover of native vascular plants by growth form group	Trees:	0
	Shrubs:	0
	Grasses etc.:	0.3
	Forbs:	0.3
	Ferns:	0.1
	Other:	0.2
High Threat Weed cover:		17.1

BAM Attribute (1000 m2 plot) DBH			
DBH	Tree stem count	Length of logs (m) (≥10 cm diameter, >50 cm in length)	0
80 + cm:	0		
50 – 79 cm:	0		
30 – 49 cm:	0		
20 – 29 cm:	0	Tree hollow count	0
10 – 19 cm:	0		
5 – 9 cm:	0		
< 5 cm:	0		

Counts apply when no. of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For multi-stemmed tree, only largest living stem is included in the count. Tree stems must be living.
For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				
Subplot:	1	2	3	4	5
Subplot score (%):	0	0	0	0	0
Average litter cover (%):	0				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography and site features			
Soil colour:		**Landform element:**	Flat
Soil texture:		**Landform pattern:**	Hills

Plot Disturbance
Weeds- adjacent to cropped land and scoured drainage area

GF Code: see Growth Form definitions in Appendix 1; N: native, E: exotic, HTE: high threat exotic; GF – circle code if 'top 3'; Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover)
Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Project name:	E240117				
Recorders:	Louise Neville,Other, AS	**Plot ID:**	P10	**Date:**	11/03/25

GF Code	Scientific name	Cover	Abundance	Voucher	N, E or HTE
	Carthamus lanatus (Saffron Thistle)	15	500		HTE
	Lolium rigidum (Wimmera Ryegrass)	70	10000		E
	Paspalum dilatatum (Paspalum)	0.5	100		HTE
	Conyza bonariensis (Flaxleaf Fleabane)	0.2	50		E
	Verbena bonariensis (Purpletop)	0.5	40		E
	Hypochaeris radicata (Catsear)	0.3	300		E
	Paronychia brasiliana (Chilean Whitlow Wort, Brazilian Whitlow)	0.1	200		E
	Briza minor (Shivery Grass)	0.1	500		E
	Petrorhagia nanteuilii (Proliferous Pink)	0.2	100		E
	Vulpia muralis (Wall Fescue)	1	1000		E
	Gamochaeta spp.	0.1	500		E
	Eragrostis curvula (African Lovegrass)	0.5	3		HTE
	Bromus hordeaceus (Soft Brome)	0.5	500		E
Fern (EG)	*Cheilanthes sieberi (Rock Fern)*	0.1	50		N
	Avena barbata (Bearded Oats)	1	200		E
Forb (FG)	*Oxalis spp.*	0.1	50		N
Grass & grasslike (GG)	*Carex inversa (Knob Sedge)*	0.1	20		N
	Brassica napus (Canola)	0.1	10		E
	Aira cupaniana (Silvery Hairgrass)	0.2	200		E
	Lactuca saligna (Willow-leaved Lettuce)	0.1	50		E
Forb (FG)	*Rumex brownii (Swamp Dock)*	0.1	20		N
	Hypericum perforatum (St. Johns Wort)	1	500		HTE
	Xanthium spinosum (Bathurst Burr)	0.1	1		HTE
Forb (FG)	*Vittadinia cuneata (A Fuzzweed)*	0.1	1		N
Other (OG)	*Glycine tabacina (Variable Glycine)*	0.1	30		N
	Plantago lanceolata (Lamb's Tongues)	0.1	5		E
	Cirsium vulgare (Spear Thistle)	0.1	1		E
Grass & grasslike (GG)	*Microlaena stipoides (Weeping Grass)*	0.1	20		N
Grass & grasslike (GG)	*Carex appressa (Tall Sedge)*	0.1	1		N
	Solanum chenopodioides (Whitetip Nightshade)	0.1	1		E
Other (OG)	*Glycine clandestina (Twining glycine)*	0.1	5		N
	Ambrosia spp.	0.1	10		E

BAM Site – Field Survey Form

Plot ID:	P11	**Date:**	04/11/2025	**Project number:**	E240117	**Plot dimensions:**	20x50
Datum:	GDA94	**Easting:**	738,791	**Recorders:**	Louise Neville,Other, AS		
Zone:	55	**Northing:**	6,442,164	**IBRA region:**	NSW South Western Slopes (Northern Inland, Upper slopes)	**Midline bearing:**	175
Plant Community Type:		281: Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion		**Condition class:**	Pasture	**PCT % cleared:**	67.00%
Vegetation Formation:		Grassy Woodlands		**Veg. Class:**	Western Slopes Grassy Woodlands		

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m2 plot)		Sum values
Count of Native Richness	Trees:	0
	Shrubs:	0
	Grasses etc.:	6
	Forbs:	5
	Ferns:	0
	Other:	0
Sum of Cover of native vascular plants by growth form group	Trees:	0
	Shrubs:	0
	Grasses etc.:	1.9
	Forbs:	0.6
	Ferns:	0
	Other:	0
High Threat Weed cover:		12

BAM Attribute (1000 m2 plot) DBH			
DBH	Tree stem count	Length of logs (m) (≥10 cm diameter, >50 cm in length)	0
80 + cm:	0		
50 – 79 cm:	0		
30 – 49 cm:	0		
20 – 29 cm:	0	Tree hollow count	0
10 – 19 cm:	0		
5 – 9 cm:	0		
< 5 cm:	0		

Counts apply when no. of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For multi-stemmed tree, only largest living stem is included in the count. Tree stems must be living.
For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				
Subplot:	1	2	3	4	5
Subplot score (%):	0	0	0	0	0
Average litter cover (%):	0				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography and site features			
Soil colour:		**Landform element:**	Open depression
Soil texture:		**Landform pattern:**	Hills

Former drainage line, dried up

Plot Disturbance
Weeds, cropping either side, disturbed former creekline

GF Code: see Growth Form definitions in Appendix 1; N: native, E: exotic, HTE: high threat exotic; GF – circle code if 'top 3'; Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover)
Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Project name:	E240117				
Recorders:	Louise Neville,Other, AS	**Plot ID:**	P11	**Date:**	11/04/25

GF Code	Scientific name	Cover	Abundance	Voucher	N, E or HTE
	Carthamus lanatus (Saffron Thistle)	10	1000		HTE
	Paspalum dilatatum (Paspalum)	1	200		HTE
	Conyza bonariensis (Flaxleaf Fleabane)	1	300		E
	Lolium rigidum (Wimmera Ryegrass)	30	30000		E
	Vulpia muralis (Wall Fescue)	5	10000		E
	Trifolium subterraneum (Subterranean Clover)	5	20000		E
	Sonchus asper (Prickly Sowthistle)	0.1	100		E
	Bromus hordeaceus (Soft Brome)	25	20000		E
	Trifolium campestre (Hop Clover)	0.1	300		E
	Briza minor (Shivery Grass)	0.2	1000		E
	Hypochaeris radicata (Catsear)	1	1000		E
	Eragrostis curvula (African Lovegrass)	0.5	10		HTE
	Hypericum perforatum (St. Johns Wort)	0.3	200		HTE
	Verbena bonariensis (Purpletop)	0.5	100		E
Forb (FG)	*Wahlenbergia gracilis (Sprawling Bluebell)*	0.2	1000		N
	Cyclospermum leptophyllum (Slender Celery)	0.1	50		E
	Petrorhagia nanteuilii (Proliferous Pink)	0.3	500		E
Forb (FG)	*Microtis spp.*	0.1	5		N
	Gamochaeta spp.	0.2	500		E
Grass & grasslike (GG)	*Juncus usitatus*	1	100		N
	Avena barbata (Bearded Oats)	0.5	50		E
Forb (FG)	*Haloragis heterophylla (Variable Raspwort)*	0.1	10		N
	Lysimachia arvensis (Scarlet Pimpernel)	0.1	20		E
Grass & grasslike (GG)	*Microlaena stipoides (Weeping Grass)*	0.5	500		N
	Echium plantagineum (Patterson's Curse)	0.1	10		E
Forb (FG)	*Rumex brownii (Swamp Dock)*	0.1	10		N
	Lactuca saligna (Willow-leaved Lettuce)	0.1	5		E
	Trifolium arvense (Haresfoot Clover)	0.1	10		E
	Lepidium africanum (Common Peppercress)	0.1	20		E
	Paronychia brasiliana (Chilean Whitlow Wort, Brazilian Whitlow)	0.1	20		E
	Bromus diandrus (Great Brome)	0.1	20		HTE
Grass & grasslike (GG)	*Carex inversa (Knob Sedge)*	0.1	10		N
Grass & grasslike (GG)	*Lachnagrostis filiformis*	0.1	20		N
	Acetosella vulgaris (Sheep Sorrel)	0.1	30		HTE
Forb (FG)	*Lythrum hyssopifolia (Hyssop Loosestrife)*	0.1	10		N
	Trifolium angustifolium (Narrow-leaved Clover)	0.1	1		E
	Plantago lanceolata (Lamb's Tongues)	0.1	1		E
	Hypochaeris spp. (A Catsear)	0.1	20		E
	Tolpis barbata (Yellow Hawkweed)	0.1	50		E
Grass & grasslike (GG)	*Chloris truncata (Windmill Grass)*	0.1	10		N
Grass & grasslike (GG)	*Setaria spp.*	0.1	5		N

Appendix B

Vegetation integrity plot data

EMM
creating opportunities

B.1 Additional lots plot data - EMM

Plot	PCT	Area	Patch size	Condition class	Zone	Easting	Northing	Bearing	compTree	compShrub	compGrass	compForbs	compFerns	compOther	strucTree	strucShrub	strucGrass	strucForbs	strucFerns	strucOther	funLargeTrees	funHollowtrees	funLitterCover	funLenFallenLogs	funTreeStem5to9	funTreeStem10to19	funTreeStem20to29	funTreeStem30to49	funTreeStem50to79	funTreeRegen	funHighThreatExotic
Plot 1	281	68.91	101	DNG	55	738490	6442412	41	0	0	11	3	1	0	0.0	0.0	46.7	0.4	0.1	0.0	0	0	29.0	0.0	0	0	0	0	0	0	5.1
Plot 2	281	60.35	101	Woodland	55	737081	6443246	134	1	0	9	5	0	1	30.0	0.0	40.7	0.6	0.0	1.0	0	1	7.0	3.0	0	0	1	0	3	0	0.2
Plot 3	281	0.35	101	Woodland	55	738132	6442374	225	1	0	9	3	0	0	20.0	0.0	25.7	0.3	0.0	0.0	0	0	10.4	1.0	0	0	8	0	0	0	20.3
Plot 4	281	0.35	101	Woodland	55	738828	6442778	165	1	0	9	2	1	1	10.0	0.0	45.6	0.2	0.1	0.1	0	0	12.0	0.0	0	1	1	4	0	1	5.0
Plot 5	281	68.91	101	DNG	55	739268	6442866	167	0	0	6	3	1	0	0.0	0.0	56.2	0.3	0.1	0.0	0	0	36.0	0.0	0	0	0	0	0	0	6.4
Plot 6	281	68.91	101	DNG	55	739024	6443148	33	0	0	7	2	0	0	0.0	0.0	70.9	0.2	0.0	0.0	0	0	8.4	0.0	0	0	0	0	0	0	10.2
Plot 7	281	68.91	101	DNG	55	740634	6441145	263	0	0	6	2	0	0	0.0	0.0	110.8	0.2	0.0	0.0	0	0	1.2	0.0	0	0	0	0	0	0	0.2
Plot 8	281	68.91	101	DNG	55	740320	6441352	283	0	0	6	2	0	0	0.0	0.0	95.3	0.2	0.0	0.0	0	0	3.0	0.0	0	0	0	0	0	0	0.5
Plot 9	-	142.72	-	Pasture	55	738,783	6,443,215	260	0	0	0	3	0	0	0.0	0.0	0.0	0.3	0.0	0.0	0	0	0.0	0.0	0	0	0	0	0	0	0.1
Plot 10	-	142.72	-	Pasture	55	738,995	6,443,018	155	0	0	3	3	1	2	0.0	0.0	0.3	0.3	0.1	0.2	0	0	0.0	0.0	0	0	0	0	0	0	17.1
Plot 11	-	142.72		Pasture	55	738,791	6,442,164	175	0	0	6	5	0	0	0.0	0.0	1.9	0.6	0.0	0.0	0	0	0.0	0.0	0	0	0	0	0	0	12.0

B.2 BBRS plot data – ELA

Location	Plot	PCT	Area	Patch size	Condition class	Zone	easting	northing	Bearing	compTree	compShrub	compGrass	compForbs	compFerns	compOther	strucTree	strucShrub	strucGrass	strucForbs	strucFerns	strucOther	funLargeTrees	funHollowtrees	funLitterCover	funLenFallenLogs	funTreeStem5to10	funTreeStem10to20	funTreeStem20to30	funTreeStem30to50	funTreeStem50to80	funTreeRegen	funHighThreatExotic
BBRS	1	281	1.38	101	Woodland	55	740109	6441806	95	1	0	7	9	1	2	20.0	0.0	38.4	0.9	0.1	0.2	0	0	38	2	1	1	1	1	1	0	15.2
BBRS	2	277	0.57	101	Woodland	55	740764	6441705	135	1	0	7	6	0	1	30.0	0.0	2.8	3.5	0.0	0.1	0	0	34	1	1	0	1	1	0	0	0.3
BBRS	3	281	1.38	101	Woodland	55	742757	6441683	95	4	0	2	9	0	2	24.5	0.0	1.3	1.4	0.0	0.3	1	0	39	0	1	1	1	1	1	0	0.2
BBRS	4	281	0.18	101	DNG	55	739855	6441867	32	2	1	12	9	1	1	5.5	0.1	3.3	1.0	0.1	0.1	0	0	35	26	1	1	1	1	0	1	35.0
BBRS	5	281	1.38	101	Woodland	55	740197	6441795	80	2	1	15	6	0	3	23.0	0.1	3.4	1.5	0.0	0.3	3	0	42	62	1	1	1	1	1	1	11.0
BBRS	6	281	0.18	101	DNG/wood	55	740606	6441730	81	2	2	12	8	1	1	15.1	0.2	28.9	1.8	0.1	0.1	4	1	52	20	1	1	1	1	1	1	2.2
BBRS	7	277	0.72	101	DNG	55	741284	6442006	80	0	2	11	4	1	0	0.0	5.1	48.9	0.4	0.1	0.0	0	0	25	0	1	0	0	0	0	1	0.6
BBRS	8	277	0.72	101	DNG	55	742068	6441885	95	1	0	8	2	0	0	4.0	0.0	21.0	0.2	0.0	0.0	1	0	24	0	0	0	0	0	0	0	17.1

Appendix C

Consultation – MWRC and BOS helpdesk

EMM
creating opportunities

25 March 2025

Julian Geddes
Director - Operations
Mid-Western Regional Council
86 Market St, PO Box 156
Mudgee NSW 2850

Subject: Birriwa Solar and BESS - Narragamba Solar – Public Road Upgrades – Commitments

Dear Julian,

I'd like to extend my appreciation to both you and Mackenzie for joining Cedric Berge and myself on-site at Birriwa Bus Route South (BBRS), Merotherie on 13 March 2025. It was incredibly valuable to assess the corridor in person, particularly the identified Hollow-Bearing Trees (HBTs) and the preliminary road design considerations.

As previously discussed in our correspondence, ACEN Australia (ACEN)is preparing a Modification Report for the Birriwa Solar and Battery project and an Environmental Impact Statement (EIS) for the Narragamba Solar Project. These documents will propose access routes to both the Birriwa development footprint and the shared workers accommodation facility, including an upgrade of BBRS between the intersection of Merotherie Road and the proposed access point.

We understand that Mid-Western Regional Council (Council) is comfortable with a 6m road seal, with shoulder widths to vary based on site conditions. This approach supports a meandering alignment where possible, to minimise impacts to Plant Community Types, roadside vegetation, and Heritage Sites, with a specific emphasis on avoiding HBTs. These considerations will be assessed as part of the environmental and social impact evaluations in the Development Application.

The final road design will be prepared in accordance with the Project's development consent conditions, to the satisfaction of Council, and in consultation with relevant stakeholders. Local roads will be upgraded prior to commencement of construction of the Project.

This letter outlines the final design commitments we discussed on site for your consideration and endorsement.

1. The final road design will maintain the following HBTs: 8, 7, 27, 21, 32, 52, 9, 16, 38 (with the loss of 43 to save 38), 51, 10, 34, 31, 23, 46, 41.
2. By refining the location of the alternative access point to the Birriwa project, we can further reduce the design footprint by approximately 160 meters at the western end of the road upgrade study area, allowing avoidance of HBT's 15, 13, 29, 11, 44, 33, 19, 47 and 49.

3. If practicable, the final road design will also aim to avoid the following HBTs:
   - Trees 28, 48, 21, 30, 40, 50, 42, 45, 39, 24, and 6.
   - Trees 3 and 4, noting that Tree 4 likely to be at risk in order to preserve Tree 3.
   - Tree 43, which is proposed for removal in order to retain Tree 38.

Based on current design constraints, Trees 5 and 25 are likely to be impacted by the final design and are therefore proposed to be removed.

We will continue to refine the road alignment in line with our on-site discussions, ensuring that safety, road functionality, and biodiversity conservation remain at the forefront of our approach.

Could you please confirm at your earliest convenience that this letter accurately reflects our on-site discussions?

ACEN Australia
Suite 2, Level 2
15 Castray Esplanade
Battery Point, TAS 7004

ACN 616 856 672
ABN 27 616 856 672

Please let me know if you have any further questions or would like to discuss any aspects of the visit or proposed refinements. We greatly appreciate Council's ongoing collaboration in working towards a practical and environmentally responsible outcome for BBRS.

Looking forward to your feedback.

Scott Thomas
Project Developer

ACEN | Australia

ACEN Australia
M: +61 477 208 317
E: scott.thomas@acenrenewables.com.au
Level 10, 330 Collins St, Melbourne, VIC 3000
www.acenrenewables.com.au

Legend

- Proposed Site Access Point
- Hollow Bear Tree's - "Consider avoiding in designs"
- Hollow Bear Tree's - "Not to be removed"
- Scar Tree "Not to be removed"
- Cadastral Boundary

Notes

1. Project details shown in this plan are preliminary only.

Locality

Project

Birriwa Solar
Renewable Energy from ACEN

Title

BBRS HBT
Committments Map

Drawing no. BISF-100

Date 25/03/2025

0 100 200 m

1:8,000 @ A1

GDA2020 MGA Zone 55

ACEN Australia

MID-WESTERN REGIONAL COUNCIL
PO Box 156, MUDGEE NSW 2850
86 Market Street, Mudgee | 109 Herbert Street, Gulgong | 77 Louee Street, Rylstone
T 1300 765 002 or 02 6378 2850 | F 02 6378 2815
E council@midwestern.nsw.gov.au

LP | LAN900138

17 April 2025

Scott Thomas
ACEN Australia
Via e-mail: scott.thomas@acenrenewables.com.au

Dear Scott,

SUBJECT: Birriwa Solar and BESS - Narragamba Solar – Public Road Upgrades – Commitments

Council's position is to generally support a design solution that will minimise the impact on the roadside environment while providing a road design that suits the short-term construction impacts and longer-term operational use of the road.

In this regard, it is preferable that the design aligns with Austroads guidelines for road geometry, applying an appropriate AADT for the development and considering both cumulative impacts and baseline rural traffic volumes. Where non-conformances occur due to the need to preserve roadside vegetation, exemptions may be considered—provided they are supported by a comprehensive road safety assessment.

It is anticipated that Austroads guidelines will require 3.1m travel lanes, with shoulder widths adjusted as needed to minimise environmental impact. Added safety features, such as guardrails, should also be considered.

The design commitments as outlined in your letter dated 25 March 2025 are generally accepted, however, Council requires the opportunity to review a draft design, road safety audits, and any requested concessions before endorsing the final design package.

If you have any further questions, please contact Council on (02) 6378 2850.

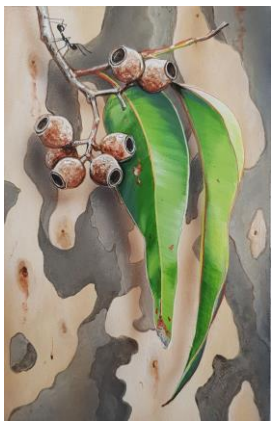
Yours sincerely,

Julian Geddes
Julian Geddes (Apr 24, 2025 11:28 GMT+10)

JULIAN GEDDES
DIRECTOR OPERATIONS

Appendix D
Bat survey report

EMM
creating opportunities



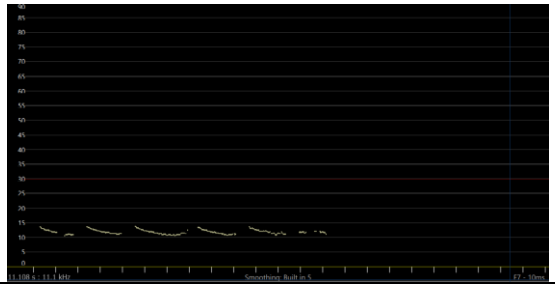
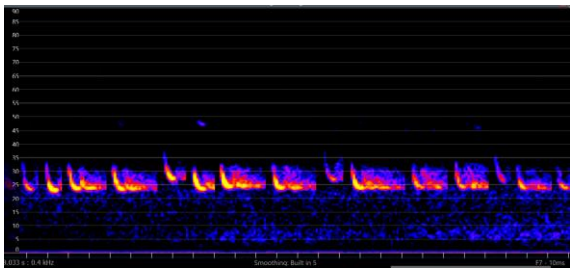
CORYMBIA ECOLOGY

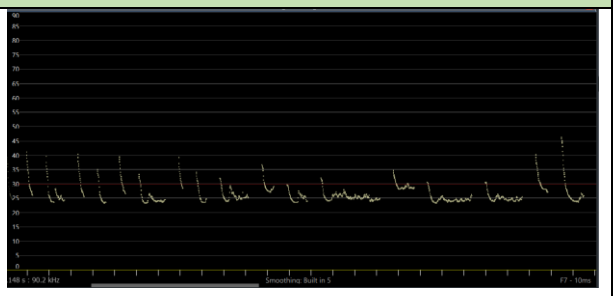
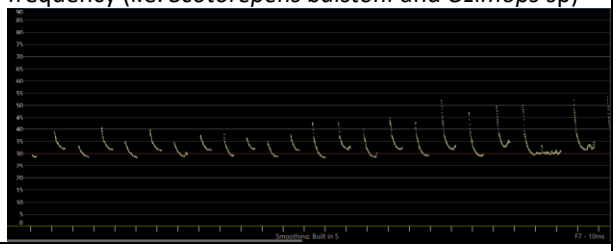
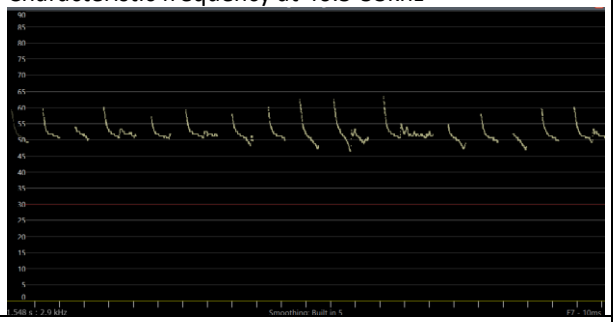
Amy Rowles
415 Parishs Rd, Hilldale, NSW, 2420
Mob: 0418451488
Email: amy@corymbiaecology.com.au
ABN 61854031078

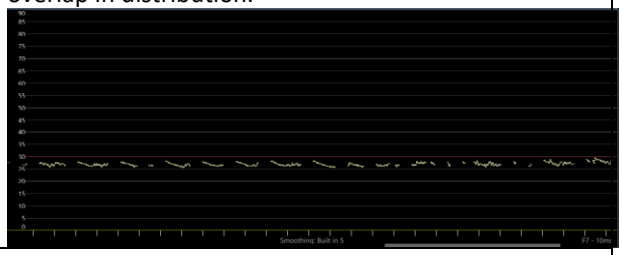
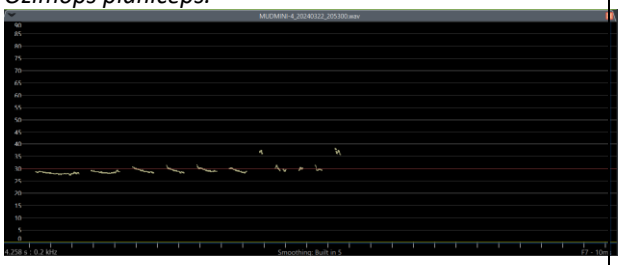
BAT CALL ANALYSIS RESULTS

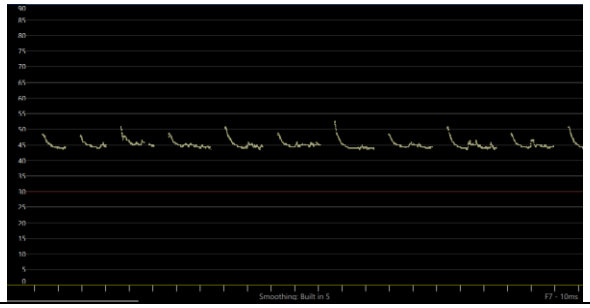
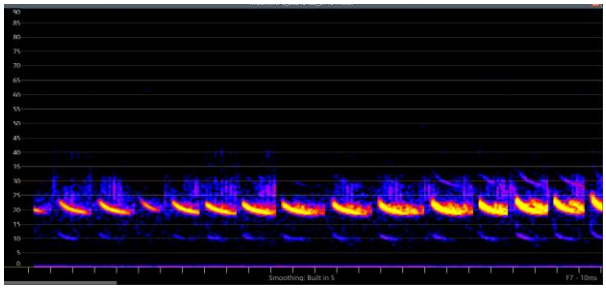
EcoLogical

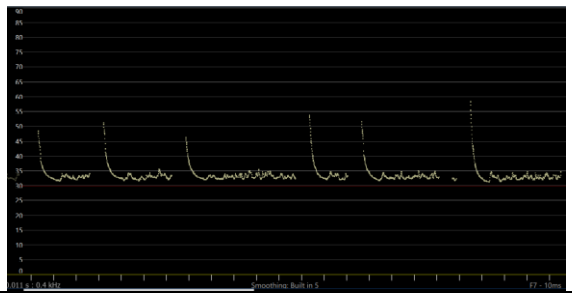
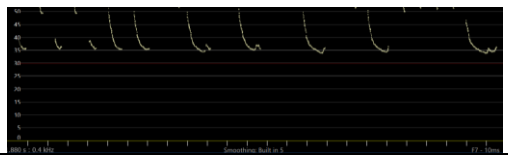
Project Name: Berriwa Bus Route

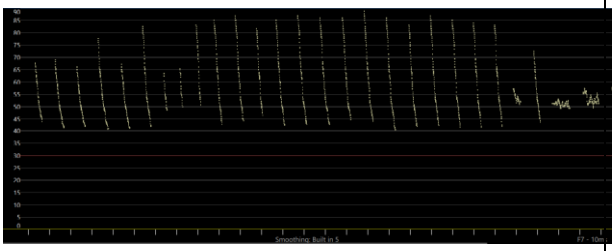
Device	2	4	5	7	8	
Date		**21-27/3/24**	**21-27/3/24**	**21-23/3/24**	**17-22/1/24**	**Comments**
Number of files (noise)	**102 (33)**	**1379 (381)**	**5819 (1096)**	**1990 (374)**	**4565 (1397)**	
Austronomus australis		D	D	D	D	Flat to curved pulse characteristic frequency at 10-15khz 
Chalinolobus dwyeri		D (1 pass)			D (1 pass) Po (1 pass)	Upright curved call characteristic frequency between 21.5 and 25.5. Pulses often alternate. Two definite passes of *Chalinolobus dwyeri* were recorded, indicating that although the species is present in the area, activity in the detector locations was low. 

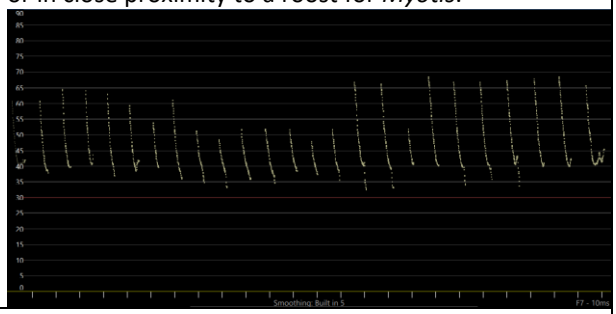
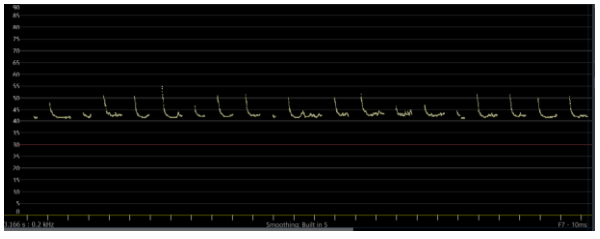
Device	2	4	5	7	8	
Date		**21-27/3/24**	**21-27/3/24**	**21-23/3/24**	**17-22/1/24**	**Comments**
Number of files (noise)	**102 (33)**	**1379 (381)**	**5819 (1096)**	**1990 (374)**	**4565 (1397)**	
						
Chalinolobus gouldii	D	D	D	D	D	Usually curved, upright pulses with a prominent foot with no tail. May sometimes downsweep and be flatter at the lower frequencies in more open areas. Alternation is present in many passes which distinguish the species from others calling at the same frequency (i.e. *Scotorepens balstoni* and *Ozimops* sp) 
Chalinolobus morio		D	D	D	D	Curved upright call with a downsweeping tail. Characteristic frequency at 46.5-53khz 
Ozimops planiceps	D	D	D	D	D	Characteristic frequency 26-30.5khz. Flat to curved pulses. This pulse is dominant harmonic, with second between 53-60. Can differentiate from non-alternating cruise phase *Chalinolobus gouldii* if the

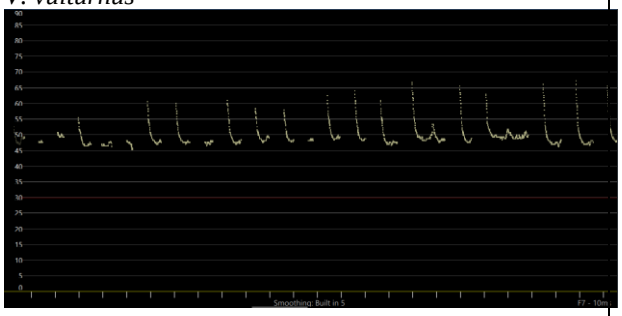
Device	2	4	5	7	8	
Date		**21-27/3/24**	**21-27/3/24**	**21-23/3/24**	**17-22/1/24**	**Comments**
Number of files (noise)	**102 (33)**	**1379 (381)**	**5819 (1096)**	**1990 (374)**	**4565 (1397)**	
						pass contains harmonics as *C. gouldii* does not appear to display harmonics. May be confused with *Ozimops petersi* and *Ozimops ridei* at the higher frequencies where there is overlap in call characteristics and overlap in distribution. 
Ozimops ridei		D	D	D	D	Characteristic frequency 28.5 to 31khz. Usually flat pulses, but also curved in attack phase. During attack phase this species can produce pulses that may be confused with other species calling in the same frequency range. Where distribution overlap this species may be confused with *Ozimops petersi* and *Ozimops planiceps.* 
Miniopterus orianae oceanensis		Po	Pr		Po	Characteristic frequency 43-48khz. The passes at the mid to lower frequencies often have a relatively short initial section, with a fairly long characteristic section with no tail or down sweeping tail. Consecutive pulses in a sequence are often irregular with varying shape and frequency. There is considerable overlap with *Vespadelus sp* and some passes may not be confidently distinguishable. A more prominent down

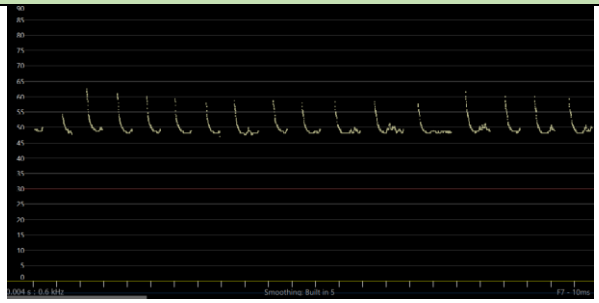
Device	2	4	5	7	8	
Date		**21-27/3/24**	**21-27/3/24**	**21-23/3/24**	**17-22/1/24**	**Comments**
Number of files (noise)	**102 (33)**	**1379 (381)**	**5819 (1096)**	**1990 (374)**	**4565 (1397)**	
						sweep tail helps to identify from *Vespadelus sp*. The higher frequency pulses, particularly in clutter or roost entrances are steeper with a longer initial section, shorter characteristic section, often down sweeping tail. These sequences may be confused with *Chalinolobus morio* . 
Saccolaimus flaviventris					D – 1 pass	Curved consistent pulses with characteristic frequency between 17 and 23khz. Dominant second harmonic around 20khz, 1st harmonic around 10 and 3rd harmonic around 30. During attack phase characteristic frequency stays fairly consistent. 

Device	**2**	**4**	**5**	**7**	**8**	
Date		**21-27/3/24**	**21-27/3/24**	**21-23/3/24**	**17-22/1/24**	**Comments**
Number of files (noise)	**102 (33)**	**1379 (381)**	**5819 (1096)**	**1990 (374)**	**4565 (1397)**	
Scotorepens balstoni			Po		Pr	Characteristic frequency 28-34khz. Curved pulse with a variable tail (absent or down-sweep, but also can up-sweep). Sometimes difficult to distinguish between non-alternating *Chalinolobus gouldii* at lower frequencies and other *scotorepens* species at the higher frequencies. Also can be confused with *Falsistrellus tasmaniensis* and *Scoteanax rueppellii.* 
Scotorepens orion / Scoteanax rueppellii			E		E	*Scotorepens orion* - Characteristic frequency 34.5-37.5khz. Curved pulse shape with absent or downsweeping tail. *Scoteanax rueppellii*- curved pulse, characteristic frequency 32-36.5. Often long pre-characteristic section. Frequency of knee usually higher than 37. Call characteristics for these species overlap considerably, usually difficult to give a definite ID for these species. 

Device	**2**	**4**	**5**	**7**	**8**	
Date		**21-27/3/24**	**21-27/3/24**	**21-23/3/24**	**17-22/1/24**	**Comments**
Number of files (noise)	**102 (33)**	**1379 (381)**	**5819 (1096)**	**1990 (374)**	**4565 (1397)**	
Nyctophilus geoffroyi / Nyctophilus gouldi and Nyctophilus corbeni		E	E		E	Near vertical pulse shape. *Nyctophilus* species currently indistinguishable on call characteristics. 

Device	2	4	5	7	8	
Date		**21-27/3/24**	**21-27/3/24**	**21-23/3/24**	**17-22/1/24**	**Comments**
Number of files (noise)	**102 (33)**	**1379 (381)**	**5819 (1096)**	**1990 (374)**	**4565 (1397)**	
Nyctophilus sp / Myotis macropus			E – 13 passes		E – 3 passes	*Myotis macropus* calls are very similar to *Nyctophilus* species and often cannot be distinguished. Good Myotis passes are often longer and stronger than *Nyctophilus* with a varying slope between consecutive pulses and often occur at a slightly lower frequency than *Nyctophilus*. A low number of passes that could be attributed to either *Nyctophilus* or *Myotis* were recorded. None of the passes were considered to be highly characteristic of *Myotis*, therefore the detector locations are unlikely to be significant foraging areas or in close proximity to a roost for *Myotis*. 
Vespadelus darlingtoni		D		D	D	Characteristic frequency for this species varies geographically from 38-46khz, with higher calls in the north and lower in the south. In the southeast corner of NSW are lower with characteristic frequency of 38-40kz. Passes will overlap with *Vespadelus regulus* above 40khz. 

Device	**2**	**4**	**5**	**7**	**8**	
Date		**21-27/3/24**	**21-27/3/24**	**21-23/3/24**	**17-22/1/24**	**Comments**
Number of files (noise)	**102 (33)**	**1379 (381)**	**5819 (1096)**	**1990 (374)**	**4565 (1397)**	
Vespadelus vulturnus	Pr	D	D	D	D	Characteristic frequency for *V. vulturnus* 42.5-53khz, where this frequency varies geographically. *For V. vulturnus*, the characteristic frequency of consecutive pulses often varies within a sequence, whereas consecutive pulses for *V. regulus* tend to be more consistent. Characteristic frequency for *V. regulus* 40-55khz, where this frequency and call shape varies geographically. A high number of *Vespadelus* passes were recorded at 45-47khz most likely *V. vulturnus*. However some of the lower, more consistent passes may be *V. regulus.* *V. vulturnus* 
Vespadelus regulus	Po	Po	Po	Po	Po	
Vespadelus troughtoni /Vespadelus vulturnus / Chalinolobus morio		E (1 pass)	E (11 passes)	E (3 passes)	E (1 pass)	Although characteristics of passes of *Vespadelus troughtoni* and *V. vulturnus* considerably overlap, most of the passes are most likely *V. vulturnus*, but there are a few passes at a higher frequency that have some possibility of being *V. troughtoni* or *Chalinolobus morio* without tails. These passes occurred in very low numbers and therefore it is considered unlikely that highly significant habitat for *V. troughtoni* occurs in the vicinity.

Device	2	4	5	7	8	
Date		21-27/3/24	21-27/3/24	21-23/3/24	17-22/1/24	Comments
Number of files (noise)	102 (33)	1379 (381)	5819 (1096)	1990 (374)	4565 (1397)	
						

Note: only calls identified a definite should be entered in Bionet

- D – definite; Pr – probable; Po - possible
- Calls were analysed using Anabat Insight.
- Example calls presented below are displayed in this report at F7.
- Analysis was completed on the 30 July 2024.
- Activity levels are in relation to overall activity at the site.
- The following resources were consulted during analysis:
    - Pennay M., Law B., and Reinhold L. (2004) Bat Calls of NSW. DEC of NSW.
    - Corben C. (2009) Anabat Techniques Workshop, Titley Scientific.
    - Personal experience analysing calls and collection of reference calls in NSW
    - Anabat Insight Workshop (2019), Titley Scientific and Balance Environmental.
    - Australasian Bat Society - BatMap. http://ausbats.org.au/batmap. Accessed 27/07/24.

Appendix E
EPBC Act Assessment

EMM
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Appendix E.1
Protected Matters Search Results

EMM
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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-Feb-2025

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	5
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	6
Listed Threatened Species:	49
Listed Migratory Species:	8

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 environment anywhere.

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 https://www.dcceew.gov.au/parks-heritage/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:	4
Commonwealth Heritage Places:	None
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:	2
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	17
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	2
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
Hunter estuary wetlands	150 - 200km upstream from Ramsar site	In buffer area only
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
Central Hunter Valley eucalypt forest and woodland	Critically Endangered	Community may occur within area	In buffer area only
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	Endangered	Community may occur within area	In buffer area only
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 grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	Critically Endangered	Community may occur within area	In buffer area only
Weeping Myall Woodlands	Endangered	Community may occur within area	In buffer area only

Community Name	Threatened Category	Presence Text	Buffer Status
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			
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Aphelocephala leucopsis Southern Whiteface [529]	Vulnerable	Species or species habitat known 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 acuminata Sharp-tailed Sandpiper [874]	Vulnerable	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 known to occur within area	In feature area
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo [67036]	Vulnerable	Species or species habitat known to occur within area	In feature area
Climacteris picumnus victoriae Brown Treecreeper (south-eastern) [67062]	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

Scientific Name	Threatened Category	Presence Text	Buffer Status
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat known to occur within area	In feature area
Grantiella picta Painted Honeyeater [470]	Vulnerable	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	In feature area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat known to occur within area	In feature area
Lophochroa leadbeateri leadbeateri Major Mitchell's Cockatoo (eastern), Eastern Major Mitchell's Cockatoo, Pink Cockatoo (eastern) [82926]	Endangered	Species or species habitat may occur within area	In buffer area only
Melanodryas cucullata cucullata South-eastern Hooded Robin, Hooded Robin (south-eastern) [67093]	Endangered	Species or species habitat known to occur within area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat may occur within area	In feature area
Pedionomus torquatus Plains-wanderer [906]	Critically Endangered	Species or species habitat may occur within area	In feature area
Polytelis swainsonii Superb Parrot [738]	Vulnerable	Species or species habitat known to occur within area	In feature area
Pycnoptilus floccosus Pilotbird [525]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Rostratula australis](#) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
[Stagonopleura guttata](#) Diamond Firetail [59398]	Vulnerable	Species or species habitat known 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 may occur within area	In buffer area only
[Maccullochella peelii](#) Murray Cod [66633]	Vulnerable	Species or species habitat likely 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
FROG			
[Crinia sloanei](#) Sloane's Froglet [59151]	Endangered	Species or species habitat may occur within area	In buffer area only
MAMMAL			
[Chalinolobus dwyeri](#) Large-eared Pied Bat, Large Pied Bat [183]	Endangered	Species or species habitat known 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 likely 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

Scientific Name	Threatened Category	Presence Text	Buffer Status
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
Pseudomys novaehollandiae			
New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Pteropus poliocephalus			
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour may occur within area	In feature area
PLANT			
Androcalva procumbens			
[87153]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Bertya mollissima			
[18382]	Endangered	Species or species habitat may occur within area	In buffer area only
Dichanthium setosum			
bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Euphrasia arguta			
[4325]	Critically Endangered	Species or species habitat may occur within area	In feature area
Homoranthus darwinioides			
[12974]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Lepidium aschersonii			
Spiny Peppercress [10976]	Vulnerable	Species or species habitat may occur within area	In feature area
Lepidium monoplocoides			
Winged Pepper-cress [9190]	Endangered	Species or species habitat may occur within area	In buffer area only
Ozothamnus tesselatus			
[56203]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
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 murrayana			
Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	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 may occur within area	In feature area
Thesium australe			
Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to 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 ingramii			
Ingram's Zieria, Keith's Zieria [56734]	Endangered	Species or species habitat known to 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

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

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Motacilla flava](#) Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area
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]	Vulnerable	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
[Gallinago hardwickii](#) Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat known to 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
Commonwealth Trading Bank of Australia		
Commonwealth Land - Commonwealth Trading Bank of Australia [13274]	NSW	In buffer area only
Communications, Information Technology and the Arts - Telstra Corporation Limited		
Commonwealth Land - Australian Telecommunications Commission [13260]	NSW	In buffer area only
Commonwealth Land - Telstra Corporation Limited [14490]	NSW	In buffer area only
Commonwealth Land - Telstra Corporation Limited [14491]	NSW	In buffer area only

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status

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
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	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 known to occur within area overfly marine area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		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 overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
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
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]	Vulnerable	Species or species habitat may occur within area overfly marine area	In feature area
Pterodroma cervicalis White-necked Petrel [59642]		Species or species habitat may occur within area	In buffer area only
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area overfly marine area	In feature area
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

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Goodiman	CCA Zone 3 State Conservation Area	NSW	In buffer area only
Yarrobil	CCA Zone 1 National Park	NSW	In buffer area only

Protected Area Name	Reserve Type	State	Buffer Status

EPBC Act Referrals

[Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Barneys Reef Wind Farm	2022/09358		Completed	In feature area
Birriwa Solar and Battery Project	2024/09912		Completed	In feature area
Central-West Orana Renewable Energy Zone Transmission Project	2022/09353		Post-Approval	In feature area
Continued Mining Operations and Construction of Associated Infrastructure	2009/5252		Post-Approval	In buffer area only
Ulan Coal Modification 6 - Underground Mining Extension	2022/09292		Assessment	In buffer area only
Controlled action				
Moolarben Coal Mine Project	2007/3297	Controlled Action	Post-Approval	In buffer area only
Narrabri to Wellington gas transmission pipeline	2011/5913	Controlled Action	Completed	In buffer area only
Open cut coal mine & associated infrastructure	2011/6158	Controlled Action	Post-Approval	In buffer area only
Ulan West Extension, Near Mudgee NSW	2015/7511	Controlled Action	Post-Approval	In buffer area only
Valley of the Winds wind farm	2020/8668	Controlled Action	Assessment Approach	In feature area
Wollar to Wellington 330kV Transmission Line Project	2005/2202	Controlled Action	Post-Approval	In buffer area only
Not controlled action				
Dubbo - Tamworth Natural Gas Pipeline	2000/32	Not Controlled Action	Completed	In buffer area only
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
Modification 4 Longwall Optimisation Project	2018/8337	Not Controlled Action	Completed	In buffer area only
Not controlled action (particular manner)				
Aerial baiting for wild dog control	2006/2713	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Referral decision				
Proposed large-scale solar farm project	2022/9171	Referral Decision	Referral Publication	In buffer area only
Stubbo Solar Farm	2022/9180	Referral Decision	Referral Publication	In buffer area only

Bioregional Assessments [Resource Information]

SubRegion	BioRegion	Website	Buffer Status
Central West	Northern Inland Catchments	BA website	In feature area
Hunter	Northern Sydney Basin	BA website	In buffer area only

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 is 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 on the contents of this report.

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 point locations and environmental data layers.

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 when time permits.

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 breeding sites; and
- 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.

Department of Climate Change, Energy, the Environment and Water
GPO Box 3090
Canberra ACT 2601 Australia
+61 2 6274 1111

Appendix E.2

Likelihood of occurrence assessment - Additional lots

EMM
creating opportunities

Family	Scientific name	Common name	BC Act status	EPBC Act status	FM Act	Habitat association	Number of records	Most recent record	Likelihood of occurrence	Justification
Actinopterygii	Galaxias rostratus	Flathead Galaxias	-	CE	CE	Flathead Galaxias is known from the southern part of the Murray Darling Basin. They have been recorded in the Macquarie, Lachlan, Murrumbidgee and Murray Rivers in NSW. Flathead Galaxias are found in still or slow moving water bodies such as wetlands and lowland streams. The species has been recorded forming shoals. They have been associated with a range of habitats including rock and sandy bottoms and aquatic vegetation.			Negligible	The streams within the subject land are highly disturbed and lack aquatic and riparian vegetation. The streams occur as ephemeral waterways in periods of high rainfall. No suitable habitat occurs within the subject land. No previous records within the locality.
Actinopterygii	Maccullochella macquariensis	Trout Cod	-	E	E	The single naturally occurring population is restricted to a small (approximately 120 km) stretch of the Murray River from below Yarrawonga Weir to Strathmerton (Douglas et al. 1994; NSW Fisheries 2001; Rimmer 1987), but is occasionally taken downstream as far as the Barmah State Forest (McKinnon 1993) and further downstream to Gunbower (Douglas et al. 2012). Unconfirmed records have also been made further downstream from near Murrabit, Swan Hill and near Tooleybuc. Trout Cod occupy stream positions characterised by a high abundance of large woody debris (or 'snags') in water that is comparatively deep and close to riverbanks. However, midstream snags are also an important habitat component			Low	The waterways within the subject land occur upstream of the Murray River and do not provide suitable habitat such as deep pools or an abundance of overhanging riparian vegetation.
Actinopterygii	Maccullochella peelii	Murray Cod	-	V	-	The Murray Cod was historically distributed throughout the Murray-Darling Basin. The Murray Cod utilises a diverse range of habitats from clear rocky streams, such as those found in the upper western slopes of NSW (including the ACT), to slow-flowing, turbid lowland rivers and billabongs (McDowall 1996). Murray Cod are frequently found in the main channels of rivers and larger tributaries. The species is, therefore, considered a main-channel specialist. Murray Cod tend to occur in floodplain channels and anabranches when they are inundated (Koehn 1997, 2006; Koehn & Harrington 2005 cited in National Murray Cod Recovery Team 2010), but the species' use of these floodplain habitats appears limited. Preferred microhabitat consists of complex structural features in streams such as large rocks, snags (pieces of large submerged woody debris), overhanging stream banks and vegetation, tree stumps, logs, branches and other woody structures. Such structures reduce or influence stream flows and provide Murray Cod with shelter from fast-flowing water			Low	The waterways within the subject land do not provide suitable microclimates for the species to occur. No submerged rocks or an abundance of woody debris and snags occurs. The waterways within the subject are shallow and slow-flowing and occurs approximately 4.5km from the Talbragar River. As the species is a main channel specialist, the species is unlikely to occur within the subject land.
Actinopterygii	Macquaria australasica	Macquarie Perch	-	E	E	The species is now restricted to a small number of fragmented populations mostly in cool, rocky, fast flowing streams in relatively undisturbed upland catchments.			Negligible	The streams within the subject land are highly disturbed. The streams occur as ephemeral waterways in periods of high rainfall. No suitable habitat occurs within the subject land. No previous records within the locality.
Actinopterygii	Mogurnda adspersa	Purple Spotted Gudgeon	-	-	E	The Southern Purple Spotted Gudgeon occurs in the Murray-Darling basin as well as parts of coastal northern NSW and Queensland. The western population of the Southern Purple Spotted Gudgeon was previously widespread in the Murray, Murrumbidgee and Lachlan River systems and tributaries of the Darling, but has experienced a significant decline in recent times. They are now considered to be rare in inland NSW. The species can be found in a variety of habitats such as rivers, creeks, streams and billabongs with slow-flowing or still waters. Cover in the form of aquatic vegetation, overhanging vegetation from river banks, leaf litter, rocks or snags are important for the species.			Low	The waterways within the subject land are highly turbid. Many of these waterways have been altered to include man-made dams and road crossings/culverts which are likely to block fish passage. The waterways within the subject land lack overhanging vegetation, rocks and snags.
Actinopterygii	Tandanus tandanus	Eel-Tailed Catfish in the Murray-Darling Basin	-	-	EP	Eel Tailed Catfish are naturally distributed throughout the Murray-Darling Basin and in the Eastern drainages NSW north of Newcastle. Eel Tailed Catfish numbers in the Murray-Darling Basin have declined due to a range of impacts including invasive species, habitat degradation, cold water pollution and fishing pressures and are now virtually absent from the Murray, Murrumbidgee and Lachlan catchments. The Eel tailed catfish is a non-migratory, benthic (bottom dwelling) species. It is relatively sedentary and adults typically only move within a 5 km range. They are generally more active at night compared with during the day. They can be found in a diverse range of freshwater environments including rivers, creeks, lakes, billabongs and lagoons. They prefer clear, sluggish or still waters, but can also be found in flowing streams with turbid waters. Substrates range from mud to gravel and rock.			Low	The waterways within the subject land are highly turbid. Many of these waterways have been altered to include man-made dams and road crossings/culverts which are likely to block fish passage. Eel-tailed Catfish is not mapped within the subject land, however is associated with Talbragar River which occurs approximately 4.4 km from the subject land.
Amphibia	Crinia sloanei	Sloane's Froglet	V	E	-	Sloane's Froglet has been recorded from widely scattered sites in the floodplains of the Murray-Darling Basin, with the majority of records in the Darling Riverine Plains, NSW South Western Slopes and Riverina bioregions in New South Wales. The species is typically associated with periodically inundated areas in grassland, woodland and disturbed habitats.			Low	Birriwa occurs on the edge of the species north-eastern range. The subject land, whilst highly disturbed, supports online dams only, with ephemeral streams occurring between. No previous records within the locality.
Amphibia	Litoria booroolongensis	Booroolong Frog	E	E	-	Live along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses. Adults occur on or near cobble banks and other rock structures within stream margins. Shelter under rocks or amongst vegetation near the ground on the stream edge. Eggs are laid in submerged rock crevices and tadpoles grow in slow-flowing connected or isolated pools.			Low	The creeks within the subject land are ephemeral. No suitable permanent habitat. These streams lack cobble banks and established riparian vegetation. No previous records within locality.
Aves	Actitis hypoleucos	Common Sandpiper	-	Mi	-	Found along all coastlines of Australia and in many areas inland, the Common Sandpiper is widespread in small numbers. The population when in Australia is concentrated in northern and western Australia. 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 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. Generally the species forages in shallow water and on bare soft mud at the edges of wetlands; often where obstacles project from substrate, e.g. rocks or mangrove roots. Birds sometimes venture into grassy areas adjoining wetlands. Roost sites are typically on rocks or in roots or branches of vegetation, especially mangroves. 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.			Low	There is no wetland or estuarine habitat within the subject land. No previous records within the locality.
Aves	Anthochaera phrygia	Regent Honeyeater	CE	CE	-	The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Woodlands Regent Honeyeaters inhabit, have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. These birds are also found in drier coastal woodlands and forests in some years. Every few years non-breeding flocks are seen foraging in flowering coastal Swamp Mahogany (Eucalyptus robusta) and Spotted Gum (Corymbia maculata) forests, particularly on the central coast and occasionally on the upper north coast. Birds are occasionally seen on the south coast.	2	2012	Low	The study area occurs in the species known range and contains woodland associated with this species. However, only two previous records exist, the nearest of which is approximately 13 km south-west of the site from 2012. All wooded vegetation of PCT 281, which provides potential foraging habitat for the species is outside the subject land and is to be retained. Species is unlikely to forage in the DNG or exotic pastureland within subject land.
Aves	Aphelocephala leucopsis	Southern Whiteface	V	V	-	Southern Whiteface live in arid regions across most of the southern half of Australia (excluding Tasmania), in a wide range of open woodlands and shrublands where there is an understorey of grasses or shrubs, or both. These areas are usually in habitats dominated by acacias or eucalypts on ranges, foothills and lowlands, and plains. This species forages almost exclusively on the ground, favouring habitat with low tree densities and a herbaceous understorey litter cover. Breeding takes place from July to October throughout most of the species' range, however, the timing of breeding can be affected by rainfall in arid regions.			Low	Species is associated with arid landscapes and their vegetation types and is not known to be associated with PCT 281. Within the locality the species may occur as a vagrant foraging in open woodland areas. All degraded woodland vegetation which provides low potential habitat for the species is located outside the subject land and will be retained. No previous records within the locality.
Aves	Apus pacificus	Fork-tailed Swift	-	Mi	-	In NSW, the Fork-tailed Swift is recorded in all regions. Many records occur east of the Great Divide, however, a few populations have been found west of the Great Divide. These are widespread but scattered further west of the line joining Bourke and Dareton. Sightings have been recorded at Milparinka, the Bulloo River and Thurloo Downs. The Fork-tailed Swift is almost exclusively aerial, flying from less then 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. They sometimes occur above rainforests, wet sclerophyll forest or open forest or plantations of pines. They forage aerially, up to hundreds of metres above ground, but also less then 1 m above open areas or over water. They often occur in areas of updraughts, especially around cliffs.			Low	Species is greatly associated with coastal landscapes and vegetation. Within this locality, the species may occur as a vagrant to forage over the native pasture within the subject land.
Aves	Botaurus poiciloptilus	Australasian Bittern	E	E	-	The Australasian Bittern is widespread and found over most of NSW except for far north-west. Preferred habitat is comprised of wetlands with tall dense vegetation, where it forages in still, shallow water up to 0.3 m deep, often at the edges of pools or waterways, or from platforms or mats of vegetation over deep water. It favours permanent and seasonal freshwater habitats, particularly those dominated by sedges, rushes and reeds or cutting grass (Gahnia sp.) growing over a muddy or peaty substrate (OEH 2018).			Low	There is no wetland habitat within the subject land. No previous records within the locality.
Aves	Burhinus grallarius	Bush Stone-curlew	E	-	-	The Bush Stone-curlew has previously been recorded in all but the most arid parts of mainland Australia. Today the species is scarce or largely absent in many parts of its former range south and east of the Great Dividing Range. It inhabits open forests and woodlands with a sparse grassy ground layer and fallen timber. The curlew likes to roost and nest in grassy woodlands of Bull Oak, gum or box with low, sparse grassy or herb understorey. Nests are usually beside a fallen log, which probably makes it harder for foxes to find. Curlews prefer a sparse understorey so they can see predators while foraging for insects.	1	2005	Low	The study area contains some open areas of Box Gum Woodland with fallen timber, however these areas are outside the subject land and are to be retained. Species is unlikely to forage in the DNG or exotic pastureland within subject land. Only one previous record within the locality from 2005.
Aves	Calidris acuminata	Sharp-tailed Sandpiper	-	Mi	-	The Sharp-tailed Sandpiper spends the non-breeding season in Australia with small numbers occurring regularly in New Zealand. 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. Many inland records are of birds on passage. In Australasia, the Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline saltlakes inland. They also occur in saltworks and sewage farms. They use flooded paddocks, sedgelands and other ephemeral wetlands, but leave when they dry. They use intertidal mudflats in sheltered bays, inlets, estuaries or seashores, and also swamps and creeks lined with mangroves.			Low	There is no wetland habitat within the subject land. No previous records within the locality.
Aves	Calidris ferruginea	Curlew Sandpiper	E	CE, Mi	-	Mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. Occasionally they are recorded around floodwaters.			Low	There is no wetland habitat within the subject land. No previous records within the locality.
Aves	Calidris melanotos	Pectoral Sandpiper	-	Mi	-	In New South Wales (NSW), the Pectoral Sandpiper 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. In Australasia, the Pectoral Sandpiper prefers shallow fresh to saline wetlands. 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. They forage in shallow water or soft mud at the edge of wetlands.			Low	There is no wetland or estuarine habitat within the subject land. No previous records within the locality.
Aves	Callocephalon fimbriatum	Gang-gang Cockatoo	V	E	-	In summer, the Gang-gang Cockatoo is generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, they may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas.	2	2020	Low	Subject land is located on the edge of species range. Species breeds in higher altitudes associated with tall mountain forests. No hollows are present within the subject land and all wooded vegetation which could be suitable for foraging is located outside of the subject land to be retained. This species was not detected during field surveys. Low number of previous records, the most recent from 2020, located approximately 20 km away.

Family	Scientific name	Common name	BC Act status	EPBC Act status	FM Act	Habitat association	Number of records	Most recent record	Likelihood of occurrence	Justification
Aves	Calyptorhynchus lathami lathami	South-eastern Glossy Black-cockatoo	V	V	-	Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Feeds almost exclusively on the seeds of several species of she-oak (Casuarina and Allocasuarina species), shredding the cones with the massive bill. Black Sheoak (*Allocasuarina littoralis*) and Forest Sheoak (*A. torulosa*) are important foods. Dependent on large hollow-bearing eucalypts for nest sites.	8	2024	Low	The subject land does not contain the necessary foraging trees (Sheoak) and PCT 281 is not associated with Glossy-black Cockatoo. Additionally no hollows are present within the subject land. A small number of proximal records exist for the species, though it is likely to occur within the locality in vegetation containing suitable foraging Sheoak species.
Aves	Chthonicola sagittata	Speckled Warbler	V	-	-	Lives in a wide range of *Eucalyptus* dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area. The rounded, domed, roughly built nest of dry grass and strips of bark is located in a slight hollow in the ground or the base of a dense plant, often among fallen branches and other litter.	70	2024	Low	Suitable foraging habitat occurs in the wooded areas outside the subject land, which are to be retained. Species is unlikely to forage or breed in the DNG or exotic pastureland within the subject land. A large number of previous records occur within the locality, the majority of which are located in the large areas of intact bushland approximately 10km east of the subject land.
Aves	Circus assimilis	Spotted Harrier	V	-	-	Occurs in grassy open woodland including *Acacia* and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. Builds a stick nest in a tree and lays eggs in spring (or sometimes autumn), with young remaining in the nest for several months.	4	2024	Low	
Aves	Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	V	-	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (*Eucalyptus camaldulensis*) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains. Hollows in standing dead or alive trees and tree stumps are essential for nesting.	25	2021	Low	Suitable foraging habitat occurs in the wooded areas outside the subject land, which are to be retained. Species is unlikely to forage in the DNG or exotic pastureland within subject land. No breeding habitat (hollows or tree stumps) was identified within the subject land. There are 41 previous local records, the majority of which are located in the large areas of intact bushland approximately 10km east of the subject land.
Aves	Daphoenositta chrysoptera	Varied Sittella	V	-	-	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and *Acacia* woodland. Feeds on arthropods glenaed from crevices in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy. Builds a cup-shaped nest of plant fibres and cobwebs in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years.			Low	Suitable foraging and breeding habitat occurs in the wooded areas outside the subject land, which are to be retained. Species is unlikely to forage in the DNG or exotic pastureland within subject land. No breeding nests were observed opportunistically within the subject land during targeted searches for raptor nests. No previous records within the locality.
Aves	Epthianura albifrons	White-fronted Chat	V	-	-	Gregarious species, usually found foraging on bare or grassy ground in wetland areas, singly or in pairs. They are insectivorous, feeding mainly on flies and beetles caught from or close to the ground. Have been observed breeding from late July through to early March, with open-cup nests built in low vegetation.	1	2020	Low	There is no wetland within the subject land. One previous record within the locality from 2020, 4 km south-east of the subject land.
Aves	Falco hypoleucos	Grey Falcon	E	V	-	The Grey Falcon is sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. The species is 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. Also occurs near wetlands where surface water attracts prey (OEH 2018).			Low	Habitat within the subject land does not contain substantial watercourses for the species to occur. Species may be associated with the Talbragar River north of the subject land where it is more likely to forage. No nests observed during site surveys for other targeted birds of prey.
	Falco subniger	Black Falcon	V	-		The Black Falcon is widely, but sparsely, distributed in NSW, mostly occurring in inland regions. Some reports of 'Black Falcons' on the tablelands and coast of New South Wales are likely to be referable to the Brown Falcon. In NSW there is assumed to be a single population that is continuous with a broader continental population, given that falcons are highly mobile, commonly travelling hundreds of kilometres. The Black Falcon occurs as solitary individuals, in pairs, or in family groups of parents and offspring.	4	2022	Low	Species is generally associated with more inland areas though a small number of scattered previous records occur within the locality. This species is relatively data deficient but it is considered given the mobility of the species, the loss of potential foraging habitat within PCT 281 DNG is unlkely to impact the species given the large areas of intact bushland in the broader locality.
Aves	Gallinago hardwickii	Latham's Snipe	-	Mi	-	Latham's Snipe is a non-breeding visitor to south-eastern Australia, and is a passage migrant through northern Australia. The range extends inland over the eastern tablelands in south-eastern Queensland (and occasionally from Rockhampton in the north), and to west of the Great Dividing Range in New South Wales. In Australia, Latham's Snipe occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies). However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity.	1	2015	Low	There is no wetland or estuarine habitat within the subject land. One previous records within the locality approximately 15km east of the site from 2015.
Aves	Glossopsitta pusilla	Little Lorikeet	V	-	-	Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species. Nests in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth-barked Eucalypts. Entrance is small (3 cm) and usually high above the ground (2–15 m). These nest sites are often used repeatedly for decades, suggesting that preferred sites are limited. Riparian trees often chosen, including species like Allocasuarina.	17	2024	Low	No breeding hollows located within the subject land. Wooded areas that may provide foraging habitat will be retained. Species is unlikely to forage in the DNG or exotic pastureland within subject land. There are a number of scattered previous records within the locality as the species is associated with PCT 281.
Aves	Grantiella picta	Painted Honeyeater	V	V	-	The species is sparsely distributed from south-eastern Australia to north-western Queensland, with its greatest concentrations and breeding locations occurring on the inland slopes of the Great Dividing Range in NSW. It inhabits mistletoes in eucalypt forests/woodlands, riparian woodlands of Black Box (E. largiflorens) and River Red Gum (E. camaldulensis), Box-Ironbark-Yellow Gum woodlands, Acacia-dominated woodlands, Paperbarks, Casuarina, Callitris, and trees on farmland or gardens. The species prefers woodlands which contain a higher number of mature trees, as these host more mistletoes. It is more common in wider blocks of remnant woodland than in narrower strips although it breeds in quite narrow roadside strips if ample mistletoe fruit is available (OEH 2018).	68	2020	Low	The subject land contains suitable Box-Gum Woodland, however it only occurs as patchy remnants which are unlikely to be utilised by the species. Nonetheless these areas are to be retained providing sub-optimal foraging habitat for this species. Species is unlikely to forage in the DNG or exotic pastureland within subject land. A number of records (68) occur approximately 10 km east of the subject land.
Aves	Haliaeetus leucogaster	White-bellied Sea-Eagle	V	-	-	The White-bellied Sea-Eagle is found in coastal habitats (especially those close to the sea-shore) and around terrestrial wetlands in tropical and temperate regions of mainland Australia and its offshore islands. The habitats occupied by the sea-eagle are characterised by the presence of large areas of open water (larger rivers, swamps, lakes and the sea).	3	2019	Low	The subject land contains ephemeral creeks but is greater than 1 km from major rivers, creeks, wetlands. Potential nest trees occur within the subject land, however, targeted surveys were undertaken during the breeding season and no large stick nests were located. Three previous records within the locality the nearest from 2019, located approximately 10km to the south.
Aves	Hamirostra melanosternon	Black-breasted Buzzard	V	-	-	Lives in a range of inland habitats, especially along timbered watercourses which is the preferred breeding habitat. Also hunts over grasslands and sparesly timbered woodlands. Breeds from August to October near water in a tall tree. The stick nest is large and flat and lined with green leaves.	1	2005	Low	
Aves	Hieraaetus morphnoides	Little Eagle	V	-	-	The Little Eagle is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. This species occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used.	7	2022	Low	Potential nest trees occur within the subject land, however, targeted surveys were undertaken during the breeding season and no large stick nests were located. A low number of scattered previous records occur within the locality, with the most recent being approximately 15km north-west of the site from 2022.
Aves	Hirundapus caudacutus	White-throated Needletail	-	V; Mi	-	The White-throated Needletail is widespread in eastern and south-eastern Australia. In NSW this species extends inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains. In Australia, the White-throated Needletail is almost exclusively aerial, recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland (DoEE 2018).	2	2024	Low	The species may utilise the wooded areas outside of the subject land to forage, however this habitat is to be retained. There are a number of scattered records within the broader locality, though the species is not associated with PCT 281.
Aves	Lathamus discolor	Swift Parrot	E	CE	-	This species migrates in the autumn and winter months to south-eastern Australia. In NSW, it mostly occurs on the coast and south-west slopes in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations (OEH 2018). Favoured feed trees include winter flowering species such as Swamp Mahogany, Spotted Gum, Red Bloodwood (C. gummifera), Mugga Ironbark and White Box. Commonly used lerp infested trees include Inland Grey Box, Grey Box (E. moluccana) and Blackbutt (E. pilularis).	3	2007	Low	The subject land does not contain the described associated winter flowering species. Grey Box does occur; however this is not a winter flowering species and is located outside of the subject land. The species may occur as a vagrant. Three records within the locality, the most recent from 2007

Family	Scientific name	Common name	BC Act status	EPBC Act status	FM Act	Habitat association	Number of records	Most recent record	Likelihood of occurrence	Justification
Aves	Leipoa ocellata	Malleefowl	E	V	-	Malleefowl predominantly inhabit mallee communities, preferring the tall, dense and floristically-rich mallee found in higher rainfall (300 – 450 mm mean annual rainfall) areas. The species utilises mallee with a spinifex understorey, but usually at lower densities than in areas with a shrub understorey. The species is less frequently found in other eucalypt woodlands, such as Inland Grey Box, Ironbark or Bimble Box Woodlands with thick understorey. 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 (OEH 2018).			Negligible	The subject land does not contain suitable mallee habitat for the species to occur. No previous local records within the locality.
Aves	Lophochroa leadbeateri	Pink Cockatoo / Major Mitchell's Cockatoo	V	E	-	Found across the arid and semi-arid inland, from south-western Queensland south to north-west Victoria, through most of South Australia, north into the south-west Northern Territory and across to the west coast between Shark Bay and about Jurien. In NSW it is found regularly as far east as about Bourke and Griffith, and sporadically further east than that. Inhabits a wide range of treed and treeless inland habitats, always within easy reach of water. Feeds mostly on the ground, especially on the seeds of native and exotic melons and on the seeds of species of saltbush, wattles and cypress pines. Nesting, in tree hollows, occurs throughout the second half of the year; nests are at least 1 km apart, with no more than one pair every 30 square kilometres.			Negligible	The subject land does not contain the preferred foraging species (native/exotic melons, wattles, saltbush or cypress pines) and PCT 281 is not associated with Pink Cockatoo. Additionally, no hollows are present within the subject land. No previous records within the locality.
Aves	Lophoictinia isura	Square-tailed Kite	V	-	-	Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. Breeding is from July to February, with nest sites generally located along or near watercourses, in a fork or on large horizontal limbs.			Low	Habitat within the subject land does not contain substantial waterbodies for the species to forage. Species may be associated with the Talbragar River north of the subject land where it is more likely to forage. No large stick nests were recorded during targeted raptor surveys. No previous records within the locality.
Aves	Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	V	-	-	The Hooded Robin is widespread across Australia and found throughout much of inland NSW. The species prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. This species requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses. Dead stumps and fallen timber or low-hanging branches will often be used to perch on for hunting. The species nest is a small, neat cup of bark and grasses bound with webs, in a tree fork or crevice, from less than 1 m to 5 m above the ground (OEH 2018).	3	2017	Low	Suitable foraging habitat occurs in the wooded areas outside the subject land, which are to be retained. Species is unlikely to forage in the DNG or exotic pastureland within subject land. No breeding habitat (hollows or tree stumps) was identified within the subject land. There are three previous local records, all located in the large areas of intact bushland approximately 10km east of the subject land.
Aves	Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V	-	-	Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (*Eucalyptus sideroxylon*), White Box (*E. albens*), Inland Grey Box (*E. microcarpa*), Yellow Box (*E. melliodora*), Blakely's Red Gum (*E. blakelyi*) and Forest Red Gum (*E. tereticornis*). Also inhabits open forests of smooth-barked gums, stringybarks, ironbarks, river sheoaks, (nesting habitat) and tea-trees.	1	2014	Low	Suitable foraging habitat may occur within the wooded areas of PCT 281, though these areas are to be retained. Breeding habitat is sub-optimal due to the lack of preferred nesting habitat (river sheoaks) within the subject land. One previous record within the locality from 2014.
Aves	Motacilla flava	Yellow Wagtail	-	Mi	-	This species occupies a range of damp or wet habitats with low dense vegetation, from damp meadows, marshes, waterside pastures, sewage farms and bogs to damp steppe and grassy tundra (Birdlife International 2017). Imporant habitat is considered to be mostly wellwatered open grasslands and the fringes of wetlands. Roosts in mangroves and other dense vegetation.			Low	The subject land contains ephemeral creeks and dams, however these lack dense riparian vegeation preferred by the species and do not provide permanent, reliable habitat for the species. Mangroves do not occur in the subject land or locality. No previous records within the locality.
Aves	Myiagra cyanoleuca	Satin Flycatcher	-	Mi	-	The Satin Flycatcher is widespread in eastern Australia and vagrant to New Zealand (Blakers et al. 1984; Coates 1990). Satin Flycatchers inhabit heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occur in coastal forests, woodlands, mangroves and drier woodlands and open forests.			Negligible	No heavily vegetated forest or gullies within the subject land. No previous records within locality.
Aves	Neophema chrysostoma	Blue-winged Parrot	V	V	-	Blue-winged parrots inhabit a range of habitats from coastal, sub-coastal and inland areas, through to semi-arid zones. They tend to favour grasslands and grassy woodlands and are often found near wetlands both near the coast and in semi-arid zones. Nests are made in hollows, preferably with a vertical opening, in live or dead trees or stumps (DCCEEW 2023).			Low	Suitable foraging habitat may occur within the wooded areas of PCT 281 outside of the subject land, which are to be retained. No suitable hollows occur within the subject land. No previous records within the locality.
Aves	Neophema pulchella	Turquoise Parrot	V	-	-	Inhabiting the steep, rocky ridges and gullies, hills, river-flats, valleys and nearby plains of the Great Dividing Range, the Turquoise Parrot is found in open forest and eucalyptus woodlands with a low shrub understorey and grassy ground-cover. Generally, distribution of the species is patchy, determined by areas of suitable habitat and ranges from north-eastern Victoria through NSW to south-eastern Queensland. Individuals generally breed from August to January, usually nesting less than two metres above the ground. Nests may be located in hollows of small trees, dead eucalyptus or in holes or stumps, fence posts or even logs lying on the ground.	2	2020	Low	Suitable foraging habitat may occur within the wooded areas of PCT 281 outside of the subject land, which are to be retained. No suitable breeding habitat was identified within the subject land. Two previous records within the locality, the most recent from 2017 approximately 15 km to the east.
Aves	Ninox connivens	Barking Owl	V	-	-	The Barking Owl inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. This species roosts in shaded portions of tree canopies, including tall midstorey trees with dense foliage such as Acacia and Casuarina species.	3	2017	Low	Suitable foraging habitat may occur within the wooded areas of PCT 281 outside of the subject land, which are to be retained. No suitable hollows occur within the subject land. Three previous records within the locality, the most recent from 2017 approximately 17 km to the south-east.
Aves	Ninox strenua	Powerful Owl	V	-		In NSW, the Powerful Owl is widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered, mostly historical records on the western slopes and plains. This species roosts by day in dense vegetation comprising species such as Turpentine (*Syncarpia glomulifera*), Black She-oak (*Allocasuarina littoralis*), Blackwood (*Acacia melanoxylon*), Rough-barked Apple (*Angophora floribunda*), Cherry Ballart (*Exocarpus cupressiformis*) and a number of eucalypt species.	4	2010	Low	Suitable foraging habitat may occur within the wooded areas of PCT 281 outside of the subject land, which are to be retained. No suitable hollows occur within the subject land. Four previous records within the locality, the most recent from 2010 approximately 17 km to the south-east.
Aves	Oxyura australis	Blue-billed Duck	V	-	-	The Blue-billed Duck prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. The species is completely aquatic, swimming low in the water along the edge of dense cover. Blue-billed Ducks are partly migratory, with short distance movements between breeding swamps and overwintering lakes with some long-distance dispersal to breed during spring and early summer. This species usually nests solitarily in Cumbungi over deep water between September and February. They will also nest in trampled vegetation in Lignum, sedges or Spike-rushes, where a bowl-shaped nest is constructed.	3	2008	Low	There is no wetland or swamp habitat within the subject land. Three previous records within the locality, approximately 17 km to the east.
Aves	Pedionomus torquatus	Plains-wanderer	E	CE	-	Plains-wanderers live in semi-arid, lowland native grasslands that typically occur on hard red-brown soils. These grasslands support a high diversity of plant species, including a number of state and nationally threatened species. Habitat structure appears to play a more important role tha plant species composition. Preferred habitat of the Plains-wanderer typically comprises 50% bare ground, 10% fallen litter, and 40% herbs, forbs and grasses.			Low	The subject land is not located within an area of NSW which is considered semi-arid nor does it have the hard red-brown soils associated with the lowland grasslands of those areas. No previous records within locality.
Aves	Petroica boodang	Scarlet Robin	V	-	-	Lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. Scarlet Robin habitat usually contains abundant logs and fallen timber: these are important components of its habitat. In autumn and winter many Scarlet Robins live in open grassy woodlands, and grasslands or grazed paddocks with scattered trees. Birds forage from low perches, fence-posts or on the ground, from where they pounce on small insects and other invertebrates which are taken from the ground, or off tree trunks and logs; they sometimes forage in the shrub or canopy layer. This species' nest is an open cup made of plant fibres and cobwebs and is built in the fork of tree usually more than 2 metres above the ground; nests are often found in a dead branch in a live tree, or in a dead tree or shrub.	10	2015	Low	
Aves	Petroica phoenicea	Flame Robin	V	-	-	Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Prefers clearings or areas with open understoreys. The groundlayer of the breeding habitat is dominated by native grasses and the shrub layer may be either sparse or dense. Occasionally occurs in temperate rainforest, and also in herbfields, heathlands, shrublands and sedgelands at high altitudes. In winter, birds migrate to drier more open habitats in the lowlands (i.e. valleys below the ranges, and to the western slopes and plains). Often occurs in recently burnt areas; however, habitat becomes unsuitable as vegetation closes up following regeneration. In winter lives in dry forests, open woodlands and in pastures and native grasslands, with or without scattered trees. In winter, occasionally seen in heathland or other shrublands in coastal areas. Birds forage from low perches, from which they sally or pounce onto small invertebrates which they take from the ground or off tree trunks, logs and other coarse woody debris.	4	2020	Low	

Family	Scientific name	Common name	BC Act status	EPBC Act status	FM Act	Habitat association	Number of records	Most recent record	Likelihood of occurrence	Justification
Aves	Polytelis swainsonii	Superb Parrot	V	V	-	The Superb Parrot is found throughout eastern inland NSW. This species inhabits forests and woodlands dominated by eucalypts, especially River Red Gums and box eucalypts such as Yellow Box or Inland Grey Box. Superb Parrots breed in either River Red Gum forests and woodlands or box woodlands (DoEE 2018).			Low	Suitable foraging habitat may occur within the wooded areas of PCT 281, though these areas are to be retained. Species is unlikely to forage in the DNG or exotic pastureland within subject land. No suitable hollows occur within the subject land. No previous records within the locality.
Aves	Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	V	-	-	Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. Woodlands on fertile soils in coastal regions. Build and maintain several conspicuous dome-shaped stick nests about the size of a football. Nests are usually located in shrubs or sapling eucalyptys, although they may be built in the outermost leaves of low branches of large eucalypts.	82	2023	Low	Suitable foraging habitat may occur within the wooded areas of PCT 281, though these areas are to be retained. No nests were observed oppotunistically during targeted diurnal surveys within the subject land. Species is unlikely to forage in the DNG or exotic pastureland within subject land. A number of previous records within the locality, the nearest from 2023, approximately 2 km to the east of the subject land.
Aves	Pycnoptilus floccosus	Pilotbird	-	V	-	Pilotbirds are endemic to south-east Australia. Upland Pilotbirds occur above 600 m in the Brindabella Ranges in the Australian Capital Territory, and in the Snowy Mountains in New South Wales and north-east Victoria (Higgins & Peter 2002; Loyn et al. 2021). Lowland Pilotbirds occur in forests from the Blue Mountains west of Newcastle, around the wetter forests of eastern Australia, to Dandenong near Melbourne (Higgins & Peter 2002; Loyn et al. 2021). Pilotbirds are strictly terrestrial, living on the ground in dense forests with heavy undergrowth (Higgins & Peter 2002).	2	2006	Negligible	The subject land lacks the dense vegetation structure required for the species. The closest previous records are approximately 10km east of the site.
Aves	Rhipidura rufifrons	Rufous Fantail	-	Mi	-	In east and south-east Australia, the Rufous Fantail mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalypts such as Tallow-wood (*Eucalyptus microcorys*), Mountain Grey Gum (*E. cypellocarpa*), Narrow-leaved Peppermint (*E. radiata*), Mountain Ash (*E. regnans*), Alpine Ash (*E. delegatensis*), Blackbutt (*E. pilularis*) or Red Mahogany (*E. resinifera*); usually with a dense shrubby understorey often including ferns.			Negligible	No wet sclerophyll forest or gullies within the subject land. No previous records within locality.
Aves	Rostratula australis	Australian Painted Snipe	E	E	-	The Australian Painted Snipe generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. The species also uses inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains (OEH 2018).			Low	There is no wetland or estuarine habitat within the subject land. No previous records within the locality.
Aves	Stagonopleura guttata	Diamond Firetail	V	-	-	The Diamond Firetail is endemic to south-eastern Australia and widely distributed in NSW. This species is found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum (*Eucalyptus pauciflora*) Woodlands. Also occurring in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. The species are often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland. The species feeds exclusively on the ground, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects (especially in the breeding season). Nests are globular structures built either in the shrubby understorey, or higher up, especially under hawk's or raven's nests (OEH 2018).	8	2023	Low	Suitable foraging and breeding habitat may occur outside of the subject land in the wooded areas of PCT 281, though these areas are to be retained. A small number of previous records occur within the locality, the closest of which are associated with the large bushland areas located 10 km east of the subject land.
Aves	Tyto novaehollandiae	Masked Owl	V	-	-	Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl but often hunts along the edges of forests, including roadsides.	1	2021	Low	Suitable foraging habitat may occur within the wooded areas of PCT 281 outside of the subject land, which are to be retained. No suitable hollows occur within the subject land. One previous record within the locality from 2021 approximately 17 km to the south-west.
Flora	Acacia ausfieldii	Ausfeld's Wattle	V	-		Found to the east of Dubbo in the Mudgee-Ulan-Gulgong area of the NSW South Western Slopes bioregion, with some records in the adjoining Brigalow Belt South, South Eastern Highlands and the Sydney Basin bioregions. Populations are recorded from Yarrobil National Park, Goodiman State Conservation Area and there is a 1963 record from Munghorn Gap Nature Reserve. A large population is also known from Tuckland State Forest to the northwest of Gulgong. Associated species include *Eucalyptus albens, E. blakelyi and Callitris spp.* , with an understorey dominated by *Cassinia spp.* and grasses	408	2024	Low	Potential habitat for this species occurs in the wooded vegetation zones of PCT 281, however the habitat is degraded due to underscrubbing and the assemblage of associated species were not found to occur within these areas. Areas of potential habitat in the wooded vegetation are outside the subject land and will not be impacted. A large number of previous records are located to the south-west and south-east of the subject land. The closest record is approximately 10 km away from 2023.
Flora	Androcalva (Commersonia) procumbens	-	V	V	-	This species is endemic to NSW and mainly confined to the Dubbo-Mendooran-Gilgandra region, but also in the Pilliga and Nymagee areas. The species grows in sandy sites, often along roadsides. It has been recorded in Eucalyptus dealbata and Eucalyptus sideroxylon communities, Broombush (Melaleuca uncinata) scrub, under mallee eucalypts with a Calytrix tetragona understorey, and in a recently burnt Ironbark and Callitris area. Other associated species include *Acacia triptera, Callitris endlicheri, Yellow Box, Allocasuarina diminuta, Philotheca salsolifolia, Xanthorrhoea species, Exocarpos cupressiformis, Leptospermum parvifolium* and *Kunzea parvifolia* (OEH 2018).	1	2021	Low	Potential habitat for this species occurs in the wooded vegetation zones of PCT 281, however the habitat is degraded due to underscrubbing and the assemblage of associated species were not found to occur within these areas. Areas of potential habitat in the wooded vegetation are outside the subject land and will not be impacted. One previous record located approximately 14 km south-east of the subject land.
Flora	Bertya mollissima	-	E	E	-	*Bertya mollissima* is endemic to north-eastern New South Wales (NSW) and has been known to occur historically from Mount Kaputar, Warrumbungle and Liverpool Ranges to the Scone and Singleton districts. Within the last 20 years, only four subpopulations have been known to be extant: Mount Kaputar summit and Waa Gorge in Mount Kaputar NP, Ukerbarley Aboringinal Area, and Bundella Lookout in Coolah Tops NP. The species grows on steep hillsides and mountain summits in shallow sandy or gravelly soil in rock cracks and among boulders. The species typically occurs within heath or open woodland communities surrounded by *Eucalyptus spp.* between 500 to 1500 m above sea level. Surveys in 2020 of habitat at the Mount Kaputar NP site recorded the area as a rocky mountain summit with *Eucalyptus nobilis* (ribbon gum), *Kunzea ambigua* (Tick Bush), *Olearia sp., Muehlenbackia sp.* 'Mt Norman' and *Pelargonium inodorum* .			Low	No associated species or suitable habitat (steep hillsides and mountain summits) occur within the subject land. No previous records within the locality.
Flora	Cassinia heleniae	-	E	E	-	Based on confirmed records, *Cassinia heleniae* is endemic to the north-western slopes of NSW, exclusively within the Torrington region, specifically the Binghi Plateau. All records excluding one occur within the Torrington State Conservation Area. The other record occurs on crown land to the north. The species grows on podzolic soils of coarse granite derived sand, or sandy loam over granite exclusively within the Torrington area, at elevations of 900-1160 m above sea level (DCCEEW 2023a).	1	2008	Low	The subject land occurs outside of the species range as it is only confirmed in the Torrington area. Other records outside of this area are disputed and likely to be *C. adunca* . Regardless, the subject land does not have soils containing granite or occurring over granite nor does it occur at a high enough altitude (DCCEEW 2023a).
Flora	Dichanthium setosum	Bluegrass	V	V	-	Bluegrass occurs on the New England Tablelands, North West Slopes and Plains and the Central Western Slopes of NSW, extending to northern Queensland. It occurs widely on private property, including in the Inverell, Guyra, Armidale and Glen Innes areas. Associated with heavy basaltic black soils and red-brown loams with clay subsoil. Often found in moderately disturbed areas such as cleared woodland, grassy roadside remnants and highly disturbed pasture. Associated species include *Eucalyptus albens, Eucalyptus melanophloia, Eucalyptus melliodora, Eucalyptus viminalis, Myoporum debile, Aristida ramosa, Themeda triandra, Poa sieberiana, Bothriochloa ambigua, Medicago minima, Leptorhynchos squamatus, Lomandra aff. longifolia, Ajuga australis, Calotis hispidula and Austrodanthonia, Dichopogon, Brachyscome, Vittadinia, Wahlenbergia* and *Psoralea* species.			Low	Suitable habitat within the subject land occurs within the DNG areas of PCT 281. Targeted surveys in these areas did not locate the species and there are no previous records within the locality. The exotic pastureland within the subject land was considered too degraded for the species to occur.
Flora	Euphrasia arguta	-	CE	CE	-	Euphrasia arguta was rediscovered in the Nundle area of the NSW north western slopes and tablelands in 2008. Prior to this, it had not been collected for 100 years. Historically, Euphrasia arguta has only been recorded from relatively few places within an area extending from Sydney to Bathurst and north to Walcha. The Royal Botanic Gardens Specimen Register records an additional location reported and vouchered in 2002 from near the Hastings River; and Euphrasia arguta was also recorded from the Barrington Tops in 2012. Historic records of the species noted the following habitats: 'in the open forest country around Bathurst in sub humid places', 'on the grassy country near Bathurst', and 'in meadows near rivers'. 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.			Low	Suitable habitat occurs within the subject land - eucalypt forest with a mixed grass and shrub understorey, often in open disturbed areas and along the road side. The exotic pastureland within the subject land was considered too degraded for the species to occur. Targeted surveys within the DNG areas of PCT 281 did not find the species within the subject land. No previous records within the locality.
Flora	Homoranthus darwinioides	Fairy Bells	V	V	-	Rare in the central tablelands and western slopes of NSW, occurring from Putty to the Dubbo district. It is found west of Muswellbrook between Merriwa and Bylong, and north of Muswellbrook to Goonoo SCA. The species has been collected from Lee's Pinch, but not relocated at its original locality north of Mt Coricudgy above the headwaters of Widden Brook. Grows in various woodland habitats with shrubby understoreys, usually in gravely sandy soils. Landforms the species has been recorded growing on include flat sunny ridge tops with scrubby woodland, sloping ridges, gentle south-facing slopes, and a slight depression on a roadside with loamy sand. Associated species include *Callitris endlicheri* , *Eucalyptus crebra* , *E. fibrosa, C. trachyphloia, E. beyeri subsp. illaquens, E. dwyeri, E. rossii, Leptospermum divaricatum, Melaleuca uncinata, Calytrix tetragona, Allocasuarina spp.* and *Micromyrtus spp.*			Low	No associated species or suitable habitat (gravelly soils) occur within the subject land.
Flora	Lepidium aschersonii	Spiny Peppercress	V	V	-	Not widespread, occurring in the marginal central-western slopes and north-western plains regions of NSW (and potentially the south western plains). In the north of the State recent surveys have recorded a number of new sites including Brigalow Nature Reserve, Brigalow State Conservation Area, Leard State Conservation Area and Bobbiwaa State Conservation Area. Also known from the West Wyalong in the south of the State. Records from Barmedman and Temora areas are likely to be no longer present. Approximately 50% of the total *Lepidium aschersonii* recorded for Australia occurs in NSW. Found on ridges of gilgai clays dominated by Brigalow (*Acacia harpophylla*), Belah (*Casuarina cristata*), Buloke (*Allocasuarina luehmanii*) and Grey Box (*Eucalyptus microcarpa*). In the south has been recorded growing in Bull Mallee (*Eucalyptus behriana*). Often the understorey is dominated by introduced plants. The species grows as a 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.			Low	The subject land does not contain suitable microhabitats for the species to occur. The subject land lacks ridges or gilgai clays, in addition to lacking the associated species.
Flora	Lepidium monoplocoides	Winged Peppercress	E	E	-	Widespread in the semi-arid western plains regions of NSW. Collected from widely scattered localities, with large numbers of historical records but few recent collections. There is a single collection from Broken Hill and only two collections since 1915, the most recent being 1950. Also previously recorded from Bourke, Cobar, Urana, Lake Cargelligo, Balranald, Wanganella and Deniliquin. Recorded more recently from the Hay Plain, south-eastern Riverina, and from near Pooncarie. Occurs on seasonally moist to waterlogged sites, on heavy fertile soils, with a mean annual rainfall of around 300-500 mm. Predominant vegetation is usually an open woodland dominated by *Allocasuarina luehmannii* (Bulloak) and/or eucalypts, particularly *Eucalyptus largiflorens* (Black Box) or *Eucalyptus populnea* (Poplar Box). The field layer of the surrounding woodland is dominated by tussock grasses. Recorded in a wetland-grassland community comprising Eragrostis australasicus, *Agrostis avenacea, Austrodanthonia duttoniana, Homopholis proluta, Myriophyllum crispatum, Utricularia dichotoma* and *Pycnosorus globosus* , on waterlogged grey-brown clay. Also recorded from a Maireana pyramidata shrubland.			Negligible	Subject land is not located within the species known predicted range. No previous records within the locality. No associated species occur within the subject land.
Flora	Ozothamnus tesselatus	-	V	V	-	Grows in eucalypt woodland and is restricted to a few locations north of Rylstone, NSW, and is conserved within the Goulburn River National Park and Munghorn Gap Nature Reserve. The species distribution overlaps with the White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland EPBC Act listed threatned ecological community (DEWHA 2008).			Low	Potential habitat for this species occurs in the wooded vegetation zones of PCT 281, however, these areas were surveyed, and no shrub species were present due to past underscrubbing. Additionally, the wooded areas of PCT 281 are outside of the subject land.

Family	Scientific name	Common name	BC Act status	EPBC Act status	FM Act	Habitat association	Number of records	Most recent record	Likelihood of occurrence	Justification
Flora	Pimelea curviflora var. curviflora	-	V	V	-	Occurs on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands. Also recorded in Illawarra Lowland Grassy Woodland habitat at Albion Park on the Illawarra coastal plain.			Low	Subject land does not occur on shale/laterite soils or shale/sandstone transition soils and is outside the species known range.
Flora	Pomaderris cotoneaster	Cotoneaster Pomadderis	E	E	-	Cotoneaster Pomaderris has been recorded in a range of habitats in predominantly forested country. The habitats include forest with deep, friable soil, amongst rock beside a creek, on rocky forested slopes and in steep gullies between sandstone cliffs.			Low	Potential habitat for this species occurs in the wooded vegetation zones of PCT 281, however, these areas were surveyed, and no shrub species were present due to past underscrubbing. Additionally, the wooded areas of PCT 281 are outside of the subject land.
Flora	Prasophyllum petilum	Tarengo Leek Orchid	E	E	-	Natural populations are known from a total of five sites in NSW. These are near Boorowa, Queanbeyan area, Ilford, Delegate and a newly recognised population c.10 km west of Muswellbrook. It also occurs at Hall in the Australian Capital Territory. This species has also been recorded at Bowning Cemetery where it was experimentally introduced, though it is not known whether this population has persisted. Grows in open sites within Natural Temperate Grassland at the Boorowa and Delegate sites. Also grows in grassy woodland in association with River Tussock (Poa labillardieri), Black Gum (Eucalyptus aggregata) and tea-trees Leptospermum spp. near Queanbeyan and within the grassy ground layer dominated by Kangaroo Grass under Box-Gum Woodland at Ilford (and Hall, ACT). Apparently highly susceptible to grazing, being retained only at little-grazed travelling stock reserves (Boorowa & Delegate) and in cemeteries (near Queanbeyan, Ilford and Hall).			Low	Suitable habitat for this species occurs in the wooded and good condition DNG vegetation zones of PCT 281. The exotic pastureland within the subject land was considered too degraded for the species to occur. Targeted surveys within PCT 281 vegetation did not locate the species. No previous records within the locality.
Flora	Prasophyllum sp. Wybong	-	-	CE	-	Endemic to NSW, it is known from near Ilford, Premer, Muswellbrook, Wybong, Yeoval, Inverell, Tenterfield, Currabubula and the Pilliga area. Most populations are small, although the Wybong population contains by far the largest number of individuals. A perennial orchid, appearing as a single leaf over winter and spring. Flowers in spring and dies back to a dormant tuber over summer and autumn. Known to occur in open eucalypt woodland and grassland.			Low	Suitable habitat for this species occurs in the wooded and DNG vegetation zones of PCT 281. The exotic pastureland within the subject land was considered too degraded for the species to occur. Targeted surveys within suitable habitat did not locate the species. No previous records within the locality.
Flora	Swainsona murrayana	Slender Darling-pea	V	V	-	The species has been collected from clay-based soils, ranging from grey, red and brown cracking clays to red-brown earths and loams. Grows in a variety of vegetation types including bladder saltbush, black box and grassland communities on level plains, floodplains and depressions and is often found with Maireana species. Plants have been found in remnant native grasslands or grassy woodlands that have been intermittently grazed or cultivated.			Low	Suitable habitat occurs within the subject land (grassy woodlands), however no associated species (Maireana sp.) were present and the site does not occur on clay-based soils which is where the species has been collected.
Flora	Swainsona recta	Small Purple-pea	E	E	-	Small Purple-pea was 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. Over 80% of the southern population grows on a railway easement. It is also known from the ACT and a single population of four plants near Chiltern in Victoria. Before European settlement Small Purple-pea occurred in the grassy understorey of woodlands and open-forests dominated by Blakely's Red Gum (*Eucalyptus blakelyi*), Yellow Box (*E. melliodora*), Candlebark Gum (*E. rubida*) and Long-leaf Box (*E. goniocalyx*). Grows in association with understorey dominants that include Kangaroo Grass (*Themeda australis*), poa tussocks Poa spp. and spear-grasses *Austrostipa* spp.			Low	Suitable habitat for this species occurs in the wooded and DNG vegetation zones of PCT 281. The exotic pastureland within the subject land was considered too degraded for the species to occur. Targeted surveys within suitable habitat did not locate any Swainsona species. No previous records within the locality.
Flora	Swainsona sericea	Silky Swainson-pea	V	-		Found in Natural Temperate Grassland and Snow Gum Eucalyptus pauciflora Woodland on the Monaro. Found in Box-Gum Woodland in the Southern Tablelands and South West Slopes. Sometimes found in association with cypress-pines *Callitris* spp.			Low	Suitable habitat for this species occurs in the wooded and DNG vegetation zones of PCT 281. The exotic pastureland within the subject land was considered too degraded for the species to occur. Targeted surveys within suitable habitat did not locate the species. No previous records within the locality.
Flora	Thesium australe	Austral Toadflax	V	V	-	Occurs on the coast, tablelands and western slopes in shrubland, grassland or woodland, often on damp sites.			Low	Suitable habitat for this species occurs in the wooded and DNG vegetation zones of PCT 281. The exotic pastureland within the subject land was considered too degraded for the species to occur. Targeted surveys within suitable habitat did not locate the species. No previous records within the locality.
Flora	Tylophora linearis	-	V	V	-	Grows in dry scrub and open forest. Recorded from low-altitude sedimentary flats in dry woodlands of *Eucalyptus fibrosa, Eucalyptus sideroxylon, Eucalyptus albens, Callitris endlicheri, Callitris glaucophylla* and *Allocasuarina luehmannii* . Also grows in association with *Acacia hakeoides, Acacia lineata, Melaleuca uncinata, Myoporum* species and *Casuarina* species.			Low	No associated species or suitable habitat (dry scrub and open forest) occur within the subject land.
Flora	Zieria ingramii	Keith's Zieria	E	E	-	Known predominately from Goonoo and Cobbora SCA, about 40 km north-east of Dubbo. Also known to occur west of Tuckland State Forest. An old record exists from a locality east of Mogriguy on the Mendooran Road, however searches of the area have not relocated the species. One record also occurs within Kings Plains National Park, 48 km south of Inverell. Grows in dry sclerophyll forest on light sandy soils. All known populations have been recorded in Eucalyptus-Callitris woodland or open forest with a shrubby to heathy understorey. Eucalyptus dwyeri appears to be a key predictor of Z. ingramii distribution. Mostly from gentle slopes in red-brown and yellow-brown sandy loams, often with a rocky surface. Associated and understorey species include Eucalyptus crebra, E. fibrosa, E. dwyeri, E. beyeriana, E. microcarpa, Callitris endlicheri, Allocasuarina diminuta and more.	2	2010	Low	Potential habitat for this species occurs in the wooded vegetation zones of PCT 281, however the habitat is degraded due to underscrubbing and none of the associated species including key predictor species Eucalyptus dwyeri occur within these areas. Areas of potential habitat in the wooded vegetation are outside the subject land and will not be impacted. Two previous local records exist approximately 19 km south-west of the subject land from 2010.
Mammalia	Chalinolobus dwyeri	Large-eared Pied Bat	V	V	-	In NSW this species has been recorded from a large range of vegetation types including: dry and wet sclerophyll forest; Cyprus Pine (Callitris glauca) dominated forest; tall open eucalypt forest with a rainforest sub-canopy; sub-alpine woodland; and sandstone outcrop country. The species requires a combination of sandstone cliff/escarpment to provide roosting habitat that is adjacent to higher fertility sites, particularly box gum woodlands or river/rainforest corridors which are used for foraging. Roosting has also been observed in disused mine shafts, caves, overhangs and disused Fairy Martin (Hirundo ariel) nests.	160	2024	Moderate	The subject land does not support sandstone cliff/escarpment, however the locality does provide breeding habitat, particularly to the south of the subject land. The species may utilise the DNG vegetation of PCT 281 for foraging. The species is more likely however, to use the wooded vegetation outside of the subject land as foraging habitat, which is to be retained. A large number of previous records exist within the locality concentrated around the areas of intact bushland approximately 10 km to the east.
Mammalia	Chalinolobus picatus	Little Pied Bat	V	-	-	Occurs in dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress pine forest and mallee and Bimbil box woodlands. Roosts in caves, rock outcrops, mine shafts, tunnels, trees hollows and buildings. Feeds on moths and possibly other flying invertebrates.	2	2009	Low	No caves, tunnels, culverts or other structure known or suspected to be used for breeding were identified within the subject land, or within 100 m of the subject land. However, derelict buildings do occur within the subject land which may provide sub-optimal roosting habitat for the species. It is considered unlikely the species would be breeding in these structures given the large areas of more suitable breeding and foraging habitat within the broader landscape. Only two previous records the most recent from 2009.
Mammalia	Dasyurus maculatus	Spotted-tailed Quoll	V	E	-	This species has been recorded from a wide range of habitats, including: coastal heathlands, open and closed eucalypt woodlands, wet sclerophyll and lowland forests (OEH 2018). Unlogged forest or forest that has been less disturbed by timber harvesting is preferable. Habitat requirements include suitable den sites such as hollow logs, tree hollows, rock outcrops or caves. Individuals require an abundance of food, such as birds and small mammals, and large areas of relatively intact vegetation through which to forage. Home ranges are estimated to be 620–2,560 ha for males and 90–650 ha for females (DoEE 2018).	1	2019	Low	The subject land contains highly fragmented vegetation and is unlikely to support the species. One previous record within the locality nearly 20 km to the south from 2019.
Mammalia	Miniopterus orianae oceanensis	Large Bent-winged Bat	V	-	-	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Maternity caves have very specific temperature and humidity regimes. Hunt in forested areas, catching moths and other flying insects above the tree tops.	78	2023	Moderate	No caves, tunnels, culverts or other structure known or suspected to be used for breeding were identified within the subject land, or within 100 m of the subject land. However, derelict buildings do occur within the subject land which may provide sub-optimal roosting habitat for the species. It is considered unlikely the species would be breeding in these structures given the very specific temperature and humidity regimes required for the species. Furthermore there are large areas of more suitable breeding and forested foraging habitat within the broader landscape.
Mammalia	Myotis macropus	Southern Myotis	V	-	-	Generally roost in groups of 10-15 close to water in caves, mine shafts, hollow-bearing trees, stormwater channels, buildings, wharves, bridges and dense foliage. Forage over streams and pools catching insects and small fish by raking their feet across the water surface.			Moderate	The subject land contains a number of farm dams which are 3m or wider. Derelict buildings do occur within the subject land which may provide sub-optimal roosting for the species. It is considered unlikely the species would be breeding in these structures given the large areas of more suitable breeding habitat within the broader landscape. One previous record within the locality from 2006, approximately 20 km south-east of the subject land.

Family	Scientific name	Common name	BC Act status	EPBC Act status	FM Act	Habitat association	Number of records	Most recent record	Likelihood of occurrence	Justification
Mammalia	Nyctophilus corbeni	Corben's Long-eared Bat	-	V	-	Inhabits a variety of vegetation types, including mallee, Bull Oak 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. A slow flying agile bat, utilising the understorey to hunt non-flying prey - especially caterpillars and beetles - and will even hunt on the ground.	3	2024	Low	The subject land does not contain suitable habitat for breeding. Wooded areas outside of the subject land occur as smaller patches and are unlikely to be used for foraging, however these areas will be retained regardless. Three previous records within the locality associated with the large areas of bushland approximately 10 km to the east of the subject land
Mammalia	Petaurus norfolcensis	Squirrel Glider	V	-	-	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey. Require abundant tree hollows for refuge and nest sites.	11	2023	Low	Potential foraging trees occur within the canopied areas of PCT 281 outside of the subject land, which are to be retained. This habitat is small and highly fragmented being surrounded by large areas of open grassland and therefore does not provide suitably connected habitat for this species. Areas of DNG for PCT 281 within the subject land do not provide habitat for this species.
Mammalia	Petrogale penicillata	Brush-tailed Rock-wallaby	E	V	-	Occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. Browse on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees.			Low	The subject land is located approximately 1.5 km north of the ridgeline to the south, and the species is unlikely to utilise the pastures or native woodland patches surrounding this ridgeline due to the isolated and degraded condition of these vegetation zones within the subject land. This habitat is highly fragmented and does not provide suitably connected foraging habitat.
Mammalia	Phascogale tapoatafa	Brush-tailed Phascogale	V	-	-	The Brush-tailed Phascogale has a patchy distribution around the coast of Australia. In NSW it is mainly found east of the Great Dividing Range although there are occasional records west of the divide. Prefer dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter. Also inhabit heath, swamps, rainforest and wet sclerophyll forest. Agile climber foraging preferentially in rough barked trees of 25 cm DBH or greater.			Low	Potential foraging trees occur within the canopied areas of PCT 281, outside of the subject land, which are to be retained. This habitat is nonetheless small and highly fragmented being surrounded by large areas of open grassland and therefore does not provide suitably connected habitat for this species. Areas of DNG for PCT 281 do not provide habitat for this species. No previous records within the locality.
Mammalia	Phascolarctos cinereus	Koala	E	E	-	The Koala inhabits eucalypt woodlands and forests and feeds on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species (OEH 2018). Large populations of koalas occur on the western slopes and plains, in particular the Pilliga region (Kavanagh and Barrott 2001) and in Gunnedah (Smith 1992) and Walgett LGAs (J. Callaghan, Australian Koala Foundation, pers. comm.). Primary feed trees within the Western Slopes and Plains Koala Management Area (KMA) are River Red Gum (E. camalduensis) and Coolabah (E. coolabah).	9	2024	Low	It is considered unlikely the species would use the wooded areas within the study area given the areas are small, isolated patches, surrounded by open grassland, nonetheless these areas will not be impacted as they are outside of the subject land. Scats were recorded during the approved project surveys approximately 2.5km west of the subject land. Nine previous records including two records from 2024 approximately 8km south-east of the subject land.
Mammalia	Pseudomys novaehollandiae	New Holland Mouse	-	V	-	Found from coastal areas and up to100 km inland on sandstone country. Known to inhabit a range of habitats including open heathland, open woodland with a heathland understory and vegetated sand dunes. Soil type may be an important indicator of suitability of habitat with deeper top soils and softer substrates being preferred for digging burrows. Other factors such as slope, geology and the amount of sun received in an area may also influence site selection.			Negligible	Unlikely to occur as the required habitat type, heathland understorey, does not occur within the subject land. No previous records within the locality.
Mammalia	Pteropus poliocephalus	Grey-headed Flying-fox	V	V	-	Grey-headed Flying foxes 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 are commonly found in gullies, close to water, in vegetation with a dense canopy.	1	2022	Low	No camps were observed within the subject land. The closest camp is located in Wellington, approxiamtley 60km south-west. Only one previous record in the locality.
Mammalia	Saccolaimus flaviventris	Yellow-bellied Sheathtail Bat	V	-	-	Roosts singly or in groups up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees.	8	2020	Low	No tree hollows were identified within the subject land. However, derelict buildings do occur which may provide sub-optimal roosting habitat for the species. It is considered unlikely the species would be breeding in these structures given the large areas of more suitable breeding and foraging habitat within the broader landscape. There are eight previous local records for the species, the most recent from 2020 approximately 11 km to the east.
Reptilia	Aprasia parapulchella	Pink-tailed Legless Lizard	V	V	-	The Pink-tailed Legless Lizard is only known from the Central and Southern Tablelands, and the South Western Slopes. The species inhabits sloping, open woodland areas with predominantly native grassy ground layers, particularly those dominated by Kangaroo Grass (Themeda australis). The species occurs in woodland with sandstone outcrops preferring ridges, buffs and slopes with a north west aspect. Thermally suitable microhabitat may be a limiting resource for the species (DoEE 2018). Sites are typically well-drained, with rocky sandstone outcrops or scattered, partially-buried rocks. The species is 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 (OEH 2018). The species has not been recorded within the locality.			Low	Subject land does not contain suitable rocky habitat. No previous records in locality.
Reptilia	Varanus rosenbergi	Rosenberg's Goanna	V	-		Rosenberg's Goanna occurs on the Sydney Sandstone in Wollemi National Park to the north-west of Sydney, in the Goulburn and ACT regions and near Cooma in the south. There are records from the South West Slopes near Khancoban and Tooma River. Also occurs in South Australia and Western Australia. Found in heath, open forest and woodland. Associated with termites, the mounds of which this species nests in; termite mounds are a critical habitat component. Shelters in hollow logs, rock crevices and in burrows, which they may dig for themselves, or they may use other species' burrows, such as rabbit warrens.			Low	Subject land does not contain suitable termite nests or rocky habitat. No previous records in locality.
Threatened ecological community	Central Hunter Valley eucalypt forest and woodland	Central Hunter Valley eucalypt forest and woodland	E	CE	-	The ecological community occurs in the Hunter Valley region (primarily in the Central Hunter). The Hunter Valley region is mostly in the north east of the Sydney Basin IBRA1 Bioregion (SYB). The Hunter Valley region and the ecological community both continue to the north east, into the NSW North Coast IBRA Bioregion. The canopy of the ecological community is dominated by one or more of the following four eucalypt species: *Eucalyptus crebra* (narrow-leaved ironbark), *Corymbia maculata* (syn. *E. maculata*) (spotted gum), *E. dawsonii* (slaty gum) and *E. moluccana* (grey box).			Negligible	Subject land has undergone vegetation mapping. This TEC does not occur within the subject land.
Threatened ecological community	Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	E	E	-	Coolibah – Black Box Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain and Mulga Lands Bioregions. Eucalyptus coolabah (Coolibah) is typically the dominant or subdominant tree species. and it may occur with or without *Acacia stenophylla* (River Cooba), *Acacia salicina* (Cooba), *Casuarina cristata* (Belah), *Eremophila bignoniiflora* (Eurah), *Eucalyptus largiflorens* (Black Box), *Eucalyptus camaldulensis* (River Red Gum) and *Eucalyptus populnea subsp. bimbil* (Bimble Box).			Negligible	Subject land has undergone vegetation mapping. This TEC does not occur within the subject land.
Threatened ecological community	Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	E	E	-	The Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia ecological community occupies a position in the landscape that is transitional between the temperate woodlands and forests of the lower slopes and tablelands of south-eastern Australia, and the semi-arid communities further inland. A tree canopy dominated by *Eucalyptus microcarpa* (Grey Box) is typically present.			Known	Subject land has undergone vegetation mapping. This TEC does not occur within the subject land.
Threatened ecological community	Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	-	CE	-	The Natural Grasslands on basalt and fine-textured alluvial plains of northern NSW and southern Queensland ecological community may be recognised by a distribution mainly in the Darling Downs of southern Queensland and the Liverpool Plains and Moree Plains of northern NSW. Occurrence is mainly associated with fine textured, often cracking clay soils derived from either basalt or alluvium. Occurrence on landforms that are typically flat to very low slopes (less than 5 percent/1 degree). Natural grasslands on basalt and fine-textured alluvial plains of northern NSW and southern Qld. Tree canopy usually absent to sparse, comprising less than 10% projective crown cover. The ground layer is typically dominated by perennial native grasses.			Negligible	Subject land has undergone vegetation mapping. This TEC does not occur within the subject land.
Threatened ecological community	Weeping Myall Woodlands	Weeping Myall Woodlands	E	E	-	Weeping Myall Woodlands occur in a range of forms from open woodlands to woodlands, in which weeping myall (*Acacia pendula*) trees are the sole or dominant overstorey species. The Weeping Myall Woodlands occurs on the inland alluvial plains west of the Great Dividing Range in NSW and QLD. It occurs in the Riverina, NSW South Western Slopes, Darling Riverine Plains, Brigalow Belt South, Murray-Darling Depression, Nandewar and Cobar Peneplain Interim Biogeographic Regionalisation for Australia (IBRA) bioregions.			Negligible	No Weeping Myall Woodland occurs within the subject land.
Threatened ecological community	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	CE	CE	-	Box – Gum Grassy Woodlands and Derived Grasslands are characterised by a species-rich understorey of native tussock grasses, herbs and scattered shrubs, and the dominance, or prior dominance, of White Box, Yellow Box or Blakely's Red Gum trees. Also occurs as a grassland.			Known	Subject land contains theTEC.

Appendix E.3

Likelihood of occurrence assessment - BBRS

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11. Assessment of Other Relevant Biodiversity Legislation

11.1. Environment Protection and Biodiversity Conservation Act 1999

Under the bilateral agreement made under Section 45 of the EPBC Act relating to environmental assessment (the bilateral agreement; Department of the Environment; DotE 2020), a proposed action does not require assessment under Part 8 of the EPBC Act, if the action is to be assessed under Part 4 Division 4.1 or Part 5.1 of the EP&A Act, provided the assessment:

- contains an assessment of all impacts the action has on each MNES (which will be specifically included in our Biodiversity Development Assessment Report)
- contains enough information about the controlled action and its relevant impacts to allow the Commonwealth Minister to make an informed decision whether or not to approve the action
- addresses all matters outlined in Schedule 4 of the *Environment Protection and Biodiversity Conservation Regulations 2000* (EPBC Regs; DotE 2000).

Under the Amending Agreement No1 issued on 24 March 2020 between the NSW and Australian Governments, the bilateral agreement will now apply to State Significant Development assessments carried out under the BAM and would apply to the assessment phase of the project. The Commonwealth would still retain authority to issue their own approval under the bilateral agreement.

11.1.1. Matters of National Significance

The protected matters search tool (PMST) was used at Project conception and at multiple times throughout the field assessments with the latest search conducted on the 29 April 2025. The PMST predicted that:

- two threatened communities
- 38 threatened terrestrial species
- eight migratory species.

One TEC listed under the EPBC Act were predicted to occur. PCT 277 and 281 are associated with *White-Box- Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*. This community was not found to occur within the Development Footprint as the vegetation identified did not meet the condition threshold required for this community.

Thirty-eight threatened species listed under the EPBC Act were predicted to occur within the BBRS Study Area:

- 21 species of birds
- five mammals
- one reptile
- nine plants.

Of these species, none listed under the EPBC Act were recorded during surveys.

Eight migratory species listed under the EPBC Act were predicted to occur. Six of the species were wetland or marine dependent species and were unlikely to occur within the BBRS Study Area. None of these species were recorded as being present within the BBRS Study Area.

Two migratory species were considered to have moderate likelihood of occurrence: *Hirundapus caudacutus* (White throated Needletail) and *Apus pacificus* (Fork-tailed Swift). Five threatened species were also considered likely to occur based on regional information. An impact assessment for these species has been completed (Table 11-1).

Table 11-1: Assessment of MNES under the EPBC Act

MNES	Occurrence	Significant assessment
Threatened ecological communities	No EPBC listed communities were recorded within the Study Area	NA
Threatened species	The following species were considered to have potential to occur: • *Hirundapus caudacutus* (White-throated Needletail) - Vulnerable • *Nyctophilus corbeni* (Corben's Long-eared Bat) -Vulnerable • *Climacteris picumnus* (Brown Treecreeper) - Vulnerable • *Stagonopleura gut*tata (Diamond Firetail) - Vulnerable • *Chalinolobus dwyeri* (Large-eared Pied Bat) - Endangered • *Anthochaera phrygia* (Regent Honeyeater) – Critically Endangered	Significant impact unlikely
Migratory species	Two migratory species have the potential to occur: • *Hirundapus caudacutus* (White-throated Needletail) • *Apus pacificus* (Fork-tailed Swift)	Significant impact unlikely

Significant impact assessments have been completed for the above species and included in Appendix 9 and are summarised in Table 11-2 below.

Table 11-2: Summary of MNES

Name of MNES	Nature and Consequence of impact	Duration of impact	Quantum of impact (ha)	Comments	Significance?
Regent Honeyeater	Indirect	Permanent	1.95	The proposal will remove 1.95 ha of potential foraging woodland and regenerating woodland habitat. This area has been subject to previous disturbance and is not an important mapped area for the Regent Honeyeater. Therefore, it is unlikely to reduce the AOO for this species. No individuals were observed or have been recorded within the BBRS Study Area, with closest recordings at Cope State Forest, 7 km southeast and north of Goodman State Conservation Area, approximately 17 km west of the BBRS Study Area. *Species will be offset under Ecosystem credits	Not significant
Fork-tailed Swift	Indirect / Direct	Permanent	2.85	The BBRS Road upgrade will remove up to 2.85 ha of suitable foraging habitat. No individuals were observed across multiple field surveys and it is unlikely that this disturbance will lead to a long-term decrease in the size of an important population of a species considering potential habitat is only likely to constitute fly-over habitat.	Not significant
Large-eared Pied Bat	Indirect /Direct	Permanent	2.85	There is no loss of breeding areas within the Development Footprint but there is the potential for loss of foraging area due to the loss of native vegetation (up to 2.85 ha). However, this species feeds on insects in flight and there are areas of woodland and DNG adjacent to the development site to support insects. *Species will be offset under Ecosystem Credits	Not significant
Brown Treecreeper	Direct	Permanent	1.95	Approximately 1.95 ha of the current Development Footprint contains woodland vegetation which may be considered suitable foraging habitat for this species. The Brown Treecreeper should still be able to use the broader landscape after construction of the Project. *Species will be offset under Ecosystem Credits	Not significant
White-throated Needletail	Direct	Permanent	2.85	This species is aerial and is unlikely to use the BBRS Study Area for roosting. No individuals were recorded within the BBRS Study Area, however, there have been recent records in the broader landscape. The species was recorded above Merotherie Road near the Talbragra River, 3.6 km north of the Birriwa Bus Route	Not significant

Name of MNES	Nature and Consequence of impact	Duration of impact	Quantum of impact (ha)	Comments	Significance?
				South intersection. In February 2003, individuals were recorded approximately 16 km northwest near Birriwa.	
Corben's Long-eared Bat	Direct / indirect	Permanent	1.95	The species occurs throughout much of inland NSW with the Pilliga scrub region a distinct stronghold for this species. It is difficult to separate the call of this species from others that call within the same range and based on its potential to exist in the locality the species was deemed likely to be present. The species is found in a wide range of inland woodland vegetation communities, including Box Gum Woodland. The BBRS Road upgrade will remove 1.95 ha woodland habitat which could potentially be used by the species, however, as there are other areas of trees adjacent to the Development Footprint, the road upgrade is unlikely to significantly impact the species.	Not significant
Diamond Firetail	Direct	Permanent	2.85	This species feeds on seeds from a variety of native grasses and pasture species and uses woodland for shelter and roosting therefore the BBRS Road upgrade has the potential to remove of up 2.85 ha of habitat. No individuals were recorded within the BBRS Study Area however there are numerous records north of Ulan, near Tallawang and south of Stubbo. The BBRS Road upgrade is unlikely to significantly impact the species due to the considerable foraging habitat that will be retained within the broader landscape. *This species will be offset under Ecosystem Credits	Not significant

Appendix E.4
Assessments of significance

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Appendix 9: EPBC Statement of Significance

Regent Honeyeater (*Anthochaera phrygia*) – Critically Endangered

The Commonwealth Conservation Advice for Regent Honeyeater (DE 2015) describes the conservation status, distribution, biology, ecology and threats to the survival of the species.

No areas of Important Habitat Mapping overlap with the Project Site. The species is most commonly associated with box-ironbark eucalypt woodlands and dry sclerophyll forest. It is also known to occur within riparian vegetation such as Yellow Box and *Casuarina* spp. where it feeds on mistletoe.

Criteria	Discussion
Lead to a long-term decrease in size of a population	The proposed development will remove up to 1.95 ha of suitable woodland, for the Regent Honeyeater. It is considered unlikely that this disturbance will lead to a long-term decrease in size of a population, considering the Study Area is not located in an important mapped area for the Regent Honeyeater. Suitable habitat within the Study Area is only likely to constitute fly-over habitat.
Reduce the area of occupancy of the species	The Area of Occupancy (AOO) for the Regent Honeyeater is estimated to be 300 km^2 (DE 2015). The proposal will remove up to 1.95 ha of potential foraging habitat. This area has been subject to previous disturbance and is not an important mapped area for the Regent Honeyeater. Therefore, it is unlikely to reduce the AOO for this species.
Fragment an existing population into two or more populations	The Regent Honeyeater is highly mobile and capable of long-distance movements, therefore not considered highly susceptible to fragmentation. The Project is considered unlikely to fragment any existing populations of the Regent Honeyeater.
Adversely affect habitat critical to the survival of a species	Conservation advice for the Regent Honeyeater (DE 2015) does not specify habitat critical to the survival of the species. However, the OEH (2024) species profile highlights temperate woodlands and riparian forests as important breeding habitats, with flowering eucalypts—particularly Mugga Ironbark, Swamp Mahogany, White Box, and Yellow Box—identified as key food sources. While the Project is unlikely to impact potential breeding habitat, it will result in the removal of important feed trees from 1.95 ha of Box Gum Woodland. Based on this, suitable habitat is present in the Study Area and there is potential for Regent Honeyeaters to forage here sporadically. However, the Study Area is not mapped under the important mapped areas for Regent Honeyeaters, majority of the proposed impact area will be on predominately cleared land, and higher quality habitat extends around and well beyond the Development Footprint. Therefore, it is considered unlikely that the proposed works will adversely affect habitat critical to the survival of a species
Disrupt the breeding cycle of a population	The Development Footprint does not occur within any known key breeding areas for these species. Therefore, the proposed works will not disrupt the breeding cycle.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The disturbance to potential habitat is considered unlikely to significantly impact the availability or quality of habitat to the extent that the species is likely to decline considering the Development Footprint has predominantly been cleared. Additionally, suitable, higher-quality habitat is available in the wider landscape.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or	Weeds and noisy miners are key invasive threats to the Regent Honeyeater (DE 2015), causing habitat degradation and competition for resources. To prevent facilitation of weed establishment or spread within retained native vegetation areas, weed hygiene protocols will be implemented. The agricultural landscape is already frequently

Criteria	Discussion
critically endangered species' habitat	inhabited by Noisy Miners and it is unlikely that the Project will increase their presence such that they will impact Regent Honeyeaters.
Introduce disease that may cause the species to decline	No threats from disease are listed within the conservation advice for this species (DE 2015). In lieu of this and the context of the proposal, it is considered unlikely that the proposal would introduce or exacerbate any disease that may cause the species to decline
Interfere with the recovery of the species	The National Recovery Plan for Regent Honeyeaters aims to: • reverse the long-term population trend of decline and increase the numbers of Regent Honeyeaters to a level where there is a viable, wild breeding population, even in poor breeding years; and to • enhance the condition of habitat across the Regent Honeyeaters range to maximise survival and reproductive success and provide refugia during periods of extreme environmental fluctuation. Impacts to these objectives are marginal given the removal of 1.95 ha of Box Gum Woodland, is likely to decrease the condition of Regent Honeyeater habitat. However, the habitat proposed to be removed is predominately cleared land with scattered trees that have been and still are used for farming and grazing practices. Efforts to minimise direct impacts to suitable habitat throughout the project site have been made during design of the proposed works. Where possible, cleared areas will be utilised to minimise the increased width required for the BBRS road upgrade and therefore minimise impact to potential Regent Honeyeater habitat.
Conclusion	The proposed development is unlikely to have a significant impact on this species

Fork-tailed Swift (*Apus pacificus*) – Vulnerable

Fork-tailed Swifts are non-breeding migrants from Asia with a widespread distribution and occupancy of a broad range of habitats. No individuals were observed during the bird surveys across the Study Area taken across multiple seasons and over multiple years. It is exclusively aerial.

Criteria	Discussion
Lead to a long-term decrease in the size of an important population of a species	The Project will remove up to 2.85 ha of suitable woodland and grassland habitat. No individuals were observed across multiple field surveys and it is unlikely that this disturbance will lead to a long-term decrease in the size of an important population of a species considering potential habitat is only likely to constitute fly-over habitat.
Reduce the area of occupancy of an important population	The proposal will remove up to 2.85 ha of potential habitat of which 0.73 ha is DNG. It is unlikely that there will be a significant reduction in the AOO for this species given all the farmland that will be retained in the surrounding landscape. The species will still be able to use the Study Area after construction of the Project
Fragment an existing important population into two or more populations	Considering that the Fork-tailed Swift is highly mobile, migratory and capable of long-distance movements, it is unlikely that this species is susceptible to fragmentation. Therefore, it is unlikely the proposed development will fragment an existing important population into two or more populations.
Adversely affect habitat critical to the survival of a species	The Development Footprint is unlikely to contain habitat critical to the survival of this species, considering that it is almost exclusively aerial.
Disrupt the breeding cycle of an important population	The Development Footprint does not occur within any known key breeding areas for this species, and it is considered a non-breeding visitor to Australia. Therefore, the

Criteria	Discussion
	proposed works will not disrupt the breeding cycle of an important population of this species.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The removal of up 2.85 ha of potential habitat is considered unlikely to significantly impact the availability or quality of habitat to the extent that the species is likely to decline considering the Development Footprint has predominantly been cleared. Additionally, suitable, higher-quality habitat is available in the wider landscape.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Invasive weeds and feral animals are already present in the Project Site and therefore are unlikely to be introduced as a result of the proposed development. The spread of invasive weeds will be controlled during pre-construction works and throughout construction.
Introduce disease that may cause the species to decline, or	The proposed development is unlikely to introduce disease that may cause the species to decline.
Interfere substantially with the recovery of the species.	There is currently no National Recovery Plan for the Fork-tailed Swift. The proposed development is unlikely to interfere substantially with the recovery of this species.
Conclusion	The proposed development is unlikely to have a significant impact on this species.

Large-eared Pied bat (*Chalinolobus dwyeri*) – Vulnerable

The Conservation Advice for Large-eared Pied Bat (DCCEEW 2023a) describes the conservation status, distribution, biology, ecology and threats to the survival of the species. This species is found mainly in areas with extensive caves and cliffs which do not occur within the Study Area and therefore breeding habitat will not be impacted by the Project. However, there are clifflines and potential caves that occur within 2 km from the Study Area and the species was recorded foraging within the Study Area.

Criteria	Discussion
Lead to a long-term decrease in the size of an important population of a species	There is no loss of breeding areas within the Study Area but there is the potential for loss of foraging area due to the loss of native vegetation (up to 2.85 ha). However, this species feeds on insects in flight and there is large tracts of woodland and DNG to support insects. Offset credits under the NSW BOS have been calculated for this species.
Reduce the area of occupancy of an important population	The Project will remove up to 2.85 ha of potential foraging habitat.
Fragment an existing important population into two or more populations	Considering that the Large-eared Pied Bat is highly mobile, migratory and capable of long-distance movements, it is unlikely that this species is susceptible to fragmentation. Therefore, it is unlikely the proposed development will fragment an existing important population into two or more populations.
Adversely affect habitat critical to the survival of a species	The Study Area does not contain habitat critical to the survival of this species, there are no caves or cliffs within the Study Area that will be impacted by the Project.
Disrupt the breeding cycle of an important population	The Study Area does not occur within any known breeding areas for this species, as there are no caves, cliffs or crevices suitable for breeding within the Study Area. Therefore, the proposed works will not disrupt the breeding cycle of an important population of this species.
Modify, destroy, remove or isolate or decrease the availability or	The removal of up 2.85 ha of potential foraging habitat is considered unlikely to significantly impact the availability or quality of habitat to the extent that the species

Criteria	Discussion
quality of habitat to the extent that the species is likely to decline	is likely to decline. Additionally, suitable, higher-quality habitat is available in the wider landscape.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Invasive weeds and feral animals are already present in the Study Area and therefore are unlikely to be introduced as a result of the Project. The spread of invasive weeds will be controlled during pre-construction works and throughout construction.
Introduce disease that may cause the species to decline, or	The proposed development is unlikely to introduce disease that may cause the species to decline.
Interfere substantially with the recovery of the species.	The National Recovery Plan for large-eared Pied Bats include: • Identify priority roost and maternity sites, • Implement conservation and management strategies for priority sites, • Educate the community and industry to understand the Large-eared Pied Bat, • Research the Large-eared Pied Bat to augment biological and ecological data, • Determine metapopulation dynamics throughout the distribution of the Large-eared Pied bat, The proposed development is unlikely to interfere substantially with these recovery objectives.
Conclusion	The proposed development is unlikely to have a significant impact on this species.

Brown Treecreeper (*Climacteris picumnus*) – Vulnerable

The Conservation Advice for Brown Treecreeper (DCCEEW 2023c) describes the conservation status, distribution, biology, ecology and threats to the survival of the species. Individuals were not observed within the Study Area but are known to be present in the broader landscape in association with dry open eucalypt forests and woodlands.

Criteria	Discussion
Lead to a long-term decrease in the size of an important population of a species	It is considered unlikely that the disturbance of 1.95 ha of potential woodland habitat would constitute an impact that would lead to a long-term decrease in the size of the important population given the abundance of habitat adjacent to the Study Area. Mitigation measures such as preclearance surveys will be conducted prior to tree removal to avoid direct impacts to any Brown Treecreeper which may be nesting in hollows within the Development Footprint.
Reduce the area of occupancy of an important population	Approximately 1.95 ha of the Development Footprint contains vegetation which may be considered suitable foraging habitat for this species, ie woodland areas with trees and large woody debris. Brown Treecreeper will be able to use the retained woodland areas within the Environmental Exclusion zones and areas within the broader landscape after construction of the Project and therefore the AOO of an important population will not be reduced.
Fragment an existing important population into two or more populations	Brown Treecreepers are highly territorial and prefer to remain within a set range year-round, making them susceptible to fragmentation. However, no individuals were recorded during multiple bird surveys within the Study Area, indicating that the species is unlikely to occur there. The Study Area has been significantly altered by cropping and grazing, with large woody debris removed, further reducing potential habitat. Given the already fragmented nature of the landscape, the Project is unlikely to cause additional fragmentation of any existing populations of the Brown Treecreeper.

Criteria	Discussion
Adversely affect habitat critical to the survival of a species	Habitat critical to the survival of the Brown Treecreeper includes areas that have: • relatively undisturbed grassy woodland with native understorey. • large living and dead trees which are essential for roosting and nesting sites and for foraging; • fallen timber which provides essential foraging habitat and; • hollows in standing dead or live trees and tree stumps are also essential for nesting. The Study Area contains suitable limited foraging habitat for this species in the form of fallen timber, leaf litter and grass tussocks within eucalypt woodlands, 1.95 ha of this will be removed. However, this species is mobile, and a large expanse of continuous and suitable habitat is available in the areas surrounding the Study Area. It is therefore unlikely that the proposed works would affect habitat critical to the survival of a species.
Disrupt the breeding cycle of an important population	Areas within the Study Area provide limited foraging and breeding habitat. This species breeds from July to February across its range in pairs or breeding groups of two to five individuals. Mitigation measures such as pre-clearance surveys to ensure the Brown Treecreeper is not present within the subject land prior to vegetation removal will be in place to avoid direct impacts to this species, potentially during the breeding season.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The loss of habitat is unlikely to significantly impact the Brown Treecreeper, as the majority of the impact area is already heavily cleared. Woodland patches will be retained within the Study Area, which is expected to continue providing limited foraging and breeding resources, though these are marginal at best. A substantial reduction in habitat quality or availability that would lead to a decline in the species is not anticipated as a result of the proposed works.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Brown Treecreepers face threats from predation by introduced mammals, exclusion by Noisy Miners, and habitat degradation caused by invasive weeds (DCCEEW 2023c). To mitigate weed establishment and spread within retained vegetated areas, hygiene procedures will be implemented. Furthermore, the presence and extent of feral predators and Noisy Miners are not expected to increase, as the land is already largely cleared and they are both already present.
Introduce disease that may cause the species to decline, or	No threats from disease are listed within the conservation advice for this species (DCCEEW 2023c). In lieu of this and the context of the proposal, it is considered unlikely that the proposal would introduce or exacerbate any disease that may cause the species to decline.
Interfere substantially with the recovery of the species.	The primary conservation and recovery outcome for the Brown Treecreeper is to stabilise or increase populations observed across the range. Given the above factors, the proposed works will not interfere substantially with recovery of the species.
Conclusion	The proposed development is unlikely to have a significant impact on this species.

White-throated Needletail (*Hirundapus caudacutus*) – Vulnerable

The Conservation Advice for White-throated Needletail (TSSC 2019) describes the conservation status, distribution, biology, ecology and threats to the survival of the species. No individuals were observed during bird surveys. The species is migratory breeding in Asia and is exclusively aerial.

Criteria	Discussion
Lead to a long-term decrease in the size of an important population of a species	The Project will remove up to 2.85 ha of suitable woodland, grassland and open farmland habitat. No individuals were observed across multiple field surveys and it is unlikely that this disturbance will lead to a long-term decrease in the size of an important population of a species considering potential habitat is only likely to constitute fly-over habitat.
Reduce the area of occupancy of an important population	The proposal will remove up to 2.85 ha of potential habitat of which 0.75 ha is DNG. It is unlikely that there will be a significant reduction in the AOO for this species given all the farmland that will be retained in the surrounding landscape. The species will still be able to use the Study Area after construction of the Project.
Fragment an existing important population into two or more populations	Considering that the specie is highly mobile, migratory and capable of long-distance movements, it is unlikely that this species is susceptible to fragmentation. Therefore, it is unlikely the proposed development will fragment an existing important population into two or more populations.
Adversely affect habitat critical to the survival of a species	The Study Area is unlikely to contain habitat critical to the survival of this species, considering that it is almost exclusively aerial. No critical habitat has been defined under section 207A of the EPBC Act. In Australia, this species is known to forage aerially, above habitats ranging from heavily treed forests to open habitats however they occasionally feed much closer to the ground in open habitats. Roosting habitat for this species consists of trees in forests and woodlands, both among dense foliage in the canopy or in hollows. The Project is unlikely to endanger the long-term survival of the species within the broader area given the potential habitat within the locality.
Disrupt the breeding cycle of an important population	The Study Area does not occur within any known key breeding areas for this species, and it is considered a non-breeding visitor to Australia. Therefore, the proposed works will not disrupt the breeding cycle of an important population of this species.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The removal of up 2.85 ha of potential habitat is considered unlikely to significantly impact the availability or quality of habitat to the extent that the species is likely to decline considering the Study Area has predominantly been cleared. Additionally, suitable, higher-quality habitat is available in the wider landscape.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Invasive weeds and feral animals are already present in the Project Site and therefore are unlikely to be introduced as a result of the proposed development. The spread of invasive weeds will be controlled during pre-construction works and throughout construction.
Introduce disease that may cause the species to decline, or	The proposed development is unlikely to introduce disease that may cause the species to decline.
Interfere substantially with the recovery of the species.	There is currently no National Recovery Plan for the White-throated Needletail. The proposed development is unlikely to interfere substantially with the recovery of this species.
Conclusion	The proposed development is unlikely to have a significant impact on this species.

Corben's Long-eared Bat (*Nyctophilus corbeni*) - Vulnerable

The Conservation Advice for Corben's Long-eared Bat (TSSC 2015) describes the conservation status, distribution, biology, ecology and threats to the survival of the species.

Criteria	Discussion
Lead to a long-term decrease in the size of an important population of a species	The species occurs throughout much of inland NSW with the Pilliga scrub region a distinct stronghold for this species. It is difficult to separate the call of this species from others that call within the same range and based on its potential to exist the species was deemed likely to be present. The species is found in a wide range of inland woodland vegetation communities including Box-Ironbark woodlands (TSSC 2015) which are found within the Study Area. The Project will remove up to 1.95 ha of potential woodland habitat. However, given the amount of habitat that will be retained within the Study Area, the Project is unlikely to lead to a long-term decrease in the size of an important population.
Reduce the area of occupancy of an important population	Due to lack of data, it is difficult to predict population decline, however, AOO is declining due to habitat loss. The Project will remove up to 1.95 ha of potential habitat. There will be woodland habitat retained within the Study Area and not impacted by the Project so therefore the Project is unlikely to reduce the area of occupancy for this species.
Fragment an existing important population into two or more populations	Due to the highly mobile nature of the Corben's Long-eared Bat, the Project is unlikely to fragment the bat subpopulation into two separate populations.
Adversely affect habitat critical to the survival of a species	Habitat critical to the survival of Corben's Long-eared Bat is divided into breeding, and foraging. A variety of suitable tree hollows, particularly stags, is required for roosting within a cluttered shrubby woodland. This habitat exists within the Development Footprint (1.95ha). The amount and quality of habitat to be removed is considered unlikely to endanger the long-term survival of the species, especially considering the high amount of potential habitat within the surrounding locality.
Disrupt the breeding cycle of an important population	Due to the highly mobile nature of Corben's Long-eared Bat, the Project is unlikely to disrupt the breeding cycle of an important population.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The disturbance of 1.95 ha of potential woodland habitat is unlikely to result in the decline of this species given that it is highly mobile, and that a large portion of this habitat will remain adjacent to the Development Footprint.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The Project is unlikely to result in the introduction or spread of invasive species that are harmful to Corben's Long-eared Bat.
Introduce disease that may cause the species to decline, or	The proposed development is unlikely to result in the introduction of disease that may cause the species to decline.
Interfere substantially with the recovery of the species.	There is no National Recovery Plan for Corben's Long-eared bat however, NSW has a Priority Action Statement which aims to increase population size through: • retention of largest hollow bearing trees including standing dead trees, • research bat ecology, dispersal, habitat requirements effects of fragmentation, and impacts of fire, • encourage protection and management of understory vegetation. The proposed development may interfere with the recovery of this species, though it is unlikely to be substantial.
Conclusion	The proposed development is unlikely to have a significant impact on this species.

Diamond Firetail (*Stagonopleura guttata*) – Vulnerable

The Conservation Advice for Diamond Firetail (DCCEEW 2023d) describes the conservation status, distribution, biology, ecology and threats to the survival of the species. Individuals were not observed within the Study Area, however they have the potential to be within the broader landscape in association with dry open eucalypt forests, grasslands and woodlands.

Criteria	Discussion
Lead to a long-term decrease in the size of an important population of a species	The removal of up to 2.85 ha of habitat will result from the proposed development. However, it is considered unlikely that this disturbance will lead to a long-term decrease in the size of an important population of a species considering the presence of suitable habitat in the wider landscape.
Reduce the area of occupancy of an important population	The proposal will remove up to 2.85 ha of habitat and is not considered a significant reduction in the AOO for this species and it will still be able to use the Study Area after construction of the Project
Fragment an existing important population into two or more populations	Considering that the Diamond Firetail is highly mobile, migratory and capable of long-distance movements, it is unlikely that this species is susceptible to fragmentation. Therefore, it is unlikely the proposed development will fragment an existing important population into two or more populations.
Adversely affect habitat critical to the survival of a species	Habitat critical to the survival of the Diamond Firetail includes areas of: • Eucalypt, acacia or casuarina woodlands, open forests and other lightly timbered habitats; • Low tree density, few large logs, and little litter cover but high grass cover for foraging, roosting and breeding; • Drooping she-oak (*Allocasuarina verticillata*) within the Mt Lofty Ranges. Critical habitat in the form of Eucalypt woodlands of low tree density occurs within the Study Area (1.95 ha). Given that woodland patches will be retained within the Study Area and scattered trees will be removed it is unlikely that the Project will adversely affect habitat critical to the survival of this species.
Disrupt the breeding cycle of an important population	Although the Study Area contains potential breeding habitat, the proposed development is unlikely to disrupt the breeding cycle of an important population given the presence of suitable breeding habitat in the wider landscape.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The removal of up 2.85 ha of habitat is considered unlikely to significantly impact the availability or quality of habitat to the extent that the species is likely to decline considering the Study Area has predominantly been cleared. Additionally, suitable, higher-quality habitat is available in the wider landscape.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Invasive weeds and feral animals are already present in the Project Site and therefore are unlikely to be introduced as a result of the proposed development. The spread of invasive weeds will be controlled during pre-construction works and during the life of the Project.

Criteria	Discussion
Introduce disease that may cause the species to decline, or	The proposed development is unlikely to introduce disease that may cause the species to decline.
Interfere substantially with the recovery of the species.	There is currently no recovery plan for the Diamond Firetail, and the proposed development is unlikely to substantially interfere with the recovery of the species.
Conclusion	The proposed development is unlikely to have a significant impact on this species.

Fork-tailed Swift (*Apus pacificus*) – Migratory

Fork-tailed Swifts are non-breeding migrants from Asia with a widespread distribution and occupancy of a broad range of habitats. No individuals were observed during the bird surveys across the Study Area across multiple seasons and over multiple years. It is exclusively aerial.

Criteria	Discussion
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	The removal of up to 2.85 ha of suitable woodland, grassland and open farmland habitat will result from the proposed development. However, it is considered unlikely that this disturbance will lead to a long-term decrease in the size of an important population of a species considering potential habitat is only likely to constitute fly-over habitat. No individuals were observed within the Study Area.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or	Invasive weeds and feral animals are already present in the Study Area and therefore are unlikely to be introduced as a result of the proposed development. The spread of invasive weeds will be controlled during pre-construction works and throughout the life of the Project.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	The Study Area does not occur within any known key breeding areas for this species, and it is considered a non-breeding visitor to Australia. Therefore, the proposed works will not disrupt the breeding cycle of an important population of this species.
Conclusion	The proposed development is unlikely to have a significant impact on this species.

White-throated Needletail (*Hirundapus caudacutus*) – Migratory

The Conservation Advice for White-throated Needletail (TSSC 2019) describes the conservation status, distribution, biology, ecology and threats to the survival of the species. No individuals were observed during bird surveys. The species is migratory breeding in Asia and is exclusively aerial.

Criteria	Discussion
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	The disturbance of 2.85 ha of potential habitat for the White-throated Needletail is unlikely to result in the decline of this species given there are extensive areas of similar habitat present in adjacent lands.

Criteria	Discussion
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or	Invasive weeds and feral animals are already present in the Project Site and therefore are unlikely to be introduced as a result of the proposed development. The spread of invasive weeds will be controlled during pre-construction works and throughout the life of the Project.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	The Study Area does not occur within any known key breeding areas for this species, and it is considered a non-breeding visitor to Australia. Therefore, the proposed works will not disrupt the breeding cycle of an important population of this species. Additionally, no specialised feeding or resting areas were identified within the Study Area.
Conclusion	The proposed development is unlikely to have a significant impact on this species.

Appendix F
Biodiversity credit report

EMM
creating opportunities

BAM Credit Summary Report

Proposal Details

Assessment Id
00046709/BAAS18117/24/00046710

Proposal Name
Birriwa MOD - Additional Lots

BAM data last updated *
05/08/2025

Assessor Name
Philippa Fagan

Report Created
15/12/2025

BAM Data version *
Current classification (live - default) (82)

Assessor Number
BAAS23005

BAM Case Status
Finalised

Date Finalised
15/12/2025

Assessment Revision
5

BOS entry trigger

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

Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion												
1	281_DNG	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	18	18.0	69	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	778

2	281_Woodland	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	41.6	41.6	0.35	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	9
											Subtotal	**787**
											Total	**787**

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

Chalinolobus dwyeri / Large-eared Pied Bat (Fauna)									
281_DNG	18.0	18.0	43.1	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Endangered	Endangered	True	583
281_Woodland	41.6	41.6	0.05	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Endangered	Endangered	True	2
								Subtotal	**585**
Myotis macropus / Southern Myotis (Fauna)									
281_DNG	18.0	18.0	53.1	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	479
281_Woodland	41.6	41.6	0.07	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	1
								Subtotal	**480**
Tyto novaehollandiae / Masked Owl (Fauna)									
281_Woodland	41.6	41.6	0.11	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	2
								Subtotal	**2**

Vespadelus troughtoni / Eastern Cave Bat (Fauna)									
281_DNG	18.0	18.0	43.1	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	True	583
281_Woodland	41.6	41.6	0.05	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	True	2
								Subtotal	**585**

BAM Credit Summary Report

Proposal Details

Assessment Id
00046709/BAAS22017/25/00057713

Proposal Name
Birriwa MOD - Bus Route South

BAM data last updated *
05/08/2025

Assessor Name
Philippa Fagan

Report Created
15/12/2025

BAM Data version *
Current classification (live - default) (82)

Assessor Number
BAAS23005

BAM Case Status
Finalised

Date Finalised
15/12/2025

Assessment Revision
3

BOS entry trigger
BOS Threshold: Area clearing threshold

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

Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion												
2	277_Woodland	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	41.1	41.1	0.57	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	15

4	277_DNG	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	35.8	35.8	0.72	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	16
											Subtotal	**31**

Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion												
1	281_Woodland	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	55.6	55.6	1.4	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	48

3	281_DNG	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	59.1	59.1	0.18	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	7
											Subtotal	**55**
											Total	**86**

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

Myotis macropus / Southern Myotis (Fauna)									
281_Woodland	55.6	55.6	0.73	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	20
277_Woodland	41.1	41.1	0.43	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	9
281_DNG	59.1	59.1	0.18	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	5
277_DNG	35.8	35.8	0.5	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	9
								Subtotal	**43**
Tyto novaehollandiae / Masked Owl (Fauna)									
281_Woodland	55.6	55.6	0.81	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	23
277_Woodland	41.1	41.1	0.22	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	5
								Subtotal	**28**

Australia

SYDNEY
Level 10 201 Pacific Highway
St Leonards NSW 2065
T 02 9493 9500

NEWCASTLE
Level 3 175 Scott Street
Newcastle NSW 2300
T 02 4907 4800

BRISBANE
Level 1 87 Wickham Terrace
Spring Hill QLD 4000
T 07 3648 1200

CANBERRA
Suite 2.04 Level 2
15 London Circuit
Canberra City ACT 2601

ADELAIDE
Level 4 74 Pirie Street
Adelaide SA 5000
T 08 8232 2253

MELBOURNE
Suite 9.01 Level 9
454 Collins Street
Melbourne VIC 3000
T 03 9993 1900

PERTH
Suite 3.03
111 St Georges Terrace
Perth WA 6000
T 08 6430 4800

Canada

TORONTO
2345 Yonge Street Suite 300
Toronto ON M4P 2E5
T 647 467 1605

VANCOUVER
2015 Main Street
Vancouver BC V5T 3C2
T 604 999 8297

CALGARY
700 2nd Street SW Floor 19
Calgary AB T2P 2W2

linkedin.com/company/emm-consulting-pty-limited

emmconsulting.com.au